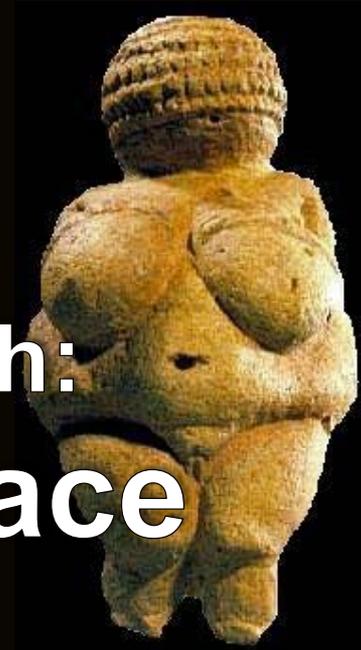


History of Thought: Darwin and Wallace



University of Minnesota Duluth
Tim Roufs

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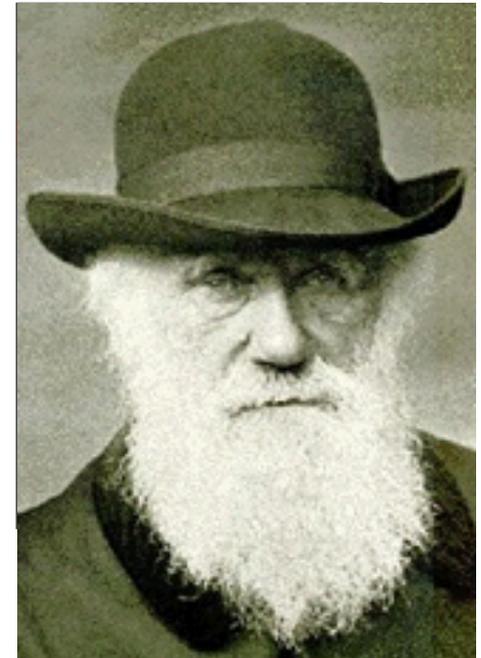
<http://www.d.umn.edu/cla/faculty/troufs/anth1602/>

[↑ to top of page / A-Z index](#)



Charles Lyell

History of Thought to 1859



Charles Darwin

Read: [Ch. 2, "The Development of Evolutionary Theory," pp. 19-36](#)

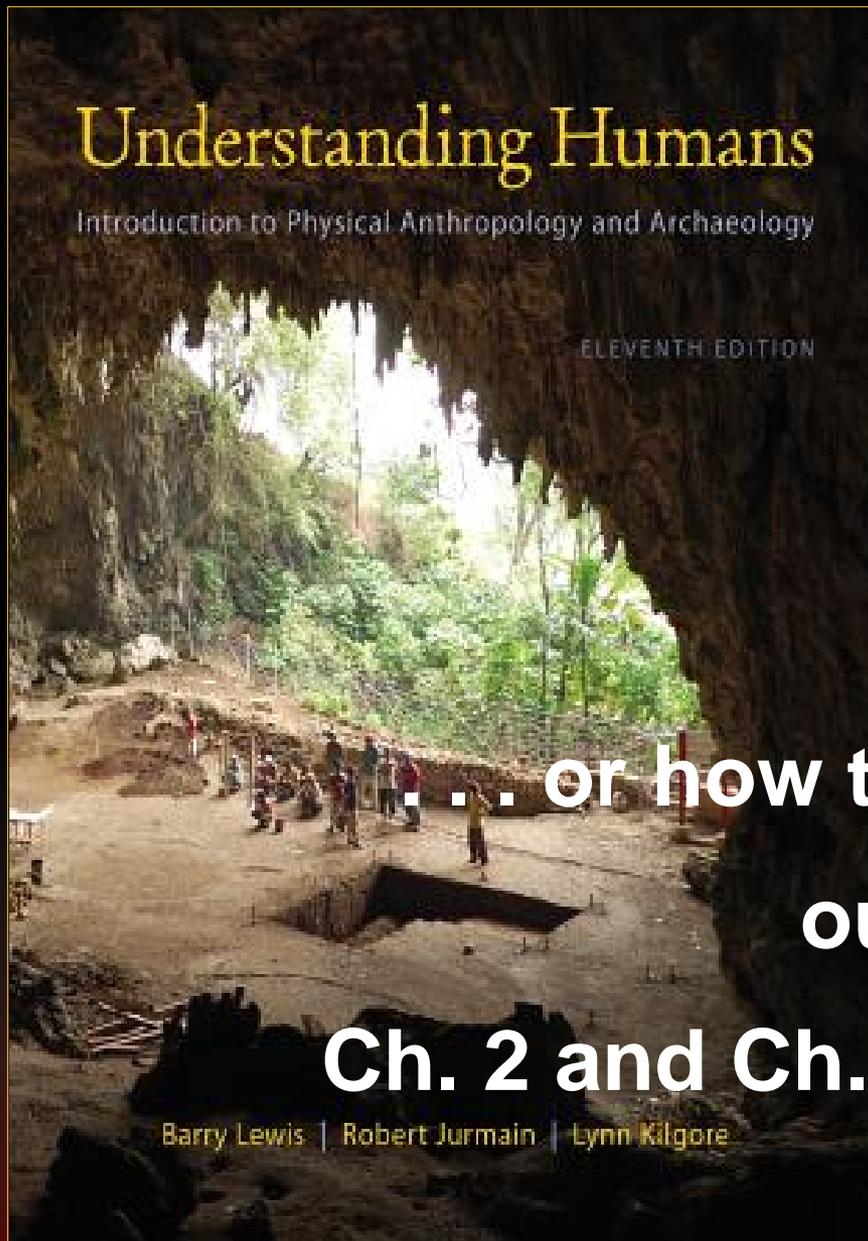
Page through: ["Appendix A: Atlas of Primate Skeletal Anatomy," pp. 425-432](#)

Post: [PCforum](#)

Understanding Humans

Introduction to Physical Anthropology and Archaeology

ELEVENTH EDITION



... or how to make sense
out of
Ch. 2 and Ch. 3 of the text ...

Barry Lewis | Robert Jurmain | Lynn Kilgore

Heredity and Evolution

CHAPTER

2

The Development of Evolutionary Theory

© The Photo Collector / Alamy

LEARNING OBJECTIVES

After you have mastered the material in this chapter, you will be able to:

- ▶ Describe the key contributions to evolutionary theory made by precursors to Darwin and explain how each influenced the development of evolutionary theory.
- ▶ Explain how natural selection works.
- ▶ Contrast the scientific understanding of biological evolution with nonscientific approaches that seek to explain the origins of life and how life has changed on earth.

Heredity and Evolution

CHAPTER

3

Heredity and Evolution

© Miod Mattoni Ltd / Photo Researchers, Inc.

LEARNING OBJECTIVES

After you have mastered the material in this chapter, you will be able to:

- ▶ Explain why cells are basic to life and describe the two different types of cells found in animals.
- ▶ Compare and contrast the two types of cell division.
- ▶ Describe the basic structure of DNA and explain how it relates to DNA replication.
- ▶ Describe the basic concepts of heredity that are found in all sexually reproducing organisms, including humans.

Major Periods in the History of Physical Anthropology

- **“Pre-Scientific Period” (to 1859)**
- **Period of Evolutionism and Concern over Races (1860 - ca. 1940)**
- **The Period Since WW II**

Major Periods in the History of Physical Anthropology

- **“Pre-Scientific Period” (to 1859)**
- **Period of Evolutionism and Concern over Races (1860 - ca. 1940)**
- **The Period Since WW II**

Major problems in “Pre – Scientific” Period

- 1. Humans were thought to have had ancient origins corresponding to the time of the creation of the earth**
- 2. Earth was thought of as a Young Place**

Glossary

creationism

The belief that humans and all life forms were specially created by God or some other divine force



FIGURE I-1 A woodcut from Schedel's *World Chronicle* of 1493 depicting God's creation of woman from Adam's rib as told in Genesis.

TOKYO'S JUDO ECONOMICS
Why Bashing Japan Doesn't Work

Newsweek

The Search for Adam & Eve

Scientists Explore a Controversial Theory About Man's Origins



catastrophism

George Cuvier's theory that the earth's geological landscape is the result of violent cataclysmic events

- vast floods and other disasters wiped out ancient life forms again and again**

In his famous work *Systema Naturae* (Systems of Nature), first published in 1735, he standardized Ray's use of genus and species terminology and established the system of **binomial nomenclature**. He also added two more categories: class and order. Linnaeus' four-level system became the basis for **taxonomy**, the system of classification we continue to use today.

Another of Linnaeus' innovations was to include humans in his classification of animals, placing them in the genus *Homo* and species *sapiens*. Including humans in this scheme was controversial because it defied contemporary thought that humans, made in God's image, should be considered unique and separate from the animal kingdom.

Linnaeus also believed in fixity of species, although in later years, faced with mounting evidence to the contrary, he came to question it. Indeed, fixity was being challenged on many fronts, especially in France, where voices were being raised in favor of a universe based on change—and, more to the point, in favor of a biological relationship between similar species based on descent from a common ancestor.

Jean-Baptiste Lamarck, Linnaeus

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alteration would make the animal bet-
ter suited to its habitat, the new trait
would be passed on to its offspring.
This theory is known as the *inheritance*

of acquired characteristics, or the *use-disuse* theory

One of the most frequently given hypothetical examples of Lamarck's theory is the giraffe, which, having stripped all the leaves from the lower branches of a tree (environmental change), tries to reach leaves on upper branches. As "vital forces" move to tissues of the neck, it becomes slightly longer, and the giraffe can reach higher. The longer neck is then passed on to offspring, with the eventual result that all giraffes have longer necks than their predecessors (Fig. 2-3). Thus, according to this theory, a trait acquired by an animal during its lifetime can be passed on to offspring. Today we know that this explanation is wrong, because only those traits that are influenced by genetic information contained within sex cells (eggs and sperm) can be inherited (see Chapter 3).

Because Lamarck's explanation of species change isn't genetically correct, it's been made fun of and dismissed. But actually, Lamarck deserves a lot of credit because he emphasized the importance of interactions between organisms and the external environment and tried to explain them. Moreover, he coined the term *biology* to refer to studies of living organisms.



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catastrophism The view that the earth's geological landscape is the result of violent cataclysmic events. This view was promoted by Cuvier, especially in opposition to Lamarck.

taxonomy The branch of science concerned with the rules of classifying organisms on the

catastrophism The view that the earth's geological landscape is the result of violent cataclysmic events. This view was promoted by Cuvier, especially in opposition to Lamarck.

11th ed., p.



Cuvier explained the fossil record as the result of a succession of catastrophes followed by new creation events

evolution

- 1. A change in the genetic structure of a population.**
- 2. The term is also frequently used to refer to the appearance of a new species.**

evolution

Modern genetic definition:

A change in the frequency of alleles (*i.e.*, “genes”) from one generation to the next.

**creation and evolution
are not mutually
exclusive**

Κόσμος
βίος
Θεός

COSMOS, BIOS, THEOS

Scientists Reflect on Science, God, and the
Origins of the Universe, Life, and *Homo sapiens*

Edited by Henry Margenau and Roy Abraham Varghese

Older Evolutionary Ideas

Example:

Titus Lucretius

(ca. 99 - 55 B.C.)

De Rerum Natura

(On the Nature of Things)

Older Evolutionary Ideas

Titus Lucretius

“ . . . Gave us the classical version of the evolution of human culture and the concept of a lowly beginning for man [*sic.*], followed by the growth of material culture, social order, religion, and language.”

-- E. A. Hoebel

Older Evolutionary Ideas

- Example:

Titus Lucretius

(ca. 99 - 55 B.C.)

- Example:

**Genesis Account of
Creation**

Older Evolutionary Ideas

- Example:

Titus Lucretius
(ca. 99 - 55 B.C.)

- Example:

**Genesis Account of
Creation**

It was so done.

16 And God made two great lights: a greater light to rule the day; and a lesser light to rule the night: and the stars.

17 And he set them in the firmament of heaven to shine upon the earth.

18 And to rule the day and the night, and to divide the light and the darkness. And God saw that it was good.

19 And the evening and morning were the fourth day.

20 God also said: Let the waters bring forth the creeping creature having life,

d Ps. 135. 5, and 148. 4; Jer. 10. 12, and 51. 15.

e Job 38. 4; Ps. 32. 7, and 88. 12, and 135. 7.

f Ps. 135. 7.

22 And he blessed them, saying: Increase and multiply, and fill the waters of the sea: and let the birds be multiplied upon the earth.

23 And the evening and morning were the fifth day.

24 And God said: Let the earth bring forth the living creature in its kind, cattle and creeping things, and beasts of the earth, according to their kinds. And it was so done.

25 And God made the beasts of the earth according to their kinds, and cattle, and every thing that creepeth on the earth after its kind. And God saw

26 And he said: ¶ Let us make man to our image and likeness: and let him have dominion over the fishes of the sea, and the fowls of the air, and the beasts, and the whole earth, and every creeping creature that moveth upon the earth.

27 And God created man to his own im-

him: male and female he created them. †

28 And God blessed them, saying: † Increase and multiply, and fill the earth, and subdue it, and rule over the fishes of the sea, and the fowls of the air, and all living creatures that move upon the earth.

29 And God said: Behold I have given you every herb bearing seed upon the earth, and all trees that have in themselves seed of their own kind, to be your meat: ‡

30 And to all beasts of the earth, and

g Infra 5. 1, and 9. 6: 1 Cor. 11. 7: Col. 3. 10.

† Wisd. 2. 23: Eccl. 17. 1.—‡ Matt. 19. 4.

‡ Infra 8. 17, and 9. 1.—§ Infra 9. 3.

Ver. 26. Let us make man to our image. This image of God in man, is not in the body, but in the soul; which is a spiritual substance, endued with understanding and free will.

God resteth
earthly pas
commandet
ledge. And

SO the
finishe

2 And on
his work
rested on
work which

3 And he
sanctified
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made.

4 These
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created, in
made the

5 And ev
sprung up
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Lord God h
and there
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6 But a
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7 And the
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9 And the
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m Ex. 20. 11

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things, and c

...man to till the soil, ... but a mist rose
from the earth and watered all the surface of
the ground. 7 Then the LORD God formed
man out of the dust of the ground and breathed
into his nostrils the breath of life, and man
became a living being.

8 The LORD God planted a garden in Eden,

Major problems in “Pre – Scientific” Period

1. Humans were thought to have had ancient origins corresponding to the time of the creation of the earth
2. Earth was thought of as a Young Place

Archbishop James Ussher

of Ireland
(1581 - 1656)

in 1650 proclaimed

“Earth was Created in 4004 B.C.”



Archbishop James Ussher
1581 - 1656

http://en.wikipedia.org/wiki/James_Ussher



Adam and Eve
Albrecht Dürer
1507

of the LORD.

CHAPTER 5

Adam's Descendants

THIS is the record of the descendants of Adam. When God created man, he made him in the likeness of God. ² Male and female he created them, and he blessed them and called them Man when they were created.

When Adam was one hundred and thirty years old, he became the father of a son in his own likeness, after his image, and he called him Seth.

⁴ Adam lived eight hundred years after the birth of Seth, and had other sons and daughters.

⁵ The whole lifetime of Adam was nine hundred and thirty years; then he died.

When Seth was one hundred years old, he became the father of Enos. ⁷ Seth lived eight hundred and seven years after the birth of Enos, and had other sons and daughters.

4:20. *Forerunner*: Hebrew has "father," not in the genealogical sense but only as the progenitor or first of that class of people who are described in vv 20-22.

4:25. *Seth . . . has given*: the two words sound very much alike in Hebrew: *Sheth-Shath*.

4:26. *Call on . . . Lord*: probably refers to organized worship of God. The expression, "to call on the name of the LORD" (*Yahweh*), is a fixed formula used regularly of the one true God. Cf Gn 21:33; 3 Kgs 18:24-26; Mi 4:5.

5:24. The case of Enoch was extraordinary. He did not die but was taken away by God while yet alive. Some think that he and Elias (4 Kgs 2:11) will appear again before the end of the world.

5:29. Noe, as his name implies, would bring comfort in some way to the human race.

became the father of Mathusale. 22 Henoch walked with God three hundred years after the birth of Mathusale, and had other sons and daughters. 23 The whole lifetime of Henoch was three hundred and sixty-five years. 24

Henoch walked with God, and he was not more because God took him.

25 When Mathusale was one hundred and eighty-seven years old, he became the father of Lamech. 26 Mathusale lived seven hundred and eighty-two years after the birth of Lamech, and had other sons and daughters. 27 The whole lifetime of Mathusale was nine hundred and sixty-nine years; then he died.

28 When Lamech was one hundred and eighty-two years old, he became the father of a son, and called him Noe, saying, 29 "This one shall bring us comfort from our work and from the toil of our hands in the ground which the LORD cursed." 30 Lamech lived five hundred and ninety-five years after the birth of Noe, and had other sons and daughters. 31

The whole lifetime of Lamech was seven hundred and seventy-seven years; then he died.

32 When Noe was five hundred years old, he became the father of Sem, Ham and Japheth.

"23 October
4004 B.C.

9 a.m. London time"--
(2 a.m. Duluth time)

Bishop Ussher,
1650.

Happy birthday, Earth



(MAGNIFICENT Times) — Today is the Earth's birthday.

According to the scholarly research of a group of Jewish theologians (English divines), creation was exactly 4004 years ago — at 9 a.m. London time, 12 a.m. Duluth time, Oct. 23, 4004 B.C.

It's a long story, not nearly so long as it could be, but still too long to begin to be told.

There was a fellow named John Ussher, born in 1581, who grew up to be a famous Archbishop of Armagh in Ireland and a whiz at figuring the ages of Old Testament characters. After years of careful calculation, Ussher began in 1650 publication of his most important work, a biblical chronology. He deduced, by adding everyone's ages, that it was 11:00 the night of God's anger that the sun of the world, saying, "Let there be light."

Since Dr. John Ussher, who died in 1656, was a good friend of Cotton Mather in Cambridge in 1704 who calculated the exact hour and day of creation. In 1780, Alfred Russel Wallace, a German scientist, announced that Noah's ark left in 2344 B.C.

These computations have not withstood the test of time.

Today's scientists, measuring the decay of uranium atoms in rocks, figure Earth is about 4.5 billion years old. And they say the light will let us perhaps determine their date but in perhaps 4 billion years after the beginning of the galaxy and perhaps 10 billion years after the birth of the universe.

Widespread Idea of the 17th and 18th Centuries

“Ladder of Perfection”

aka **“The Great Chain of Being”**

aka ***“Scala Naturae”***

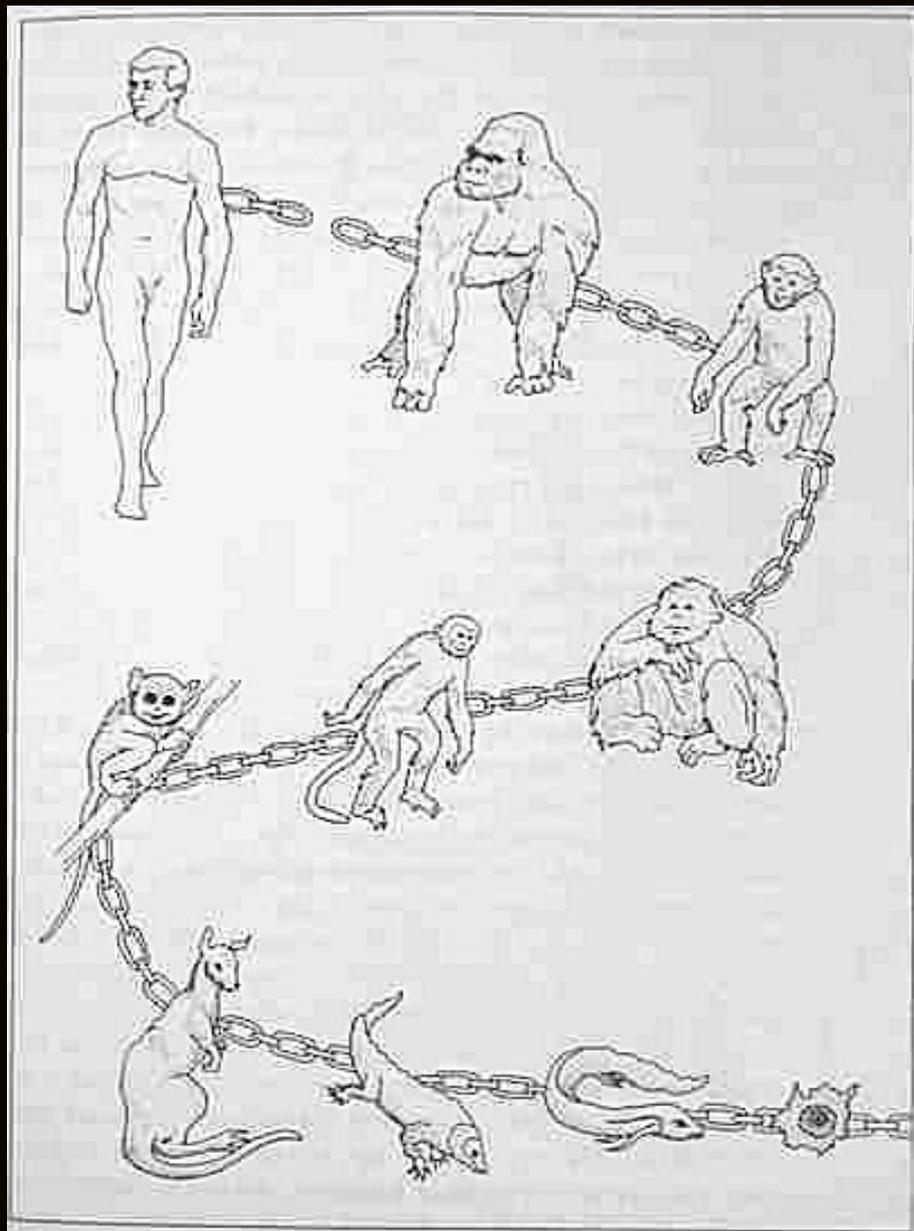
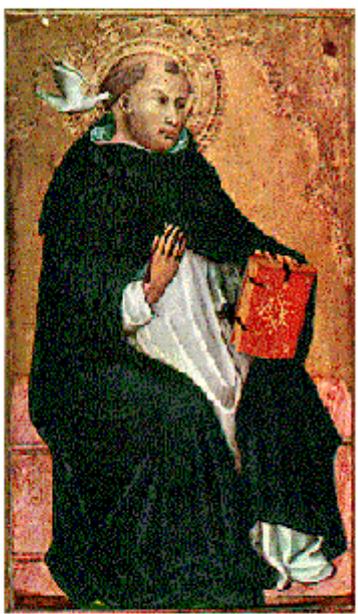


Figure 37. The Great Chain of Being: a fallacious hierarchy of life forms.



This Great Chain, first described by **St. Thomas Aquina**, is together. The Great Chain is as follow



St. Thomas Aquinas
(1225 - 1274)

[Pope
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Earl
Viscount
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Shep
Thi

L'HOMME.
Orang-Outang.
Singe.
QUADRUPÈDES.
Ecorraï volans.
Chauve-souris.
Arnaute.
OISEAUX.
Oiseaux égarés.
Oiseaux amphibies.
Poissons volans.
POISSONS.
Poissons rampans.
Anguilles.
Serpens écus.
SERPENS.
Limaces.
Limaçons.
COQUILLAGES.
Vers à tuyaux.
Ynges.
INSECTES.
Gallinules.
Tent., ou Solitaires.
Polypes.
Ortes de Mer.
Senéves.
PLANTES.
Lichens.
Mouffures.
Champignons, Agarics.
Tendes.
Coraux & Corallines.
Lithophytes.
Amibans.
Fels., Gyps., Silicés.
Ardoises.
PIERRES.
Perres égarées.
Cryballisations.
SELS.
Vinols.
METAUX.
DEMINETAUX.
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Important People / Works

Linnaeus

aka Karl Von Linnæus

(1707 - 1778)

Systema Naturae

1758



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Business Minor, Senior



*"Studying abroad
was the greatest
experience I've ever
had. The opportunity
to discover the world
through diverse
cultural perspectives
is priceless. The*

*friendships I've gained and the stories I
have will last a lifetime."*

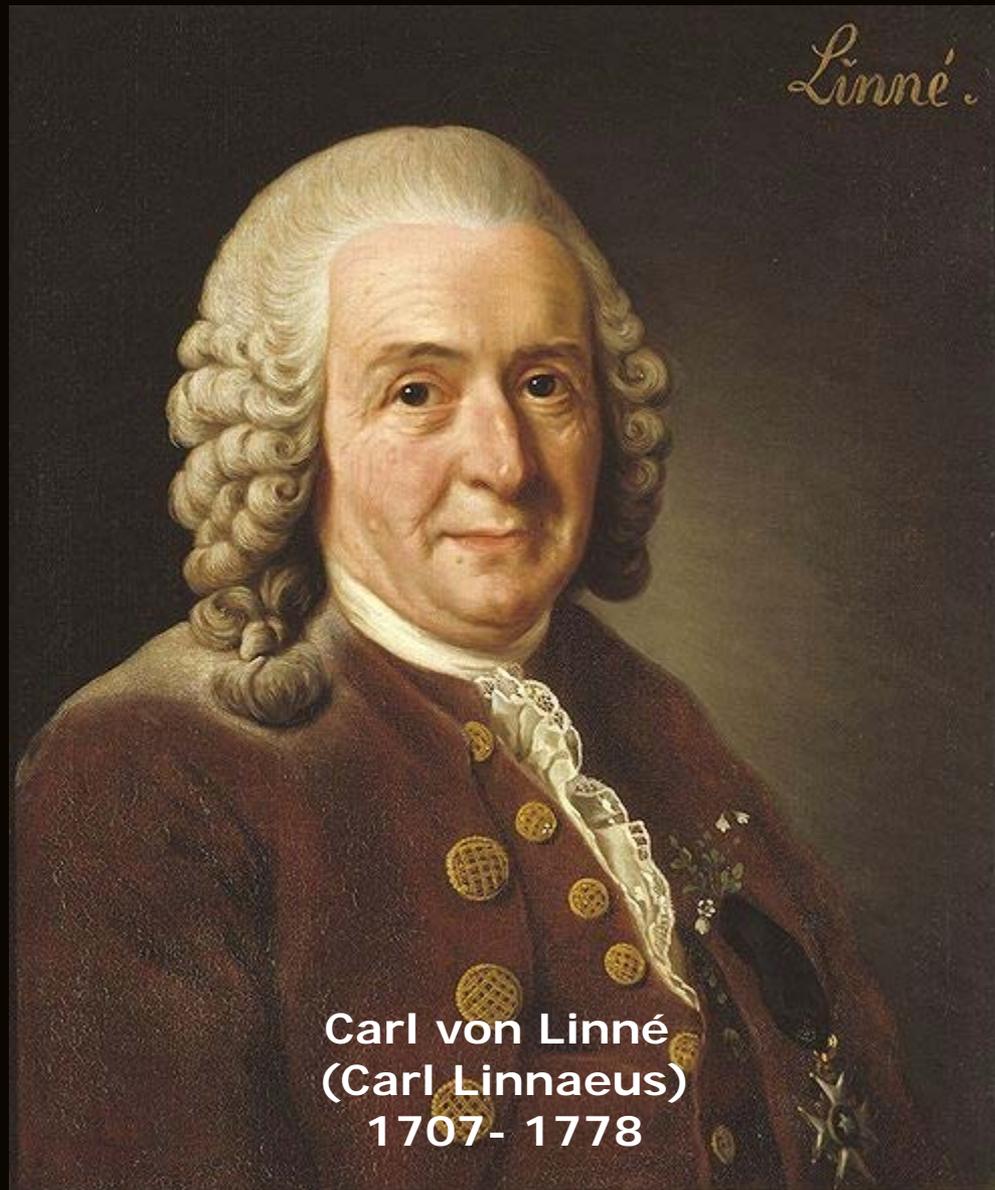
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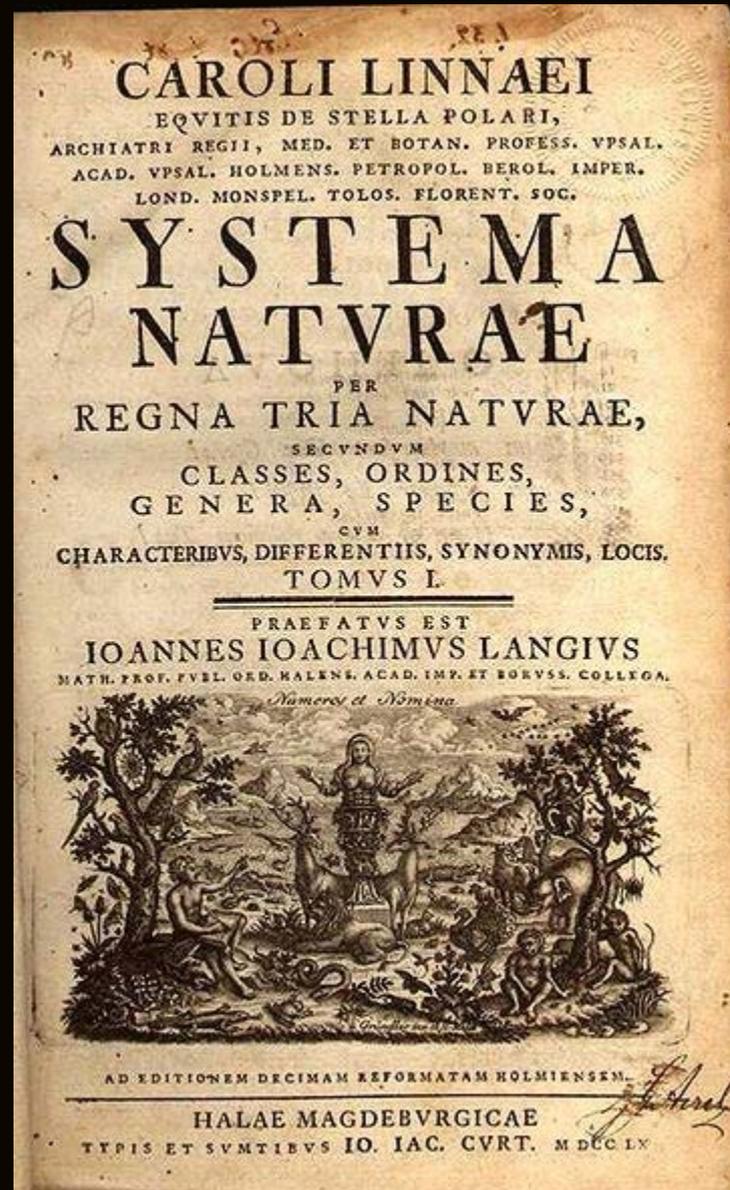
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**Carl von Linné
(Carl Linnaeus)
1707- 1778**

Carl von Linné
(Carl Linnaeus)
1758



Basic Concepts

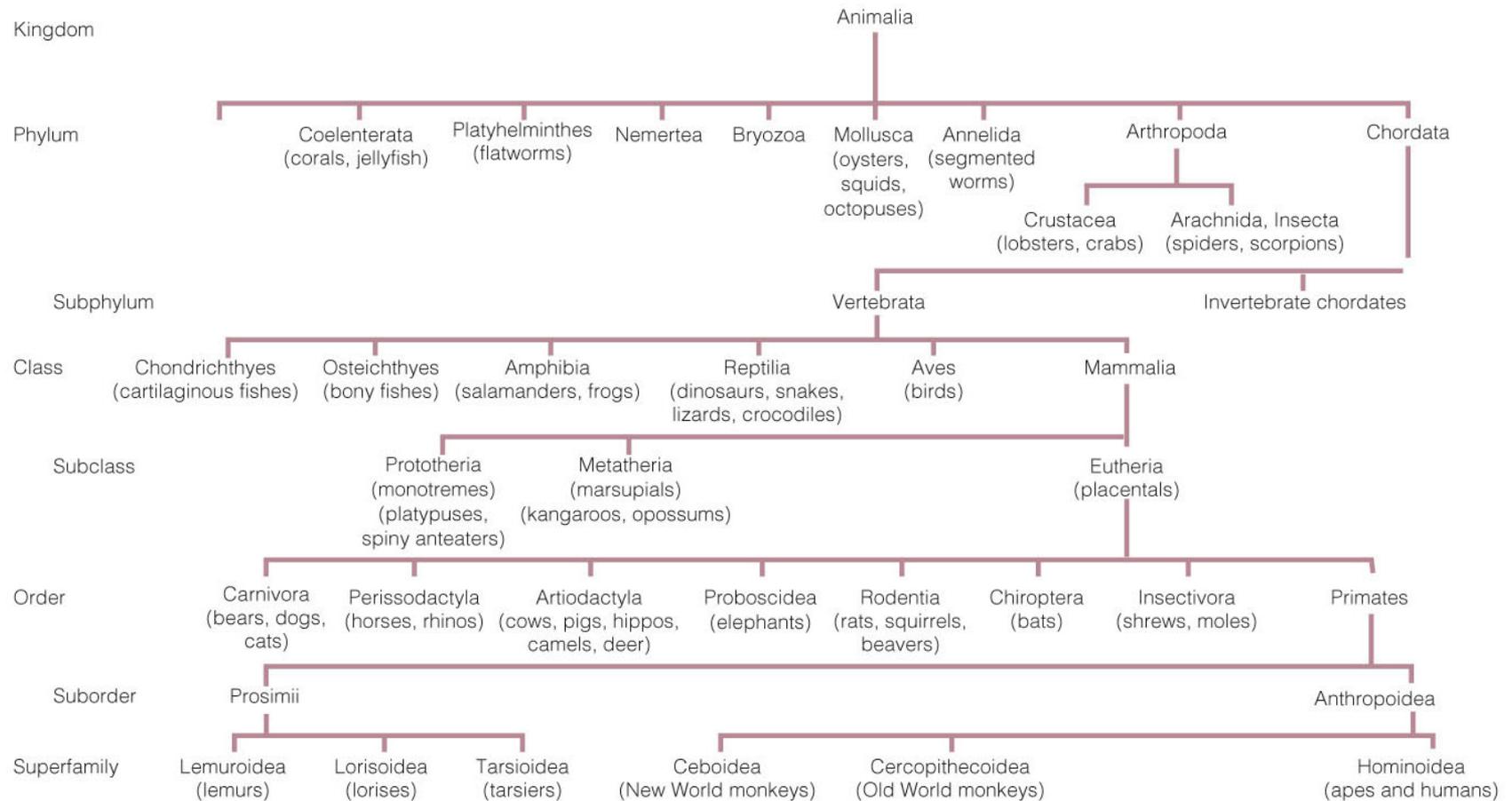
. . . **genus species variety:**

Animalia . . . Homo sapiens sapiens

Animalia . . . Gorilla gorilla gorilla

~

“binomial nomenclature”



Classification chart, modified from Linnaeus.

Glossary

taxonomy

the branch of science concerned with the rules of classifying organisms on the basis of evolutionary relationships

Glossary

taxon

a unit (group) in taxonomy

MAMMALIA.

ORDER I. PRIMATES.

*Fore-teeth cutting; upper 4, parallel; teats 2
behind.*

1. HOMO.

Sapient. Diurnal; varying by education and situation.

2. Four-toothed canine, hairy. *Wild Man.*
3. Copper-coloured, choleric, erect. *American.*
Hair black, straight, thick; nostrils wide, face harsh; beard scanty; obstinate, content free. Paints himself with fine red lines. Regulated by customs.
4. Fair, sanguine, brawny. *European.*
Hair yellow, brown, flowing; eyes blue; gentle, acute, inventive. Covered with close vestments. Governed by laws.
5. Sooty, melancholy, rigid. *Asiatic.*
Hair black; eyes dark; fierce, haughty, covetous. Covered with loose garments. Governed by opinions.
6. *African.*
crafty, voracious.

taxon

Manif.

1. Small, active, timid. *Maintainer.*
2. *Patagonian.*
3. Less fertile. *Hottentot.*
4. Beardless. *American.*
5. Head conic. *Chinese.*
6. Head flattened. *Canadian.*

*The anatomical, physiological, history, &c. of the
histories of man, are best described by their respective writers.*

Vol. I. C

2. SIMIA.

Linnaeus' classification of the genus *Homo*.

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The World's No.1 Science & Technology News Service

Linnean naming system faces challengers

10:00 12 September 04

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A band of renegade biologists is taking on a mammoth task that threatens to upset a status quo that has been unchallenged for almost 250 years. Put simply, they want to change the way scientists name every living organism on the planet.

These rebels say that our system of naming plants, animals, fungi and bacteria, famously introduced by Linnaeus in 1758, is frustrating efforts to understand the living world. They want to replace it with a more

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After 250 Years of Classifying Life, 90 Percent Remains Unknown

By [Robin Lloyd](#), LiveScience Senior Editor
posted: 13 November 2007 07:44 am ET

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BRONX, NEW YORK--Most people can tell the difference between some types of berries, or bugs or trees, but much of the planet's life remains unnamed and unseen.

A stunningly egotistical Swedish naturalist, Carl Linnaeus, tried long ago to set humanity on track to remedy that.

His book, "[Systema Naturae](#)," first published in 1735 at 13 pages long, proposed a hierarchical system for classifying plants, animals and minerals (we later chipped away minerals into the domain of geology) and launched an effort to identify and inventory all the world's living things.

Now 250 years after publication of the book's latter editions, scientists still have discovered as

Related Images

ENLARGE PHOTO



Title page of Carl Linnaeus' personal copy of the first edition of "Systema Naturae." Credit: courtesy of the Hagstromer Medico-Historical Library, Stockholm

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-KENTS- CAVERN

DEVON'S FAMOUS
PREHISTORIC CAVES



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Kents Cavern is a prehistoric cave and award winning visitor attraction. The site was used by Britain's earliest ancient humans thousands of years ago and today the cave is the only underground visitor centre in the UNESCO Global Geopark, a protected national monument and an internationally renowned prehistoric show cave.

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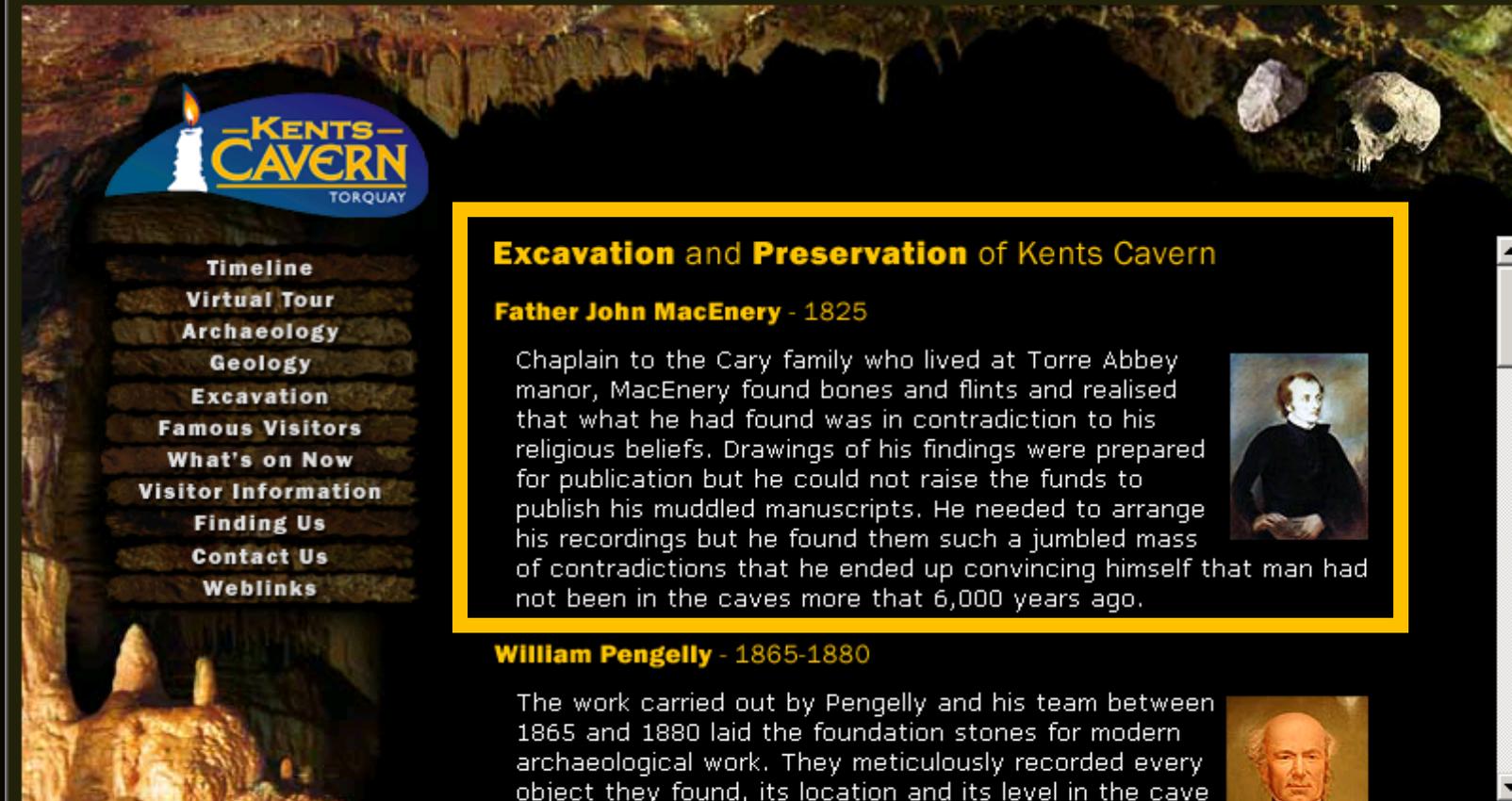
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Scientists search for more evidence of Neanderthal occupation



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The website features a dark, cave-themed background with stalactites and a skull. On the left, a blue logo with a candle reads "KENTS CAVERN TORQUAY". Below it is a vertical menu of navigation links. The main content area is highlighted with a yellow border and contains two sections: "Excavation and Preservation of Kents Cavern" and "Father John MacEnery - 1825" with a portrait, and "William Pengelly - 1865-1880" with a portrait.

KENTS CAVERN
TORQUAY

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Excavation and Preservation of Kents Cavern

Father John MacEnery - 1825

Chaplain to the Cary family who lived at Torre Abbey manor, MacEnery found bones and flints and realised that what he had found was in contradiction to his religious beliefs. Drawings of his findings were prepared for publication but he could not raise the funds to publish his muddled manuscripts. He needed to arrange his recordings but he found them such a jumbled mass of contradictions that he ended up convincing himself that man had not been in the caves more that 6,000 years ago.



William Pengelly - 1865-1880

The work carried out by Pengelly and his team between 1865 and 1880 laid the foundation stones for modern archaeological work. They meticulously recorded every object they found, its location and its level in the cave





Famous caves celebrate a milestone



Ancient monument:

Kents Cavern in Torquay celebrates its 100th anniversary this year.

Of course, the caves themselves are very much older than that...but it's a century since they were bought and turned into a visitor

1903 – 2003

as a visitor attraction

in
ve
of

**These caves were first lived in
700,000 years ago**

human dwelling in Britain, with artefacts and remains dating back half a million years.

SEE ALSO

Kents Cavern's Centenary Day ev

Kidzone

News Features

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Kents Cavern

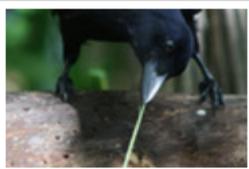
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Whodunit? Crows Ask That Question, Too



The Mysterious Affair at Kents Cavern

by Michael Balter on 3 August 2012, 2:05 PM | [16 Comments](#)

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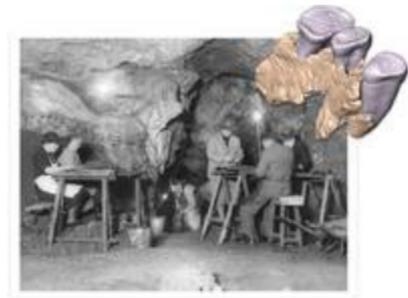
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The twee town of Torquay, on England's Devon coast, has two major claims to fame: It was the birthplace and longtime home of mystery writer Agatha Christie, and it's the home of Kents Cavern, one of the United Kingdom's most important archaeological sites. Last year, researchers reported that [an upper jaw found in the cave could be the oldest modern human fossil in Europe](#). But a new study questions that claim, arguing that the date of the jawbone may never be known with certainty. The controversy has an important bearing on debates about the spread of *Homo sapiens* out of Africa.

"One bad date can rewrite the entire prehistory of our species in Europe," says Paul Pettitt, an archaeologist at the University of Sheffield in the United Kingdom and co-author of the new study, which is in press at the *European Journal of Archaeology*. But members of the original team, [who published their dating results last year in *Nature*](#), have responded sharply to the criticisms. The new study's conclusions, says Thomas Higham, a radiocarbon dating expert at the University of Oxford in the United Kingdom and lead author of the *Nature* paper, "expose a breathtaking ignorance of the [new]

[ENLARGE IMAGE](#)



Sloppy dig, uncertain date?

Archaeologists have raised questions about the reliability of excavations conducted by Arthur Ogilvie (*right, with white beard*) at Kents Cavern, which could compromise radiocarbon dating of a human jawbone found there.

Credit: (photo) Courtesy of Torquay Museum; (teeth, inset) Natural History Museum of London/Torquay Museum/University of Hull, Dept. of Engineering

News Front Page



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Page last updated at 10:12 GMT, Sunday, 13 September 2009 11:12 UK

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Cave dig unearths important finds

Teeth and bones from late Ice Age animals, including hyenas, deer and woolly rhinos, have been discovered by archaeologists at a cave in Devon.

The dig at Kents Cavern, Torquay, also unearthed a 15,000-year-old spearpoint, known as a "sagaie", which is made from reindeer antler from the same era.

The spearpoint is thought to be the first complete one found in the UK.

The dig, organised by the University of Durham and the University of Sheffield, is part of a study into Neanderthals.



The dig is part of a study into why and when Neanderthals became extinct



News Front Page



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Cannibalism theory over bone find



BBC Devon
Sport, travel,
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Cannibal theory over early Briton

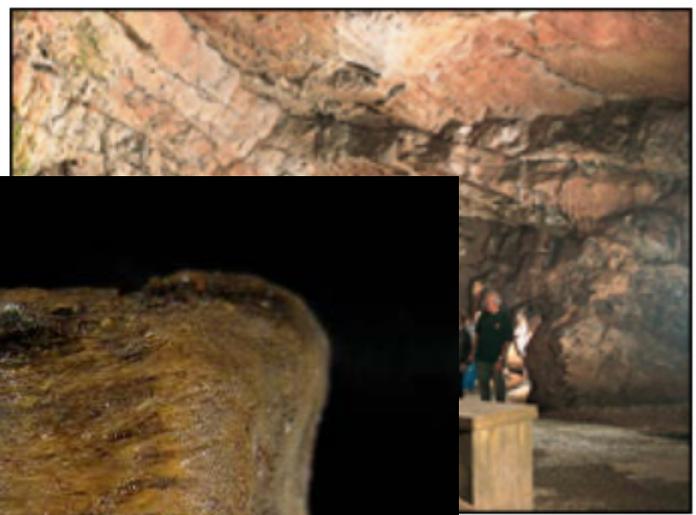
By Judith Burns
Science reporter, BBC News

A fragment of bone from a Devon cave may hint at cannibalism by early Britons, according

Researchers
year-old bo
made by a
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Scientists b
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Mesolithic p
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Human rem



history of
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Britain.

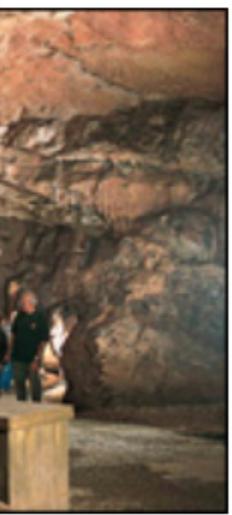
Cannibal theory over early Briton

By Judith B
Science rep

**A fragmen
Devon cav
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according**

Researcher
year-old bo
made by a s
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dismember

Scientists b
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Mesolithic p
cannibalism



history of
possibly

Human remains from this period are extremely rare in Britain.

Important People / Works

- Isaac de la Peyrère, 1655

Back to Father MacEnery . . .

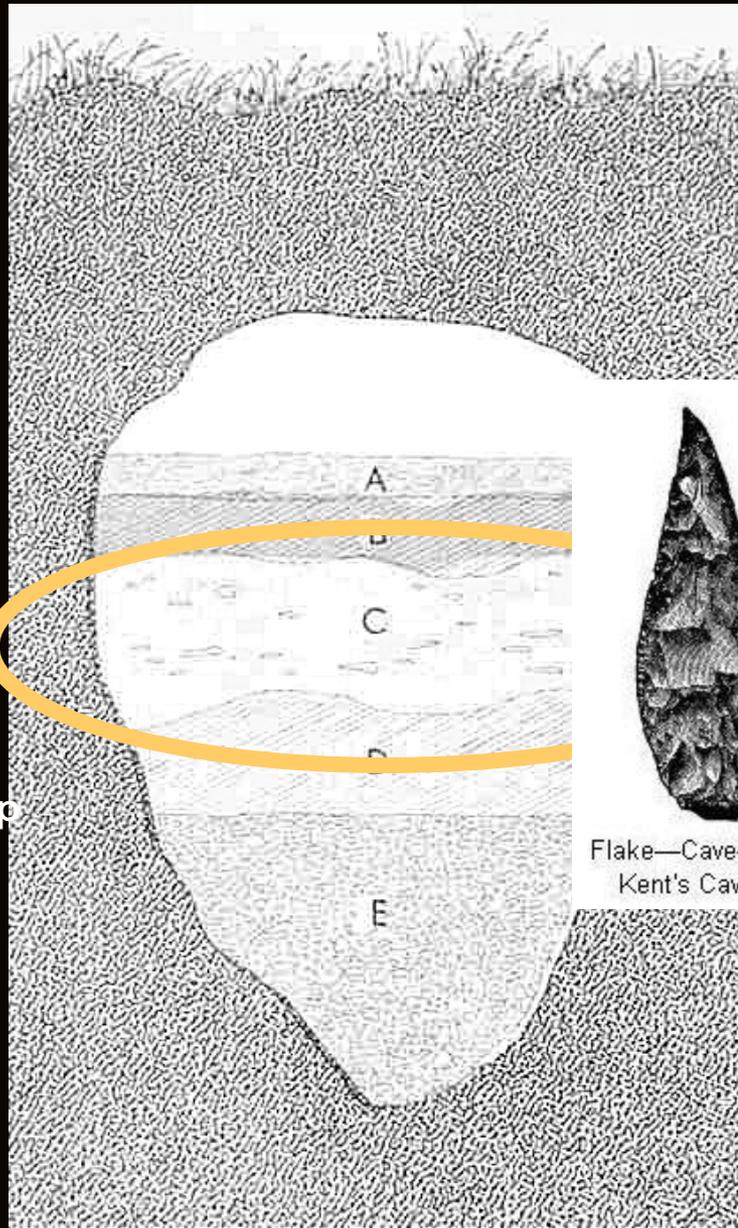
~~Thompe Charles something, 1800~~

- **Father John MacEnery, 1829**
 - Kent's Cavern, Devonshire



37,000 - 40,000 ybp

[BBC News article](#)

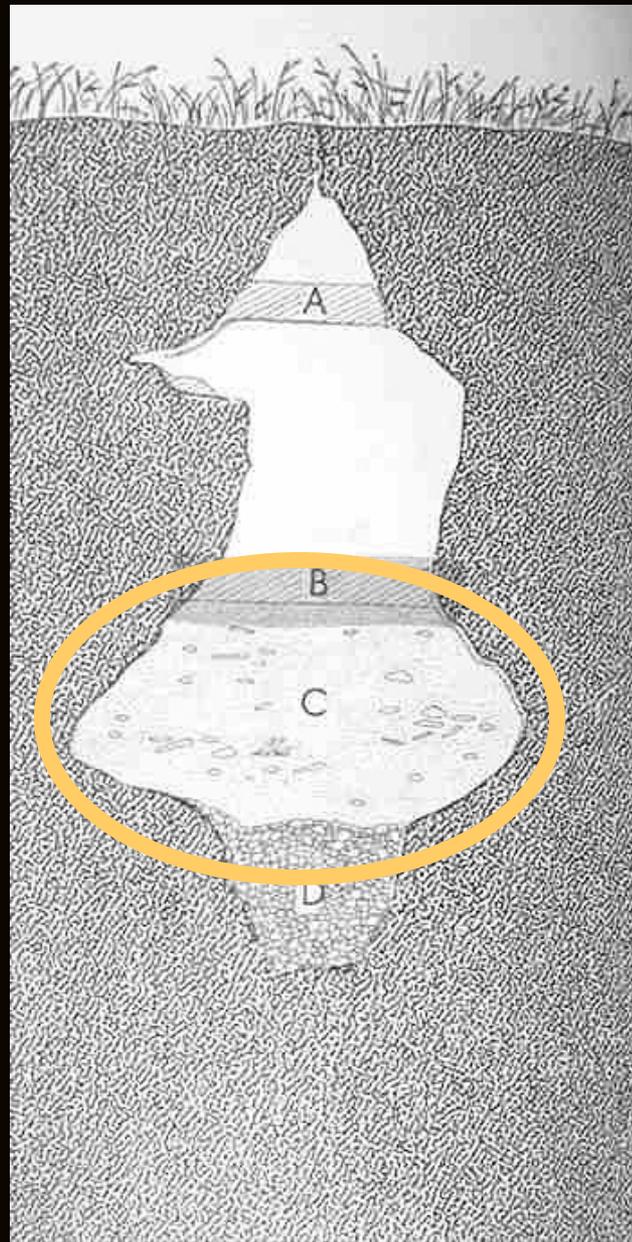


Flake—Cave-earth,
Kent's Cavern.



Spear-head—Cave-earth,
Kent's Cavern.

**Kent's Cavern (Kent's Hole)
Torquay, Devonshire, SW England**

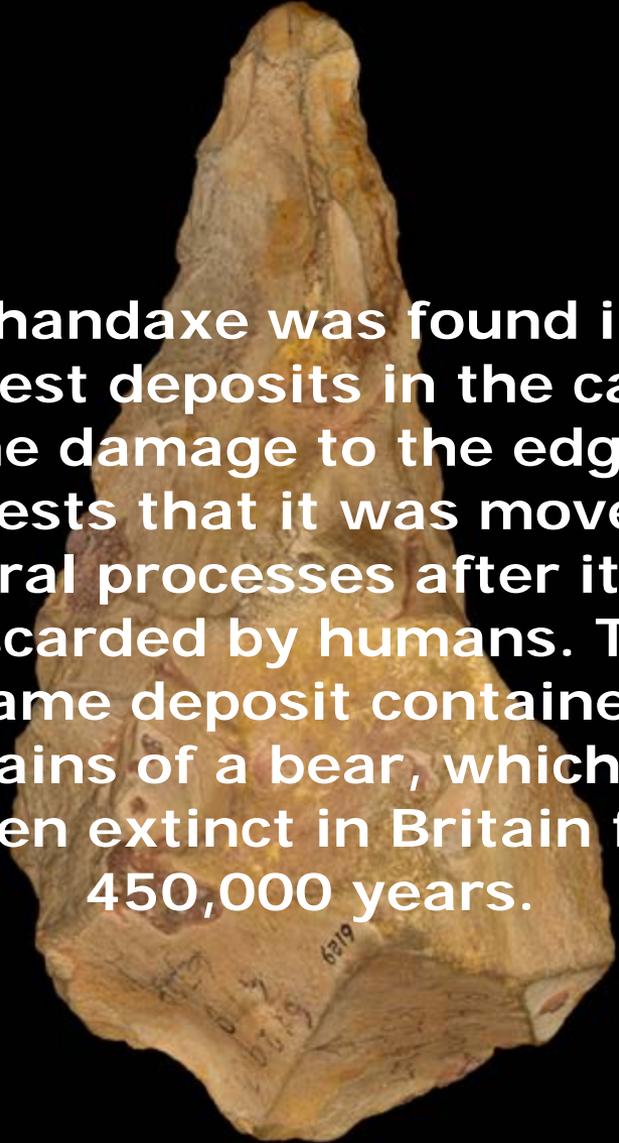


Kent's Cavern (Kent's Hole)
Torquay, Devonshire, SW England



Recreation of a human settlement at Kents Cavern, Devon

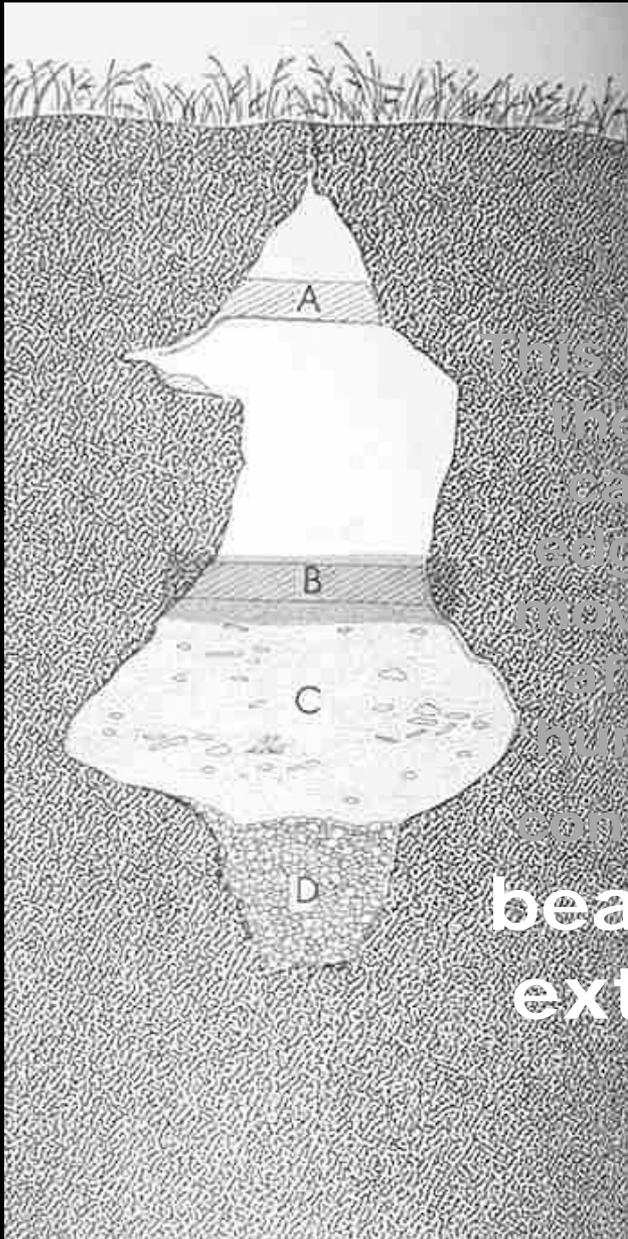
http://www.infobritain.co.uk/Ancient_Britain_History.htm



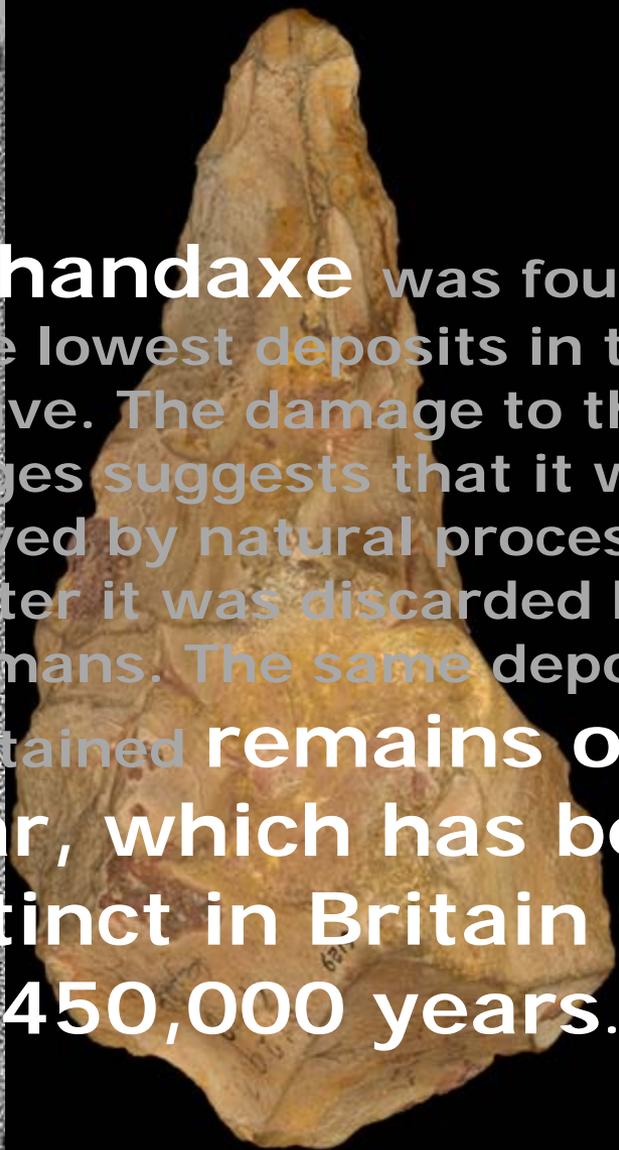
This handaxe was found in the lowest deposits in the cave.

The damage to the edges suggests that it was moved by natural processes after it was discarded by humans. The same deposit contained remains of a bear, which has been extinct in Britain for 450,000 years.

**Kent's Cavern
Devon, England
500,000 B.C.**



This handaxe was found in the lowest deposits in the cave. The damage to the edges suggests that it was moved by natural processes after it was discarded by humans. The same deposit contained remains of a bear, which has been extinct in Britain for 450,000 years.



Kent's Cavern
Devon, England
500,000 B.C.

Important People / Works

- **Early Discovery of Prehistoric Evidence . . .**

- hand ax, 1715, Grayes Inn Lane, London

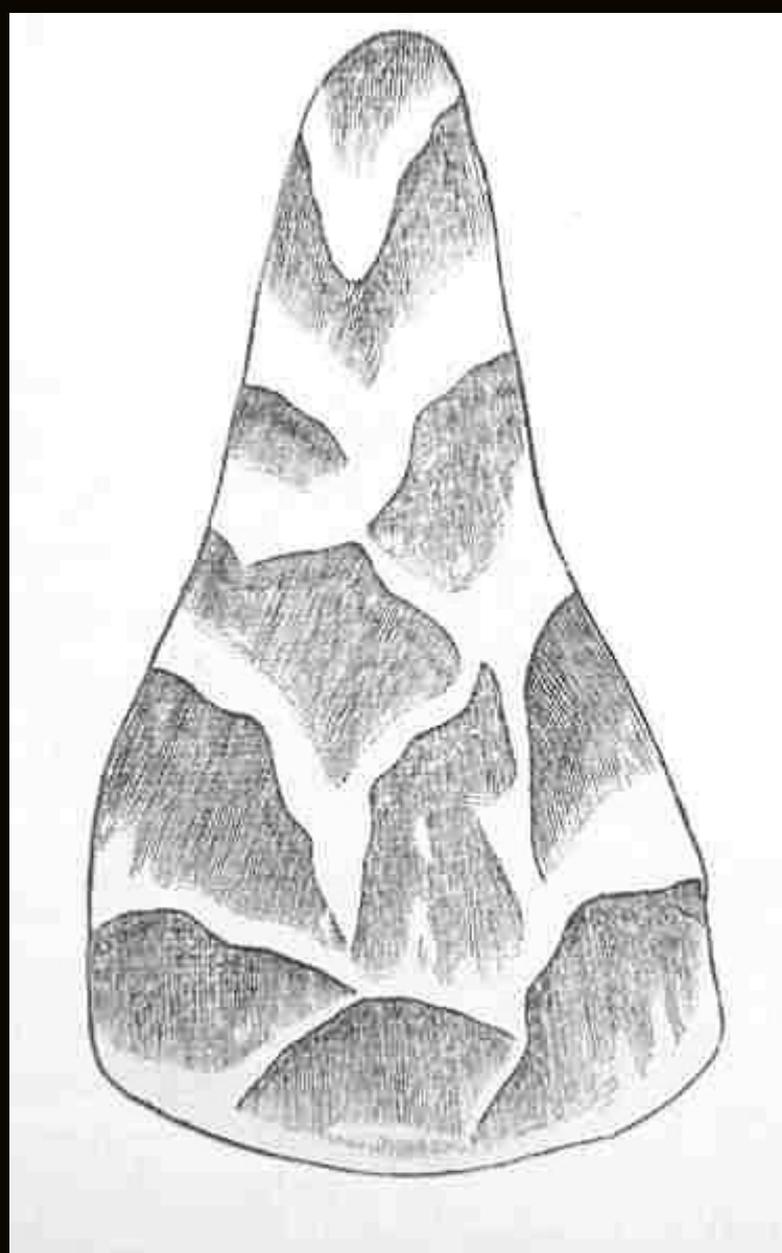
- etc.*

Hand Ax, 1715



Collectanea 1:biv
1715

Hand ax, frontispiece: ". . . The first published illustration of a hand ax. . . (Hearne's [1715] edition of Leland's *Collectanea 1:ixiv*). This implement is described in the Sloane Catalogue: 'No. 246. A British weapon [*sic.*] found, with elephant's tooth, opposite to Black Mary's, near Grayes Inn Lane' (as quoted in J. Evans 1897: 581.) (right) The same hand ax reproduced [but not included here] as a woodcut in J. Evans, *Ancient Stone Implements* 1897: Fig. 451. . . ." (Frank Hole and Robert F. Heizer, *An Introduction to Prehistoric Archeology*, 3rd ed., New York: Holt, Rinehart, and Winston, 1973, p. 59.)



Hand Ax, 1715
Gray's Inn Lane, London, England



**Examples of the Mousterian tool kit,
including (from left to right),
a Levallois point, a perforator, and a side scraper.**

side scraper



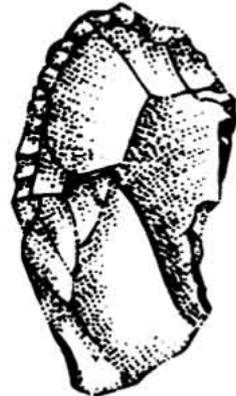
(a)

point



(b)

end scraper



(c)

burin



(d)

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Small tools of the Acheulian Industry.

Understanding Humans, 10th ed., p. 252

Important People / Works

REM:

- **Early Discovery of Prehistoric Evidence . . .**

Important People / Works

- **Isaac de la Peyrère, 1655**
- **John Friedrich Esper, 1771**
- **John Frere, 1790**
- **Philippe-Charles Schmerling, 1830**
- **Father John MacEnery, 1829**
 - Kent's Cavern, Devonshire

Important People / Works

- Early Discovery of Prehistoric Evidence . . .
 - what about *the stone tools*?

Important People / Works

- Early Discovery of Prehistoric Evidence . . .
 - what about *the stone tools*?

Important People / Works

- Early Discovery of Prehistoric Evidence . . .
 - what about *the stone tools?*
. . . **“thunderstones”**

Science News

Share Blog Cite

Thunderstone Mystery: What's a Stone Age Axe Doing in an Iron Age Tomb?

ScienceDaily (June 16, 2010) — "If one finds something once, it's accidental. If it is found twice, it's puzzling. If found thrice, there is a pattern," the archaeologists Olle Hemdorff and Eva Thäte say.

See Also:

Health & Medicine

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Fossils & Ruins

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In 2005 the archaeologists investigated a grave at Avaldsnes in Karmøy in southwestern Norway, supposed to be from the late Iron Age, i.e. from 600 to 1000 AD. Avaldsnes is rich in archeological finds. They dot an area that has been a seat of power all the way back to around 300. Archaeologist Olle Hemdorff at the University of Stavanger's Museum of Archaeology was responsible for a series of excavations at Avaldsnes in 1992-04.



Tomb raiders: Archeologists Olle Hemdorff og Eva

The Thunder-Stones. - Netscape

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Bookmarks Location: <http://www.santafe.edu/~shalizi/White/antiquity/thunder.html> What's Related

Warfare of Science with Theology Chapter VII: The Antiquity of Man and Prehistoric Archaeology

The Thunder-Stones

WHILE the view of chronology based upon the literal acceptance of Scripture texts was thus shaken by researches in Egypt, another line of observation and thought was slowly developed, even more fatal to the theological view.

From a very early period there had been dug from the earth, in various parts of the world, strangely shaped masses of stone, some rudely chipped, some polished: in ancient times the larger of these were very often considered as thunderbolts, the smaller as arrows, and all of them as weapons which had been hurled by the gods and other supernatural personages. Hence a sort of sacredness attached to them. In Chaldea, they were built into the wall of temples; in Egypt, they were strung about the necks of the dead. In India, fine specimens are to this day seen upon altars, receiving prayers and sacrifices.

Naturally these beliefs were brought into the Christian mythology and adapted to it. During the Middle Ages many of these well-wrought stones were venerated as weapons, which during the "war in heaven" had been used in driving forth Satan and his hosts; hence in the eleventh century an Emperor of the East sent to the Emperor of the West a "heaven axe"; and in the twelfth century a Bishop of Rennes asserted the value of thunder-stones as a divinely-appointed means of securing success in battle, safety on the sea, security against thunder, and immunity from unpleasant dreams. Even as late as the seventeenth century a French ambassador brought a stone hatchet, which still exists in the museum at Nancy, as a present to the Prince-Bishop of Verdun, and claimed for it health-giving virtues.

In the last years of the sixteenth century Michael Mercati tried to prove that the "thunder-stones" were weapons or implements of early races of men; but from some cause his book was not published until the following century, when other thinkers had begun to take up the same idea and then it had to contend with a theory far more accordant with theologic modes of reasoning.

Document: Done

Important People / Works

- Early Discovery of Prehistoric Evidence . . .

- **thunderstones**

- [hand ax, 1715](#), Grayes Inn Lane, London

- *etc.*

Duluth News Tribune



Hail fell in many parts of the Northland on Monday afternoon [14 May 2007].

These hailstones, up to about 1 1/4 inch in diameter, fell in downtown Duluth.

(Bob King / News Tribune)

It's Raining Frogs!



Throughout history, there have been tales of raining frogs. These stories, as crazy as they may seem, are actually real events! From Biblical tales of Egyptian storms to British towns suddenly finding themselves covered with frogs falling from the sky, such events are caused when a wind storm passes over a pond or lake teeming with frogs, picking them up and dumping them elsewhere!

One recent story, from the *Press Democrat news services*, was in June of 1997.

"CULIACAN, Mexico- It rained frogs in the town of Villa Angel Flores.

A small tornado whirled up a cluster of toads from a local body of water Saturday night and dropped them all the town in the Pacific coast state of Oaxaca, the newspaper *El Debate* reported Tuesday. Motorists reported the amphibians dropping from the sky around 11 p.m."

But these stories are not uncommon - there was a story as recently as June of 2005 when a Belgrade paper reported a similar incident in Serbia.

Thousands of tiny frogs rained on a town in north-western Serbia, Belgrade daily *Blic* reported on Tuesday. Strong winds brought storm clouds over Odzaci, 120km north-west of Belgrade, on Sunday afternoon, but instead of rain, down came the tiny amphibians, witnesses said.

"I saw countless frogs fall from the sky," said Odzaci resident Aleksandar Ciric.



Waterspouts near St. Thomas. [CREDIT: Jan Havelka - OK1NU]

physics | environment

It's Raining Fish

Unusual objects sometimes fall from the sky, courtesy of waterspouts.

By [Susan Cosier](#), posted September 17th, 2006.

Just before last New Year's Eve, Carl and Kathy Hennige of Folsom, California e-mailed their local newspaper to report some strange weather. It was raining fish.

Important People / Works

- Early Discovery of Prehistoric Evidence . . .
 - and what about *the bones* associated with the “thunderstones” ???

Important People / Works

- Early Discovery of Prehistoric Evidence . . .
 - and what about *the bones* associated with the “thunderstones” ???
. . . “monsters”

Basic Concepts

. . . genus species variety:

Animalia . . . Homo sapiens sapiens

Animalia . . . Homo monstrosus

Animalia . . . Gorilla gorilla gorilla

MAMMALIA.

ORDER I. PRIMATES.

Fore-teeth cutting; upper 4, parallel; teats 2 pectoral.

1. HOMO.

Sapient. Diurnal; varying by education and situation.

2. Four-footed, mute, hairy. *Wild Man.*
3. Copper-coloured, choleric, erect. *American.*
Hair black, straight, thick; nostrils wide, face harsh; beard scanty; obstinate, content free. Paints himself with fine red lines. Regulated by customs.
4. Fair, sanguine, brawny. *European.*
Hair yellow, brown, flowing; eyes blue; gentle, acute, inventive. Covered with close vestments. Governed by laws.
5. Sooty, melancholy, rigid. *Asiatic.*
Hair black; eyes dark; severe, haughty, covetous. Covered with loose garments. Governed by opinions.
6. Black, phlegmatic, relaxed. *African.*
Hair black, frizzled; skin silky; nose flat; lips tumid; crafty, indolent, negligent. Anoints himself with grease. Governed by caprice.

Manifera Varying by climate or art.

1. Small, active, timid. *Mountaineer.*
2. Large, indolent. *Patagonian.*
3. Less fertile. *Hottentot.*
4. Beardless. *American.*
5. Head conic. *Chinese.*
6. Head flattened. *Canadian.*

The anatomical, physiological, natural, moral, civil and social histories of man, are best described by their respective writers.

Vol. I.—C

2. SIMIA.

Accent

October 1994
Number 2



Michelle Burke, Dan Ryland and Jane Curtin

'CONEHEADS'

See story, page 4

And comparing their imitations, speech and visages, I think not
of them have no better Predecessors then Monkeys: which I have
seene three of great stature.

The women give their Infants sucke as they hang at their breasts,
the uberos: duggs stretched over her shoulder.

And though these Savages be treacherous, yet doubtlesse they ex-
seeme more of an Englishman then of Portugal or Spaniard.

This is sufficient to speake of the Inhabitants, I will add one line
of the Bay, and so goe on.

From an engraving after Sir Thomas Herbert



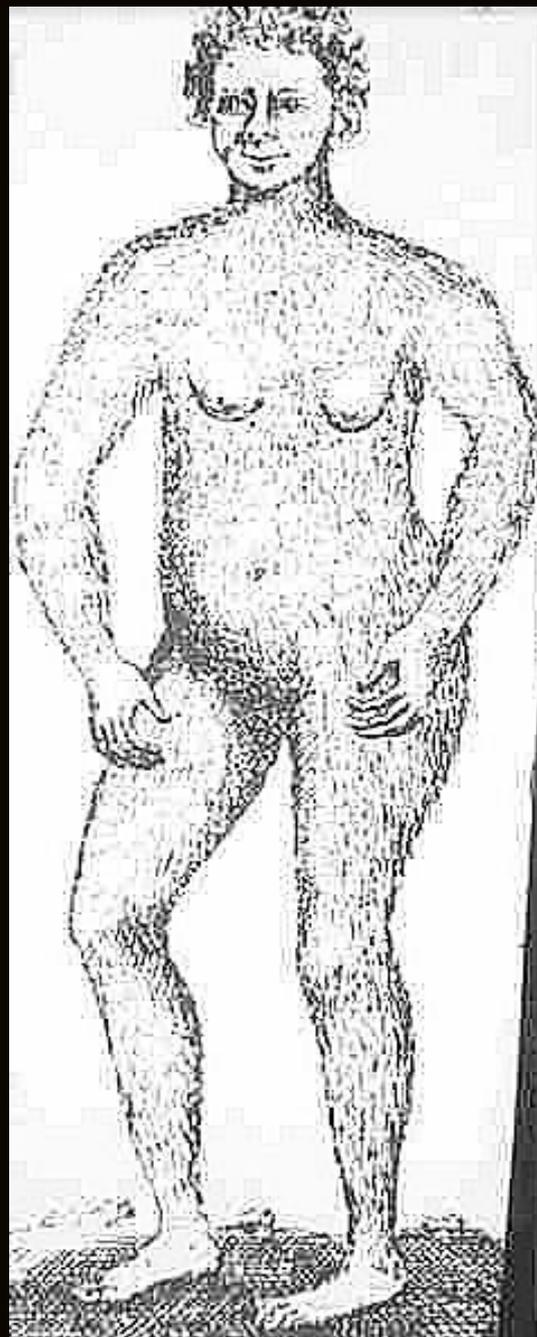
Sir Thomas Herbert 1634

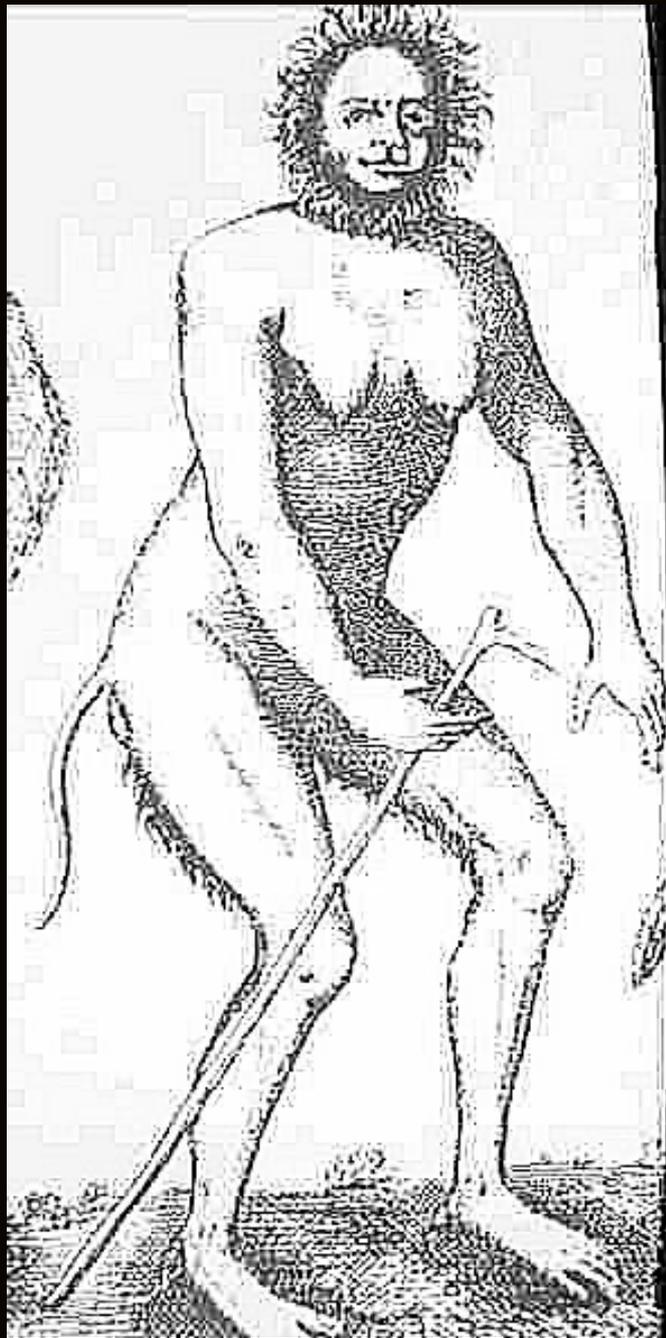
Anthropology had its origins in the accounts given by early European travelers and explorers about the various peoples with whom they came into contact. Unscientific and exaggerated though these sometimes were, their still provide valuable source material for anthropologists who want to know how the various indigenous people lived before their patterns of life was altered by contact with Western civilization. Illustrated here is a page from Sir Thomas Herbert's *Travels into Africa and Asia*, which was published in 1634 and contained one of the earliest known commentaries on the Hottentots of South Africa. (Courtesy of the South African Information Service.)



Homo monstrosus

Source: De Waal Malefijt, Annemarie. (1968).
"*Homo monstrosus*," *Scientific American*, 219:4:112-118.









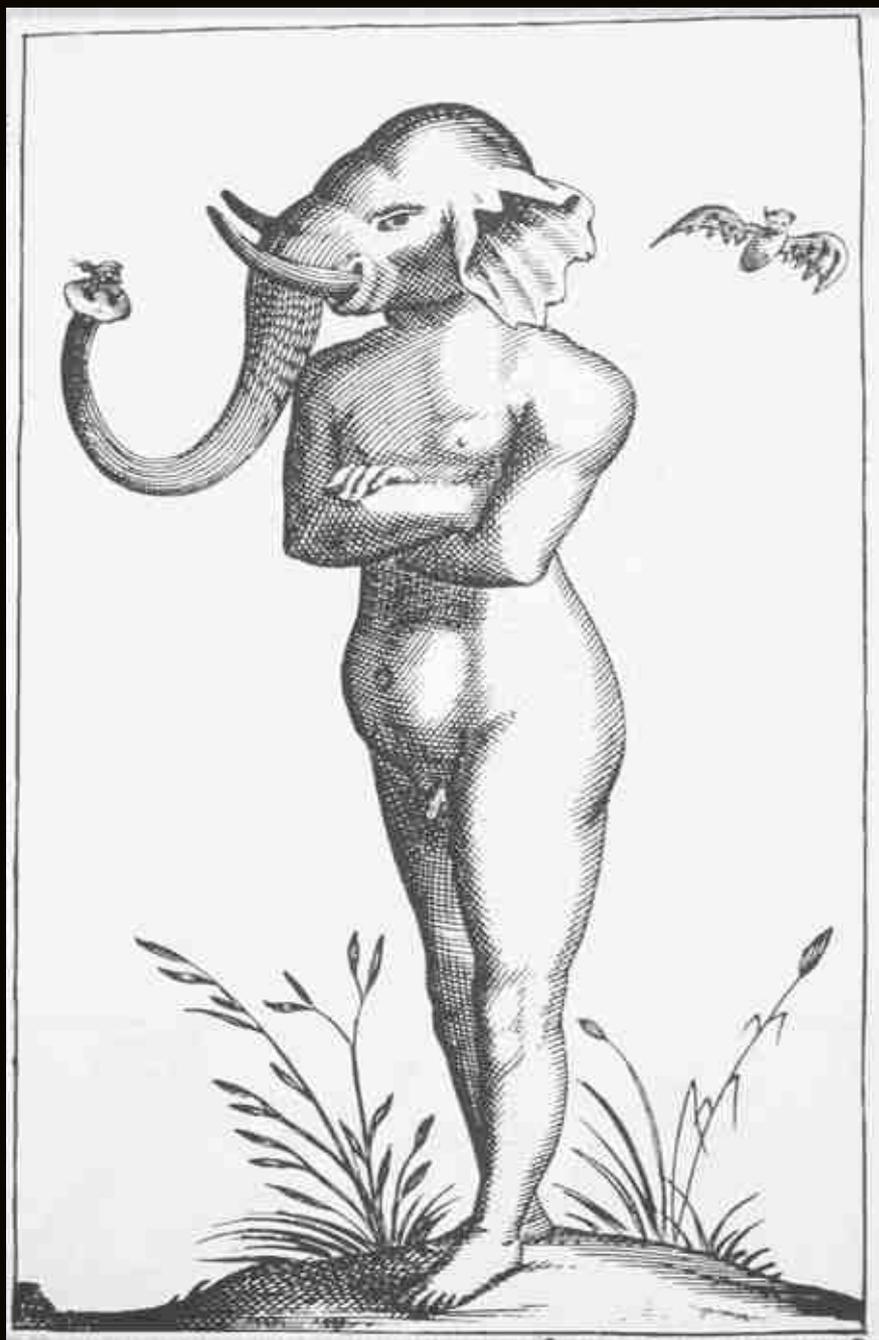






Cynocephale













Homo monstrosus

**How can intelligent, even
highly educated people
believe in monsters ?**

Homo monstrosus

**Because everybody knew
they existed !**



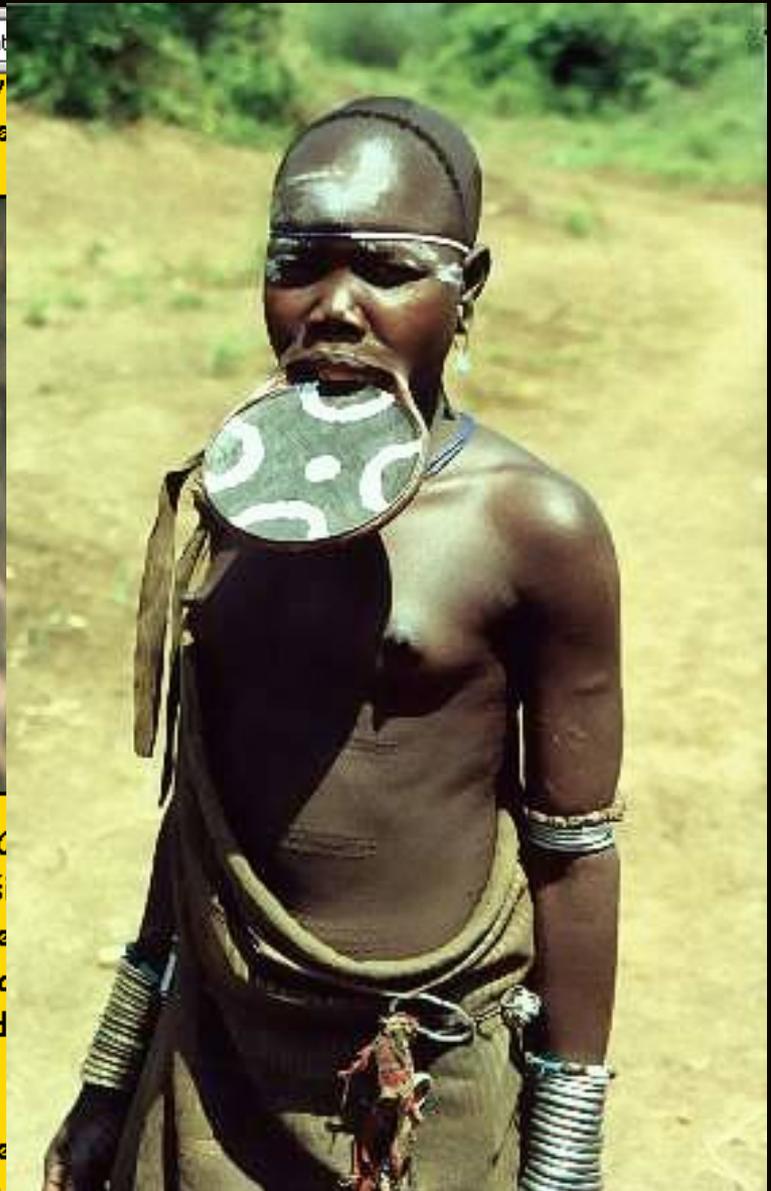
<http://sweb.cz/trailin/mursi/mursi.ht>

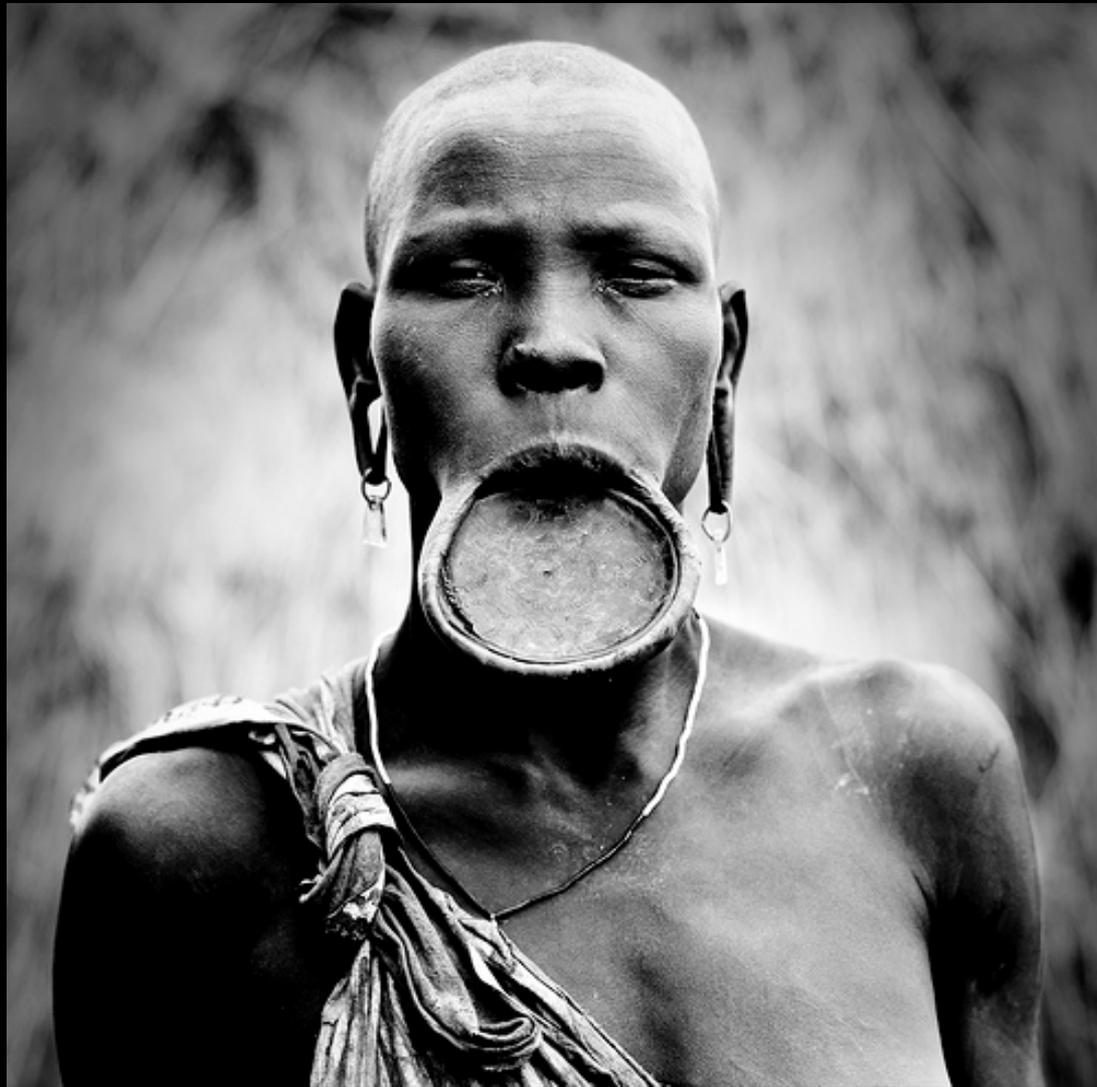
vkládají si do vzniklých ran kulaté talířky z pálené hlíny, kovové a dřevěné válečky, kruhové prstence, želví krunýče



K samotným Mursi se musí jet do národního parku Mago. Cesta je vyložená. Hned za Jinkou se překonává tok menší řeky širší a hluboký. Nežpevniná hlinitá cesta dále pokračuje až k vjezdovému, který zavede skupinu do Head quarters parku, kde se platí za vydat úzkou "polní" cestou dále do parku, která je v období začínají asi 20 km od střediska parku.

V samotné vesnici se platí poplatek za parkování, platí se





Mursi woman with labret

Omo valley, Ethiopia

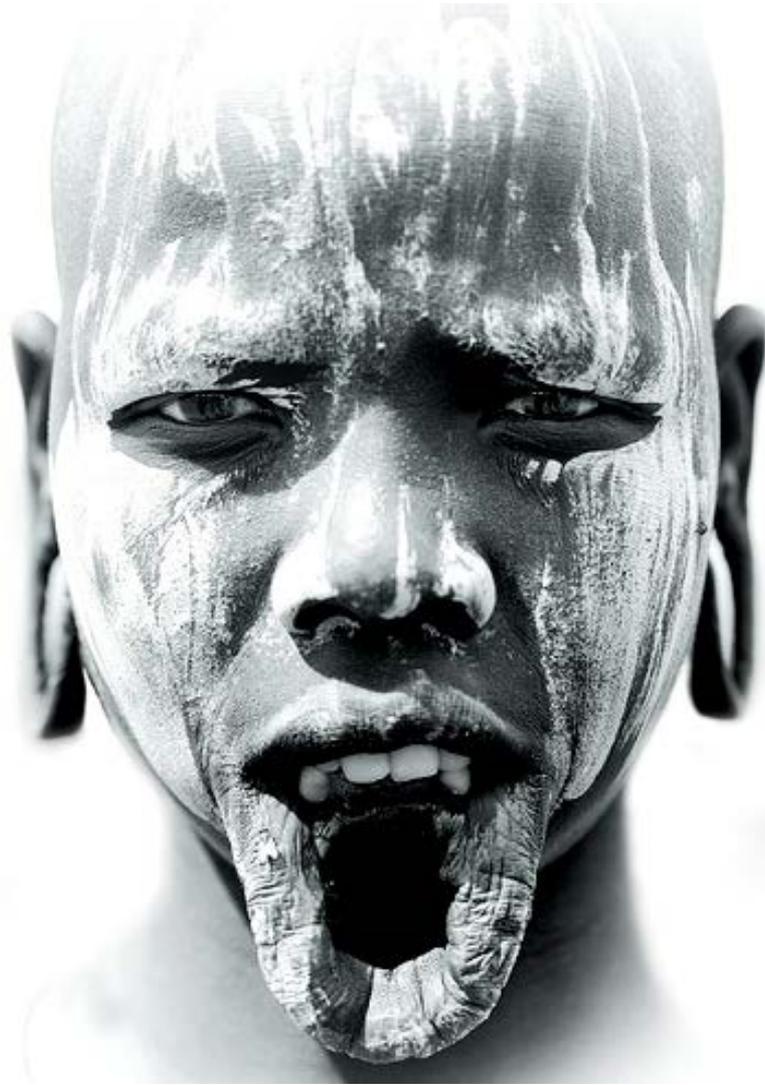
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Mursi woman with labret

Omo valley, Ethiopia

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Mursi woman

Omo valley, Ethiopia

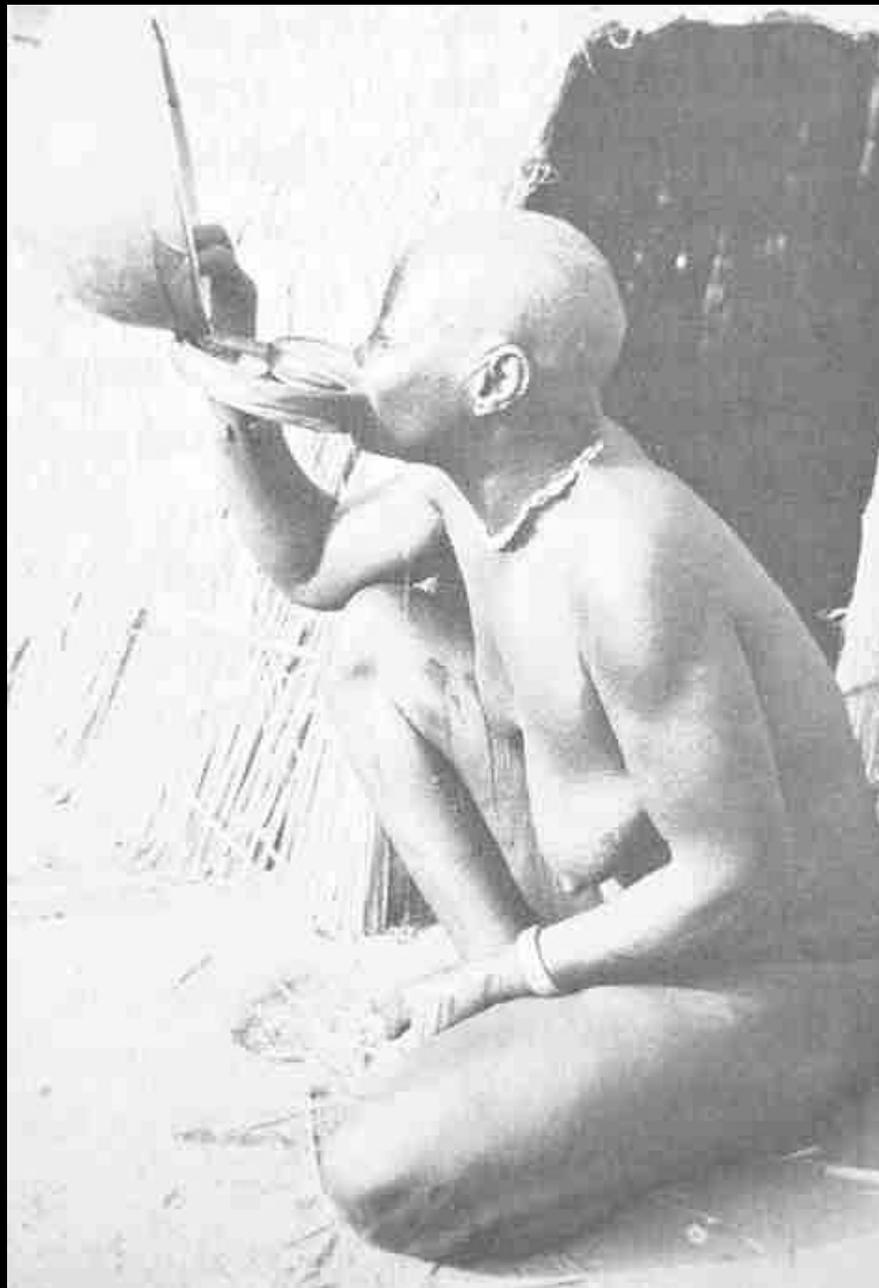
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Mursi woman with labret

Omo valley, Ethiopia

<http://flickr.com/photos/41622708@N00/3791415577>



Sara-kaba woman near Lake Chad

MAMMALIA.

ORDER I. PRIMATES.

Fore-teeth cutting; upper 4, parallel; teats 2 pectoral.

1. HOMO.

Sapient. Diurnal; varying by education and situation.

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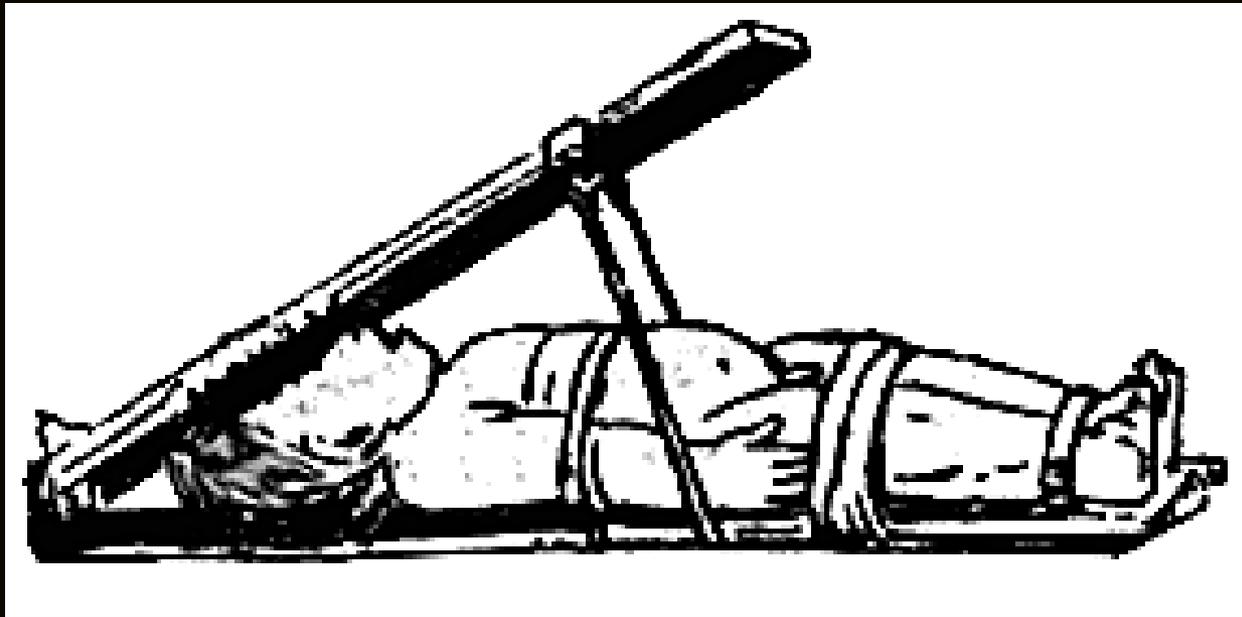
The physical, physiological, natural, moral, civil and social histories of man, are best described by their respective writers.

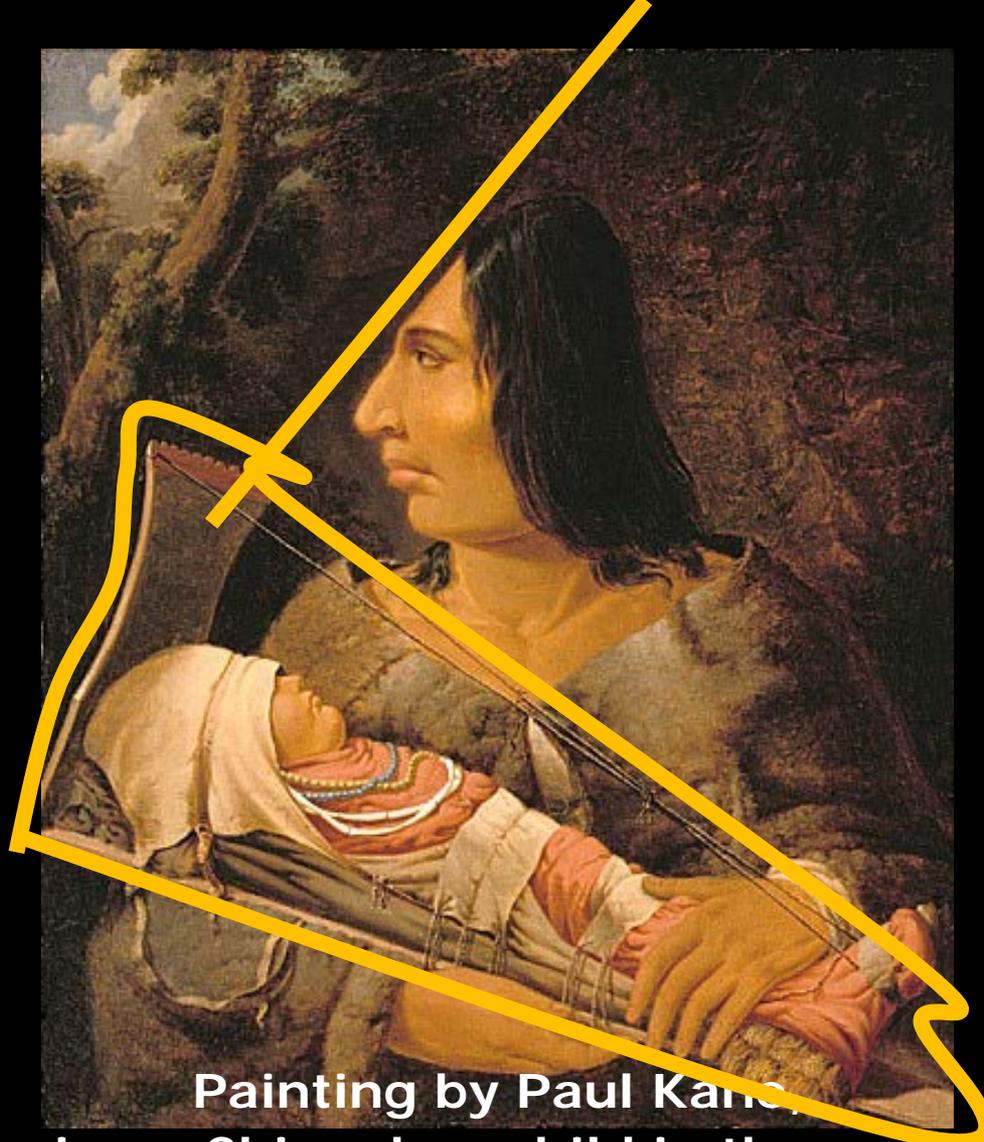
Vol. I.—C

2. SIMIA.



Koskimo (Kwakiutl) woman





Painting by Paul Kane, showing a Chinookan child in the process of having its head flattened, and an adult after the process.

http://en.wikipedia.org/wiki/Head_flattening

Homo monstrosus

Because everybody knew
they existed !

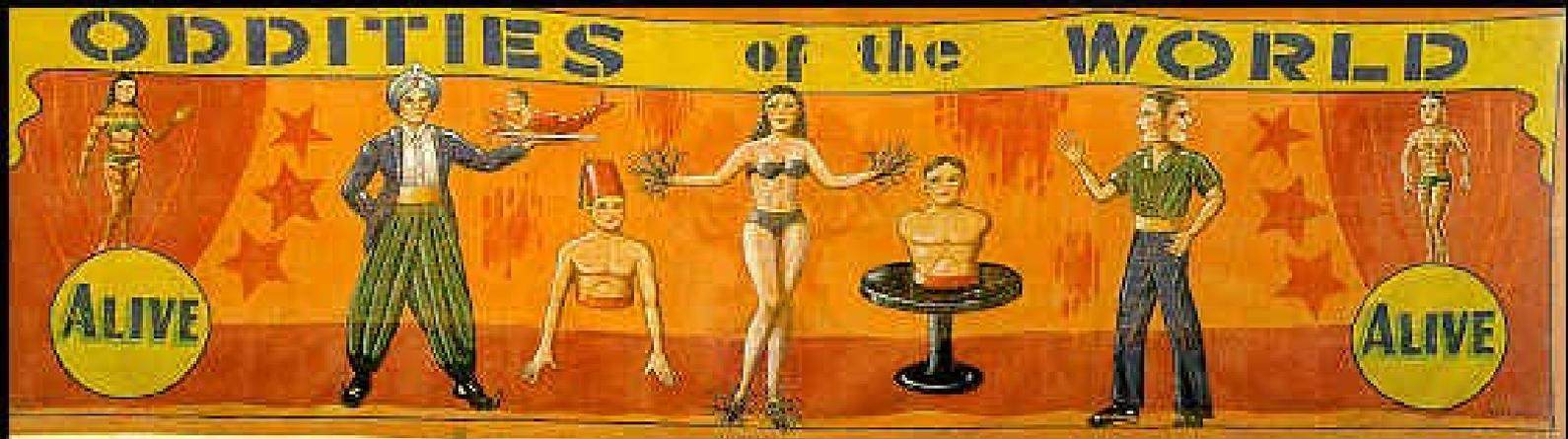
**And they even saw them at
the “freak shows”**



P. T. Barnum and "Commodore Nutt"

"Range of Variation"

FIG. 9. P. T. Barnum and Commodore Nutt. Nutt was a dwarf and a popular "curiosity" at the American Museum. Photo by Gurney, c. 1863. (Becker Coll., Syracuse University.)



One Man's Eye - Mozilla

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CONGRESS OF FREAKS WITH RINGLING BROTHERS AND BARNUM & BAILEY (COMBINED) CIRCUS
1904 - 1905

Photo by CENTURY

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Ringling Brothers and Barnum and Bailey "Freak Show"



SARTLEE, THE HOTTENTOT VENUS.
NOW Exhibiting in London.
Drawn from Life

Saartjie Baartman
1789 - 1815

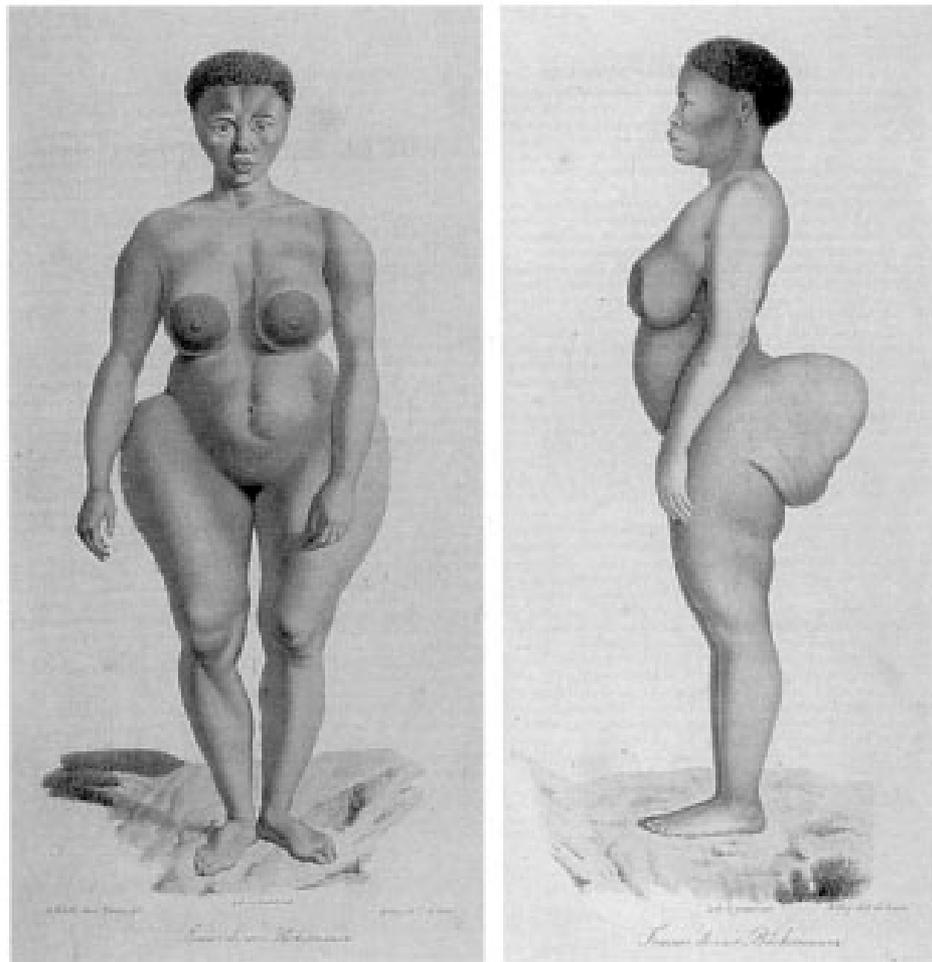
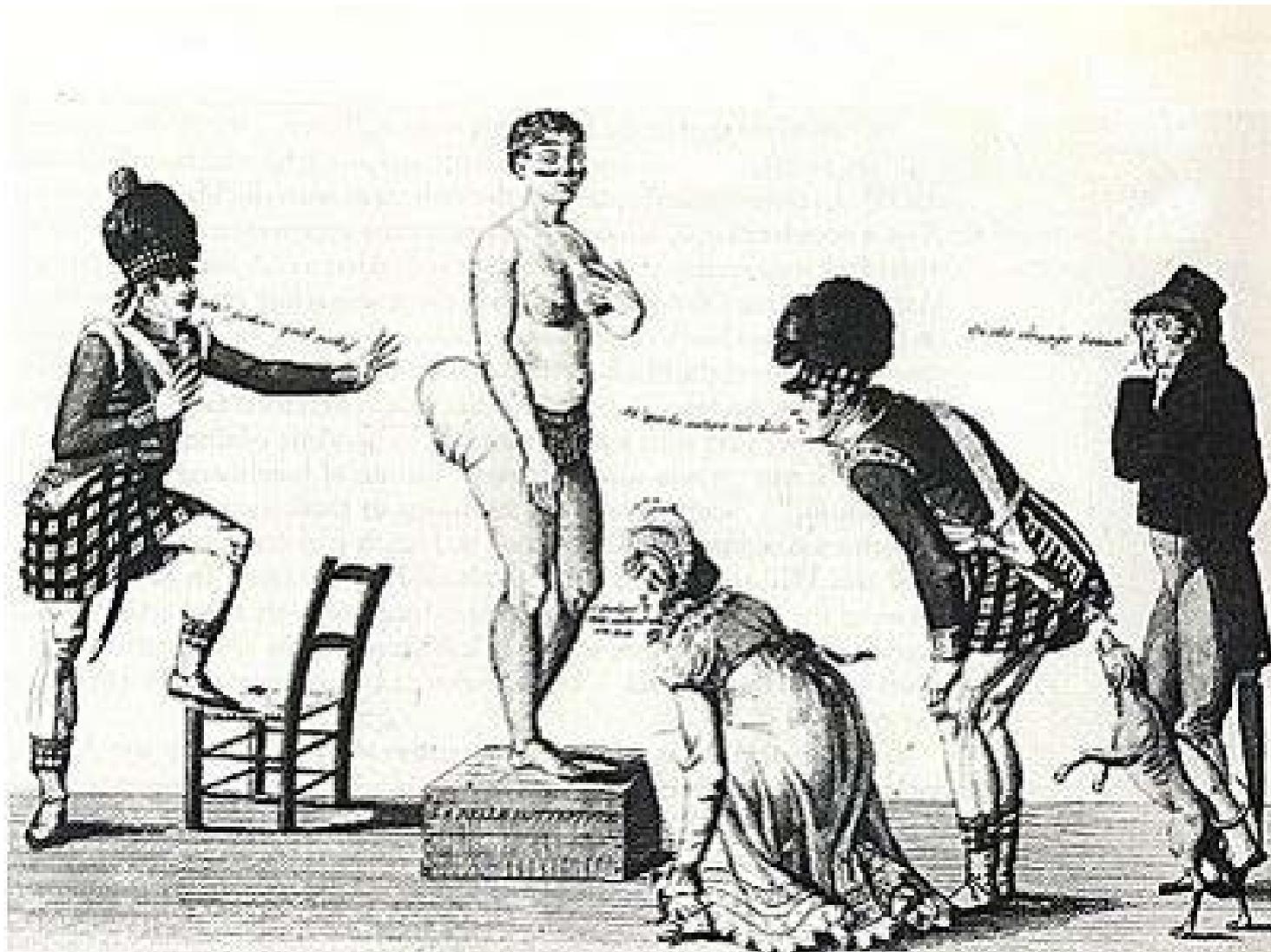


Figura 2: Étienne Geoffroy Saint-Hilaire. *A História natural dos mamíferos com figuras originais coloridas, desenhadas a partir de animais vivos*, Paris, A. Belin, 1824, tomo 1, pranchas 1 e 2; Paris, Muséum d'Histoire Naturelle, biblioteca.

Saartjie Baartman
1789 - 1815



Saartjie Baartman
1789 - 1815



http://en.wikipedia.org/wiki/Saartjie_Baartman

She died on 29 December **1815**

Her skeleton, preserved genitals and brain were placed
on display in Paris' *Musée de l'Homme* until 1974.

Her remains were repatriated to her homeland, the Gamtoos
Valley, on 6 May 2002 and she was

finally laid to rest on 9 August 2002

on Vergaderingskop, a hill in the town of Hankey

over 200 years after her birth.

Saartjie Baartman

1789 - 1815

http://en.wikipedia.org/wiki/Saartjie_Baartman

She died on 29 December **1815**

Her skeleton, preserved genitals and brain were placed
on display in Paris' *Musée de l'Homme* until 1974.

Her remains were repatriated to her homeland, the Gamtoos
Valley, on 6 May 2002 and she was

finally laid to rest on 9 August 2002

on Vergaderingskop, a hill in the town of Hankey

over 200 years after her birth.

Saartjie Baartman

1789 - 1815

http://en.wikipedia.org/wiki/Saartjie_Baartman



Saartjie Baartman
1789 - 1815

You are in: World: **Europe**

Monday, 29 April, 2002, 14:35 GMT 15:35 UK

'Hottentot Venus' goes home



Ambassador Skweyiya accepted the remains for South Africa

The remains of an African woman who was paraded around Europe as a freak and scientific curiosity have been handed back to the South African Government in a symbolic gesture of reconciliation by France.

The skeleton and bottled organs of Saarti Baartman - who was known as the "Hottentot Venus" for her pronounced buttocks and genitals -

WATCH/LISTEN ON THIS STORY

- The BBC's Hugh Schofield**
"Saartjie Baartman's fate became a symbol of European colonial attitudes to Africa"

See also:

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- ▶ 26 Feb 02 | Country profiles Country profile: South Africa

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- ▶ **Internet links:**
- ▶ Musée de l'Homme - information
- ▶ South African Department of Arts, Culture, Science and Technology

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6 May 2002

August 2009

The cadavers are preserved through a process called polymer preservation, whereby the 90 percent of the corpse that is water gets replaced by silicone polymer, which, after hardening, turns body tissue into a preserved rubber-like material.



BODIES Exhibit in Paris an at The Mall of America



Produced by Premiere Exhibitions, Inc. "BODIES" has elicited no shortage of outrage as it has journeyed around the world. In April an exhibit in Paris was shut down after a French court ruled that displaying dead people for profit is a "violation of the respect owed to them." In pronouncing the ruling, Judge Louis-Marie Raingeard said that, "under the law, the proper place for corpses is in the cemetery."

August 2009



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Page last updated at 11:50 GMT, Monday, 7 July 2008 12:50 UK

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Aborigine skulls to be taken home

A delegation of Aboriginal people from Australia has arrived in Edinburgh to take home human remains.

The six skulls and a human ear bone are in collections belonging to the National Museums of Scotland and Edinburgh University.

Four members of the Ngarrindjeri people made the trip to take home their ancestor's remains.

Aboriginal people and the Australian Government have fought to repatriate remains from museum collections.

On Monday morning, the Ngarrindjeri people burned eucalyptus leaves in front of the university's McEwan Hall in a "smoking ceremony".



A ritual Smoking Ceremony was conducted at the university

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Posted on Wed, Aug. 30, 2006
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Let's hope we all survive this bad TV idea

Commentary by ROBIN WASHINGTON

If you hadn't planned on watching the new season of "Survivor" premiering on CBS (locally, KDLH Channel 3) next week, don't let me change your mind. In what the network insists isn't a ratings play for the grand-dad of reality shows, the 20 contestants "stranded" on the Cook Islands in the South Pacific will be divided by race -- black, white, Asian and Hispanic

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"It all amounts to a 21st Century version of a circus freak show; no one is supposed to watch junk like that but everyone does."

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The other reason reality is all over the dial is the "they-can't-do-that!" factor in which contestants are subjected to horrors ranging from being covered in

- The National
- Jeff Probst

Important People / Works

Jonathan Swift

(1667 - 1745)

Gulliver's Travels

1726



*Compositum ius, fideque animi, sanctaeque recessus
Mentis, et incertum generose pectus honesto.*

TRAVELS
INTO SEVERAL
Remote Nations
OF THE
WORLD.

IN FOUR PARTS.

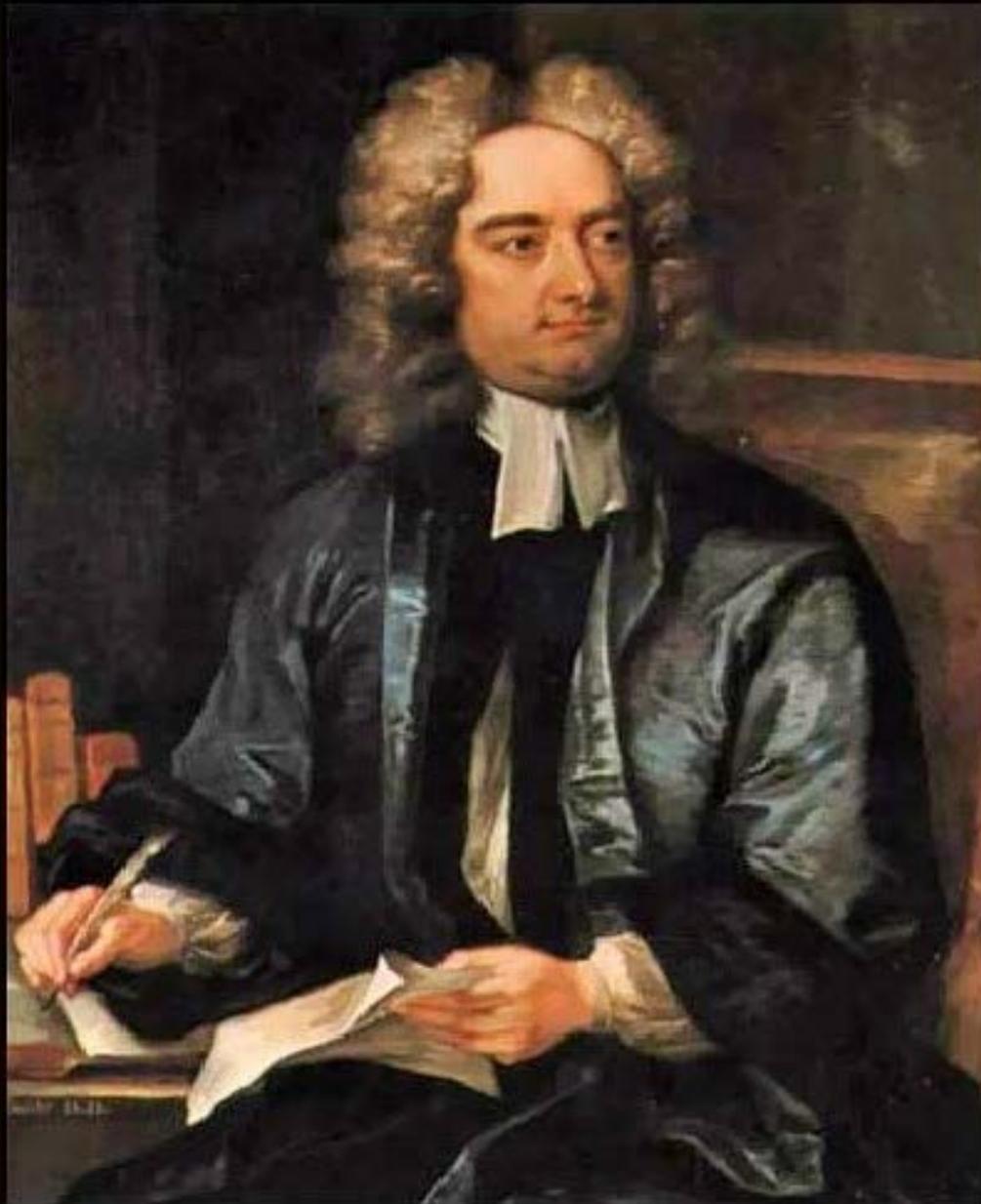
By *LEMUEL GULLIVER*,
first a SURGEON, and then a CAPTAIN
of several SHIPS.

VOL. I.

LONDON:

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Temple-Gate in Fleet-street.
M, DCC, XXVI.

1726

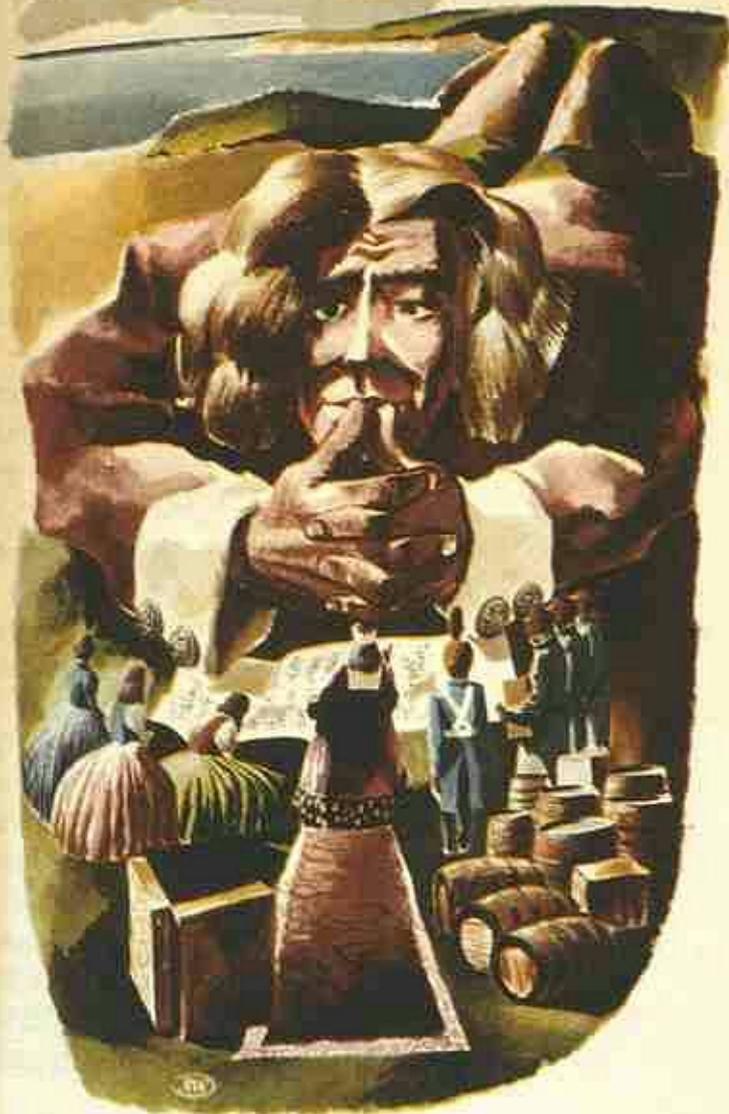


http://en.wikipedia.org/wiki/Jonathan_swift

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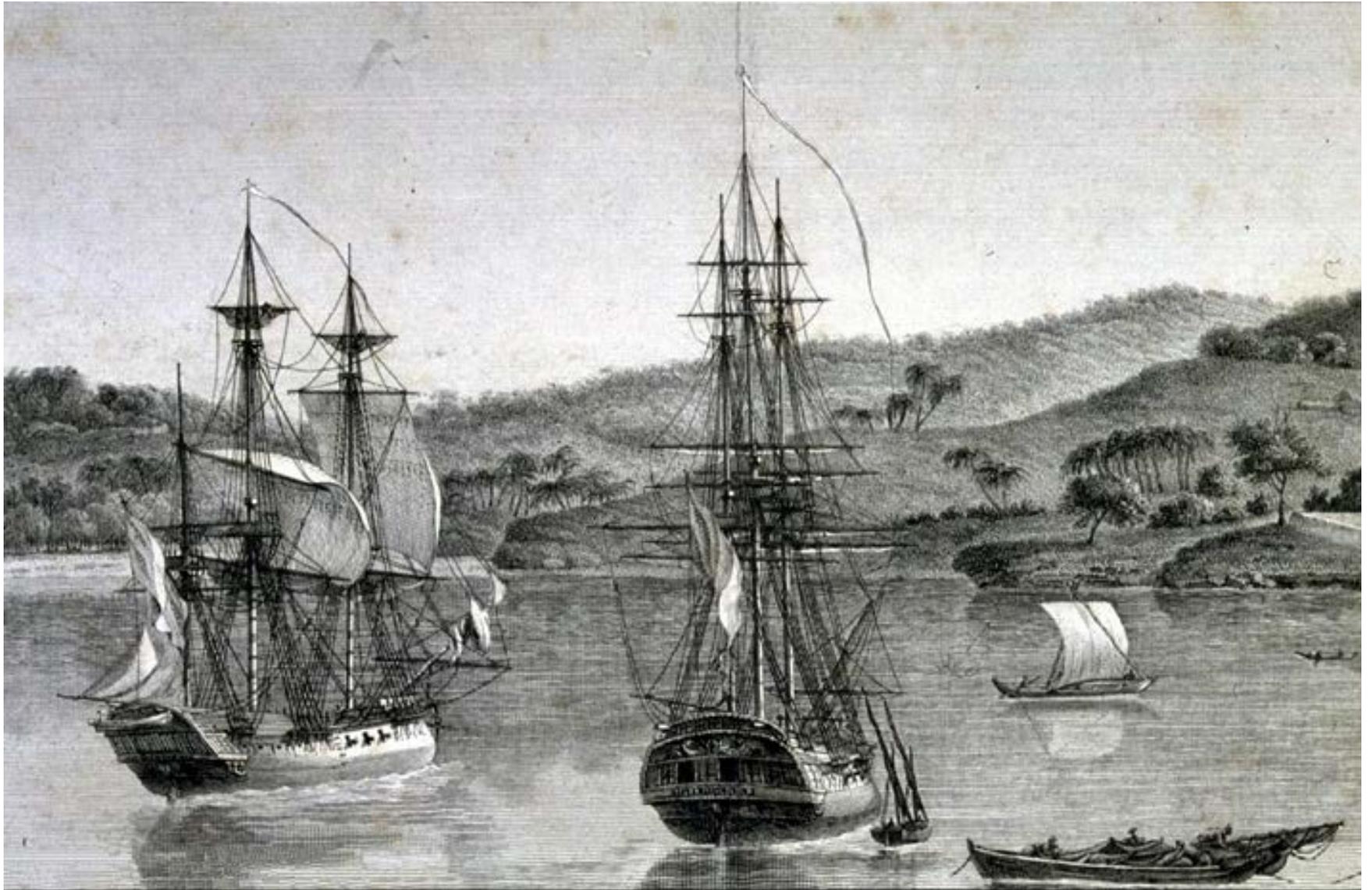
I lay down on my face to kiss his hand



**meanwhile images
of the colonial people
continue to set the
mental picture
of peoples from
around the world**

**For example,
The Baudin expedition
to Australia
1800 to 1803**

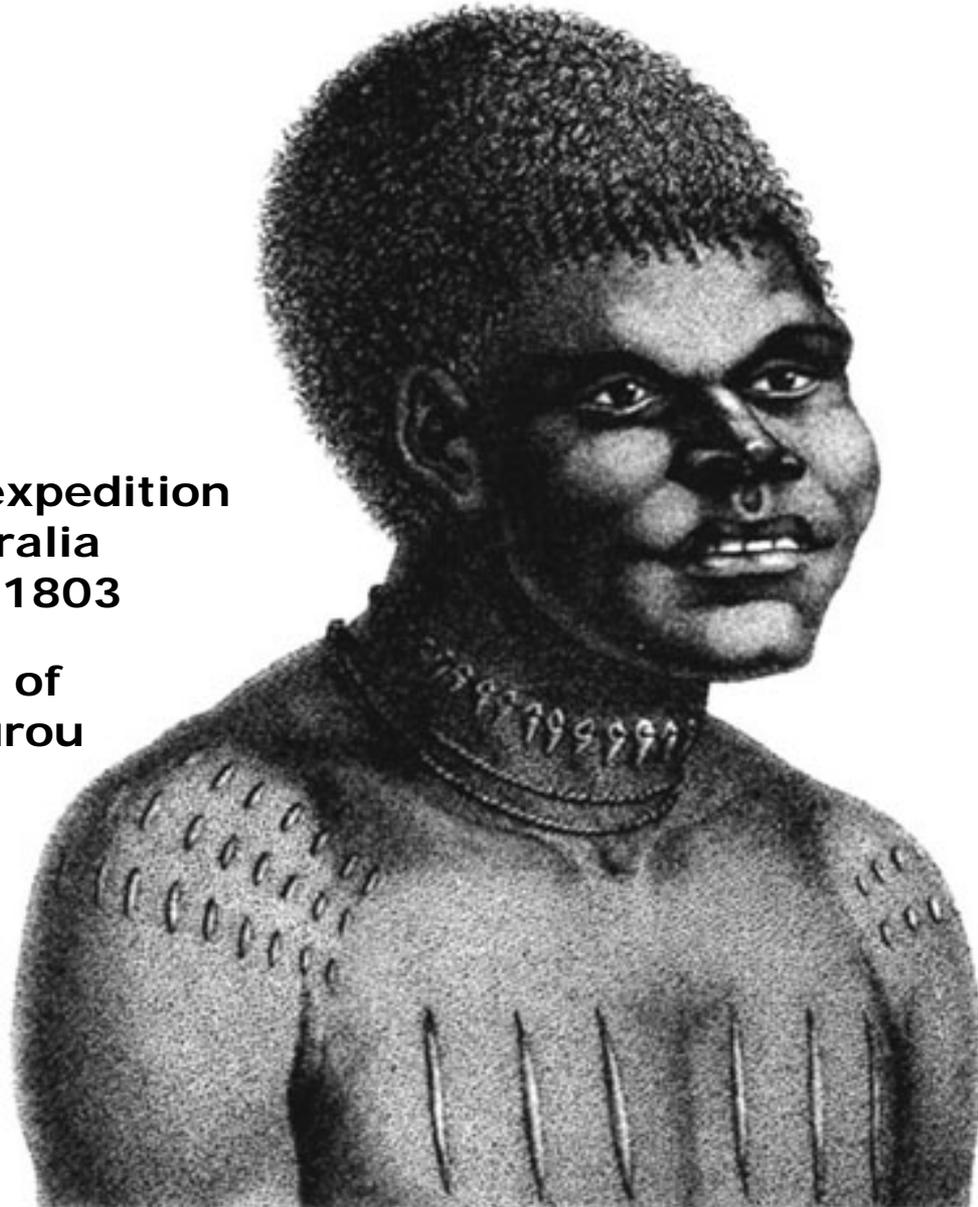
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of peoples from
around the world**



http://en.wikipedia.org/wiki/Baudin_expedition_to_Australia

**The Baudin expedition
to Australia
1800 to 1803**

**Portrait of
Bara-Ourou**



Artist: Nicolas-Martin Petit

<http://www.andaman.org/BOOK/chapter52/5-Tasmania-traditional/traditional.htm>

**The Baudin expedition
to Australia
1800 to 1803**





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Trugernanner

From Wikipedia, the free encyclopedia

(Redirected from [Trucanini](#))

Truganini, often known as **Trugernanner** (circa 1812–[May 8, 1876](#)), was a woman generally considered to be the last full blood **Tasmanian Aborigine**.

There are a number of different versions of her name, including **Trugannini**, **Trucanini** and **Trucaninny**. Trugernanner was also widely known by the nickname "**Lalla Rooke**".

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- 1** [Truganini's life](#)
 - 1.1** [Early life](#)
 - 1.2** [Final years and legacy](#)
- 2** [Cultural references](#)
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Truganini's life [edit]

Early life [edit]

Truganini was born in circa 1812 on [Bruny Island](#), south of today's **Tasmanian** capital **Hobart**, and separated from the Tasmanian mainland by the [D'Entrecasteaux Channel](#).^[1] She was a daughter of Mangana

Truganini (Trugananner)



Truganini in 1866.

Born	circa 1812 Bruny Island , Australia
Died	May 8, 1876

And there were many others. . . .

REM?

Major problems in the “Pre – Scientific” Period

1. Humans were thought to have had ancient origins corresponding to the time of the creation of the earth
2. Earth was thought of as a Young Place

James Hutton

(1726 - 1797)

Theory of the Earth

1775

**first demonstrated the
immense antiquity of the
earth**

James Hutton

(1726 - 1797)



Glossary

“deep time”

The theory that the earth is billions of years old and thus has a long history of development and change

Charles Lyell

(1797 - 1875)



Important People / Works

Charles Lyell
(1797 - 1875)

Principles of Geology
1830

~

“Uniformitarianism”

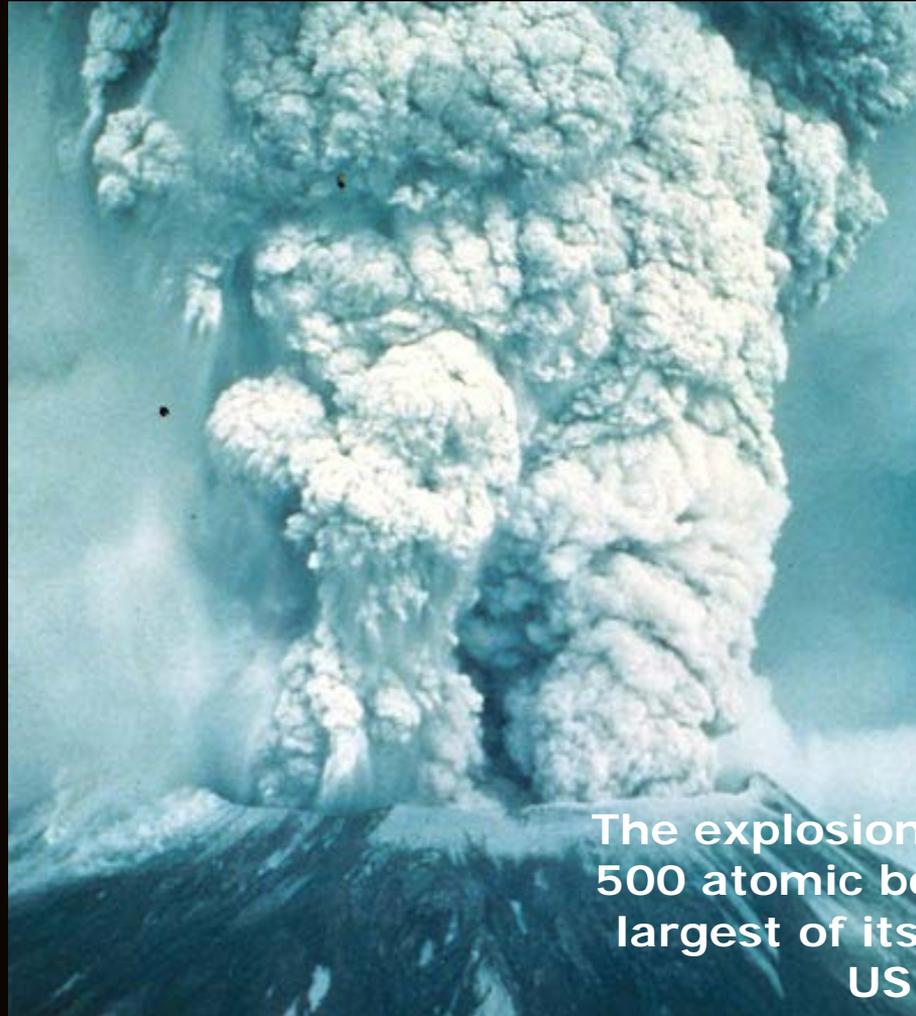
Important People / Works

Charles Lyell
(1797 - 1875)

Principles of Geology
1830

~

“Uniformitarianism”



The explosion had the power of 500 atomic bombs and was the largest of its kind in recorded US history

Mount St Helens erupted at 0832 on 18 May 1980, sending a plume of ash 15 miles (24 km) into the sky . . .



**River of fire: Lava streams from the
Hawaiian volcano Kilauea in 1959**

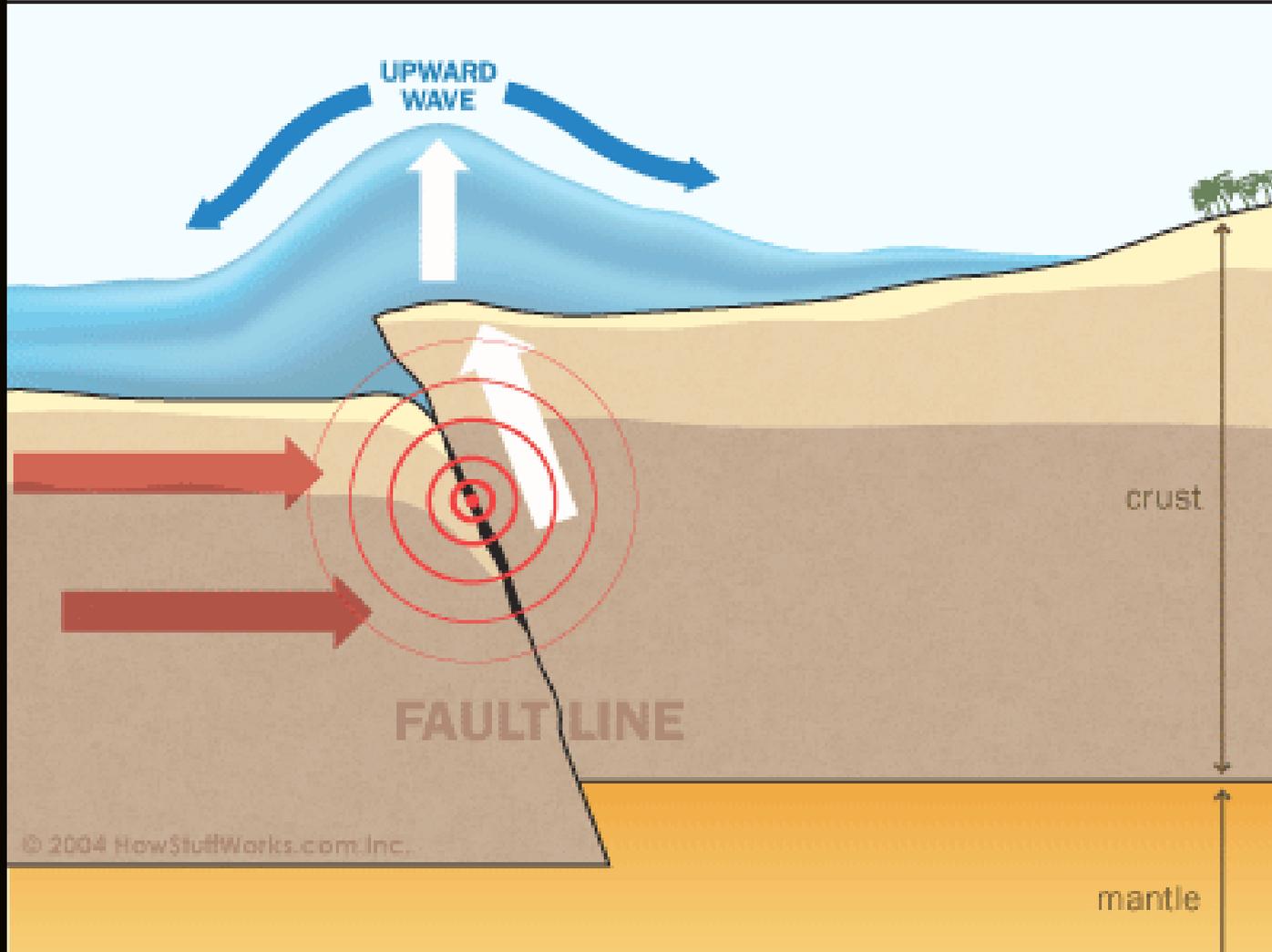
<http://www.bbc.co.uk/sn/tvradio/programmes/supervolcano/article2.shtml>



On Boxing Day 2004, a powerful earthquake off the Indonesian coast triggered a tsunami that reached the shores of three continents leading to the deaths of more than 200,000 people

<http://news.bbc.co.uk/2/hi/science/nature/4381395.stm>

How Tsunamis Work: Tsunamigenesis



tsunamis

<http://weir.vsb.bc.ca/library/disasters.html>

http://news.bbc.co.uk/2/hi/in_pictures/4802458.stm

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Deadly history of earthquakes

Earthquakes have claimed hundreds of thousands of lives in the last 100 years and improvements in technology have only slightly reduced the death toll.

15 August 2007

At least 437 people are killed in Peru's coastal province of Ica, as a 7.90-magnitude undersea earthquake strikes about 145km (90 miles) south-east of the capital, Lima.

17 July 2006:

A 7.7 magnitude undersea earthquake triggers a tsunami that strikes a 200km (125-mile) stretch of the southern coast of



The Kobe quake highlighted Japan's lack of disaster preparation

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Action call on disappearing coast

Wales has been urged to take "urgent action" to prepare for the impact of coastal erosion and flooding.



The National Trust has warned of flooding at 66 sites

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The National Trust says three-quarters of the Welsh coastline it owns could be badly affected over the next century.

It owns a sixth of Wales' coast, or over 143 miles (230km), and its report, *Shifting Shores*, says policymakers must plan for "a future of advancing seas".

Environment Minister Carwyn Jones said it was "entirely consistent" with the Welsh Assembly Government's approach.

The National Trust In Wales warns that 66

VIDEO AND AUDIO NEWS

Eggsy from Goldie Looking Chain discusses coastal erosion

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In pictures: Africa's deadly floods

Some 1.5m people across Africa have been affected and at least 250 killed by floods - the worst for several decades.

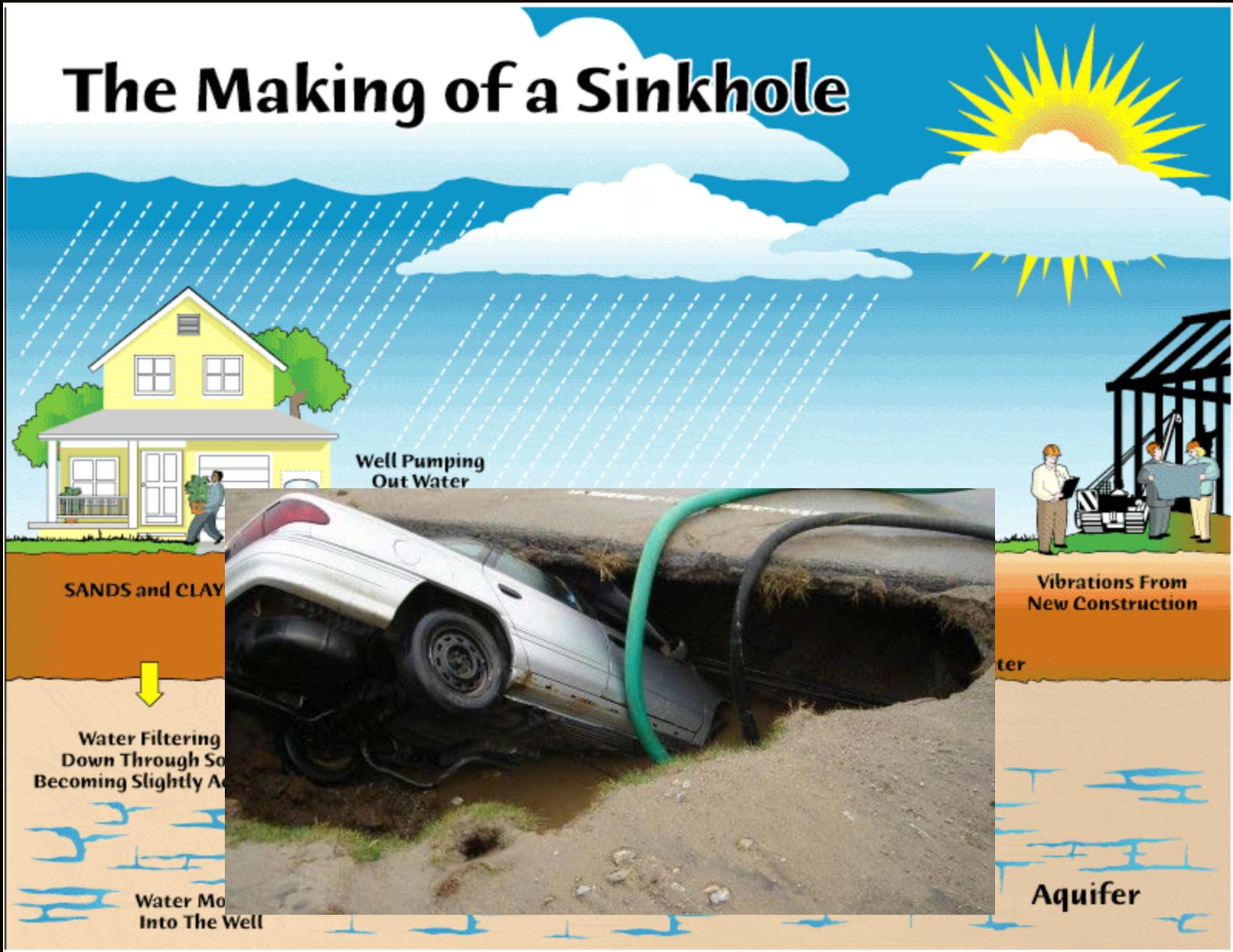
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The Making of a Sinkhole



Published: 03:52 EST, September 23, 2007

Rising Seas Likely to Flood U.S. History

By SETH BÖRENSTEIN, AP Science Writer



Photo/Paul Sakuma)

Climatologist Stephen Schneider of Stanford University talks about the water level before Oracle Corp. headquarters in Redwood City, Calif., Sept. 6, 2007. Rising ocean waters brought on by global warming may bring the Pacific Coast to the foot of the Oracle towers in a hundred years or so, scientists say. (AP

(AP) -- Ultimately, rising seas will likely swamp the first American settlement in Jamestown, Va., as well as the Florida launch pad that sent the first American into orbit, many climate scientists are predicting.

In about a century, some of the places that make America what it is may be slowly erased.

Global warming - through a combination of melting glaciers, disappearing ice sheets and warmer waters expanding - is expected to cause oceans to rise by one meter, or about 39 inches. It will happen regardless of any future actions to curb

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Rising sea levels threaten history



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as well as the Florida launch pad that sent

Stanford University biologist Terry Root says that in a hundred years or so rising ocean waters from global warming may kill the last remaining wetlands in Palo Alto, Calif., behind her Sept. 6, 2007. (AP Photo/Paul Sakuma)

http://news.bbc.co.uk/2/hi/science/nature/5324984.stm

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How a tornado is formed

Tornadoes are among the most violent storms on Earth, with the potential to cause very serious damage.

Although no two tornadoes are the same, they need certain conditions to form - particularly intense or unseasonable heat.



As the ground temperature increases, moist air heats and starts to rise.

NATURAL DISASTERS

Animated guides to the world's most devastating phenomena

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The official hurricane season begins on 1st June and lasts until November.

Hurricanes occur most often between August and October. The term hurricane is used to describe storms that occur in the Atlantic with wind speeds of 75mph and above. Storms that form on the western side of the Pacific, through the Philippines, China, Vietnam and Japan are called typhoons.

The storms that frequent the Bay of Bengal and caused damage and misery to Bangladesh are known as tropical cyclones. They also affect areas from the Indian Ocean to eastern Africa and through Indonesia to the northern coasts of Australia.

The areas of hurricane development
The most favourable areas for hurricane development changes throughout the hurricane season, particularly as the sea temperatures in the 'basins' increase and then decrease with the coming and going of the

Key Points

- At the beginning of the season, storms tend to form in the Gulf of Mexico.
- At the peak of the season, the sea near the Lesser Antilles and close to the Cape Verde Islands is a likely source.
- At the end of the season, more storms occur in the western Caribbean.

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In pictures: Felix aftermath



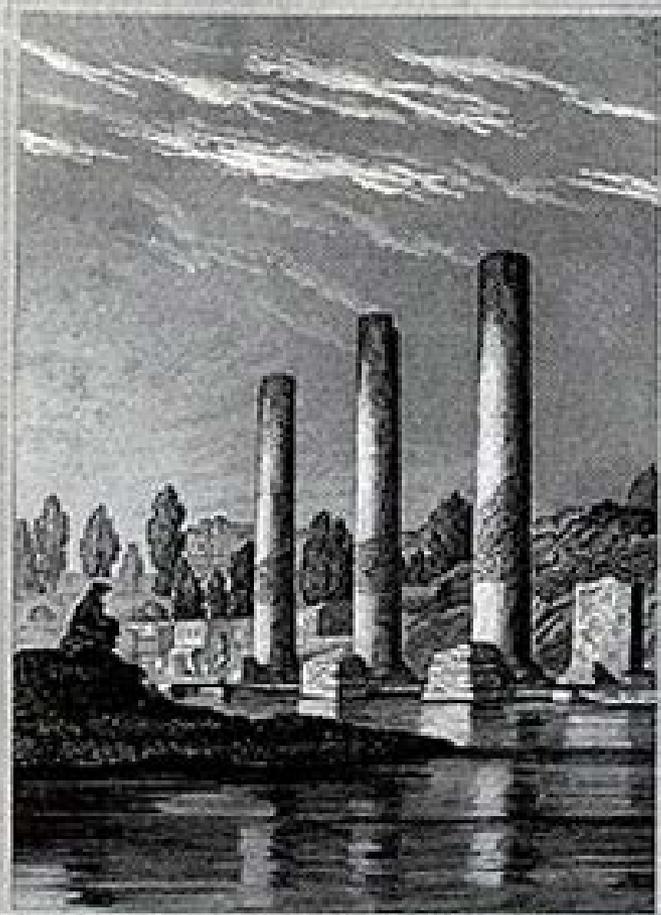
Hurricane Felix cuts Nicaragua's low-lying coastal strip, leaving dozens dead and thousands missing. [Back](#) [1](#) [2](#) [3](#) [4](#)

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Remains of the Temple of Clajus at Tegyus.

PRINCIPLES
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GEOLOGY.

AN ATTEMPT TO EXPLAIN THE FORMER CHANGES
OF THE EARTH'S SURFACE.

BY REFERENCE TO CAUSES NOW IN OPERATION.

BY
CHARLES LYELL, Esq., F.R.S.

FOUNDED BY SIR HENRY DEE, Bart.

IN TWO VOLUMES.

Vol. I.

LONDON:
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uniformitarianism

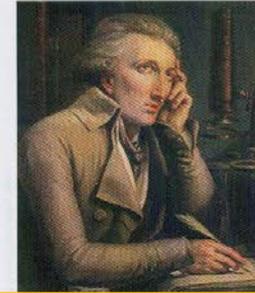
The theory that the earth's features are the result of long-term processes that continue to operate in the present as they did in the past

- elaborated on by Lyell, this theory opposed catastrophism and provided for immense geological time**

emphasized the importance of interactions between organisms and the external environment and tried to explain them. Moreover, he coined the term *biology* to refer to studies of living organisms.

Georges Cuvier Georges Cuvier (1769–1832), the most vehement opponent of Lamarck, was a French vertebrate paleontologist who introduced the concept of extinction to explain the disappearance of animals represented by fossils (Fig. 2-4). Although a brilliant anatomist, Cuvier never grasped the dynamic concept of nature, and he insisted on the fixity of species. So, rather than assume that similarities between certain fossil forms and living species indicated evolutionary relationships, he suggested a variation of a theory known as **catastrophism**.

Catastrophism was the belief that the earth's geological features are the results of sudden, worldwide cataclysmic events like the Noah flood. Cuvier's version of catastrophism suggested that a series of regional disasters had destroyed most or all of the plant and animal life in various places. These areas were then restocked with new, similar forms



uniformitarianism The theory that the earth's features are the result of long-term processes that continue to operate in the present as they did in the past. Elaborated on by Lyell, this theory opposed catastrophism and contributed strongly to the concept of immense geological time.

10th ed., p. 25

uniformitarianism, which Cuvier's theory that by first being proposed by James Hutton in the late 1700s. Even so, it was Lyell who demonstrated that such forces as wind, water erosion, local flooding, frost, decomposition of vegetation, volcanoes, earthquakes, and glacial movements had all contributed in the past to produce the geological landscape that exists in the present. What's more, the fact that these processes still occurred indicated that geological change was still happening and that the forces driving such change were consistent, or *uniform*, over time. In other words, although various aspects of the earth's surface (for example, climate, plants, animals, and land surfaces) are variable through time, the *underlying processes* that influence them are constant.

modelled by Cuvier, especially in opposition

uniformitarianism The theory that the earth's features are the result of long-term processes that continue to operate in the present as they did in the past. Elaborated on by Lyell, this theory opposed catastrophism and contributed strongly to the concept of immense geological time.

Jacques Boucher de Crève-cœur de Perthes

http://en.wikipedia.org/wiki/Jacques_Boucher_de_Perthes

Jacques Boucher de Crève-cœur de **Perthes**

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http://en.wikipedia.org/wiki/Jacques_Boucher_de_Perthes

Important People / Works

Jacques Boucher de Crèvecoeur de Perthes
in 1838 - 1839:

**“Chipped stone tools are
human artifacts.”**

Important People / Works

Jacques Boucher de Crèvecoeur de Perthes
in 1838 - 1839:

**“And the tools may be
as old as a *million*
years.”**

Prehistoric Cultures

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History of Thought: Darwin and Wallace