Psalm 8, vs. 3-5

“When I consider your heavens,
The work of your fingers,
The moon and the stars,
which you have set in place,
what is man that you are mindful of him,
The son of man that you care for him?
You made him a little lower that the heavenly beings, and crowned him with glory and honor.
Overall Progression

I. Early Anatomical Investigations & Taxonomy
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III. Initial Finds of Neanderthals in mid-late 1800’s
IV. Discoveries, Interpretations & Frauds, 1890-1920.
V. Australopithecines—south & east Africa: mid-1900’s
VI. *H. erectus* & *H. ergaster*
VII. Later Discoveries in east Africa
VIII. Current Discussion and Controversies

I. Early Anatomical Investigation & Taxonomy
The Anatomy Lesson of Nicolas Tulp
(Rembrandt van Rijn, 1632)

1600’s: Anatomists examine apes

- 1641: Nicolas Tulp publishes “Homo sylvestris: Orang-outang” in *Observationes medicae*
  --observations on (live) juvenile female ape, probably chimpanzee, in the menagerie of Frederick Henry, Prince of Orange.
  --equated with the satyr of antiquity (e.g., Pliny)
“Satyricus indicus”

1699: Edward Tyson, M.D. (1650-1708)

• --English anatomist
• --provided small chimpanzee (possibly orang-outan) brought in on ship; died of infection.
Illustrations from Tyson, 1699

Tyson, 1699, p. 94:

“The catalogue of both (features) are so large, that they sufficiently evince, that our Pygmie is no Man, nor yet the common ape; but a sort of animal between both, and tho’ a biped, yet of the Quadrumanus kind: tho’ some men, too, have been observed to use their feet like hands, as I have seen several”
Carolinus Linneaus (mid-1700’s)

Linnaeus: Order Primates includes genus *Homo*

From 9th edition, 1756
Gorilla

1848: “Osteological Contributions to the Natural History of the Chimpanzees (Troglodytes, Geoffroy), Including the Description of the Skull of a Large Species (Troglodytes gorilla, Savage), Discovered by Thomas S. Savage, M.D., in the Gaboon Country, West Africa.

Transactions of the Zoological Society Of London 3:381-422.

Richard Owen, Hunterian Prof. of Anatomy, Royal College of Surgeons, London

II. Archaeological Finds in the Early and Mid-1800’s
1797: John Frere (1740-1807) locates stone implements in gravels, 12 feet below surface, Hoxne, Suffolk, England

1820’s: William Buckland and others excavate British caves

1823: Buckland publishes *Reliquiae Diluvianae, or Observations on the Organic Remains Contained in Caves, Fissures, and Diluvial Gravel, and on Other Geological Phenomena, Attesting the Action of a Universal Deluge*
1840’s-50’s: Boucher des Perthes (1788-1868) excavates worked flints in Amiens region, Somme River Valley

Des Perthes publishes 3 volumes, *Celtic and Antediluvian Antiquities*

--Later stratigraphy reveals the gravels to be 500,000 + yrs.

Stone biface from St. Acheul
University of Missouri collections

Charles Lyell (1797-1875)

*The Geological Evidences for the Antiquity of Man* (1863)
John Lubbock, Lord Avebury (1834-1913)

1865: Lubbock publishes *Prehistoric Times, as illustrated by ancient remains, and the manners and customs of modern savages*

--Lubbock coins terms: “Neolithic” and “Paleolithic”

Thomas Henry Huxley (1825-1895)
T. H. Huxley, 1863

*Evidence as to Man’s Place in Nature*

Neanderthal (Feldhofer), 1856

Photo: Smithsonian Institution

Illustration of Feldhofer specimen by Busk, in Huxley, 1863
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III. Initial Finds of Neanderthals in the Mid-Late 1800’s
Neanderthal (Feldhofer), 1856

Photo: Smithsonian Institution

African/European Fossil Hominid Sites
Gibraltar cranium, 1848

Cranium discovered by workmen at Forbes’ Quarry, north face of “the Rock”

Neanderthals: Sites
Neanderthal

Skull: La Ferrassie I, discovered Sept., 1909
Teeth extremely abraded;
wear resembles that of modern Eskimos.

Neanderthal skeleton,
American Museum of Natural History
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IV. Discoveries, Interpretations, and Frauds, 1890-1920
Ernst H.P.A. Haeckel (1834-1919)

Haeckel: *The History of Creation, 1868*

“Ape-men”

=“pithecanthropines”
Eugene Dubois (1858-1940)

Dutch medical doctor; inspired by Ernst Haeckel

Requested assignment to Java, Collected remains at Trinil, on bank of Solo River, 1891

Central Java

Solo River Sites

Sangiran
*Pithecanthropus erectus*,
the “upright ape-man”.

--Today, termed *Homo erectus*

---

**H. erectus**

Sangiran 17, from central Java, 18 km N. of Solo.
Dated at 1.66 m.a.  
Cranial capacity: 1029 cm³.

Photo courtesy U.S. National Museum
Neanderthals: Early Interpretations

Neanderthal skeleton, American Museum of Natural History

Skull: La Ferrassie I, discovered Sept., 1909
Teeth extremely abraded; wear resembles that of modern Eskimos.
Dordogne Canton, S. France:
La Chapelle-aux-Saints (exc. 1905-08)

The “Old Man”:
La Chapelle aux Saints (1908)
The “Old Man” of La Chapelle aux Saints

Site is cave in Dordogne canton, S. France.

Excavated 1908; complete skeleton of adult (30-yr.-old) male

--Skeleton in sleeping posture.

--Deposits include associated ice-age fauna; stone tools.

Marcellin Boule (1861-1942)
Neanderthal restoration, after Boule, Field Museum of Natural History

Image by Frantisek Kupka, 1909, based on Boule’s interpretation

Neanderthal as caveman

Image by Frantisek Kupka, 1909, based on Boule’s interpretation
State of the art: 1910

A) Numerous sites w/ Neanderthal remains, associated with “Mousterian industry” tools (after site of Le Moustier, Dordogne)

B) Controversial remains of *Pithecanthropus* from Java; DuBois becomes increasingly unhelpful.

C) Chronology only crudely ascertained

James Orr, *God’s Image in Man* (1905)  
the Stone Lectures, Princeton Seminary, 1903

“...the tendency in modern scientific speculation has been to claim for man an almost fabulous antiquity. Common estimates are 100,000 or 200,000 years; some, as Dr. A. R. Wallace, would go back half a million....on scientific grounds alone it has been found necessary to retrench enormously the periods claimed for man’s existence on the Earth...the question, then, as to the age of the known remains of man, resolves itself pretty much into this: what period of time has elapsed since the close of the Ice Age? ... These (evidences) yield the result that the post-glacial time cannot be more than ten thousand years, and probably not more than seven thousand.”

James Orr (1844-1913); Evangelical Scottish Presbyterian; Christian apologist (photo: 1909)
B. B. Warfield, 1911
“On the Unity and Antiquity of the Human Race”

“the tremendous drafts on time which were accustomed to be made by the geologists about the middle of last century and which continue to be made by one school of speculative biology today have been definitively set aside, and it is becoming very generally understood that man cannot have existed on the earth more than ten thousand to twenty thousand years”

Benjamin Breckenridge Warfield (1851-1921);
Evangelical American Presbyterian;
Charles Hodge Chair of Christian Theology at Princeton Seminary

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B. B. Warfield, 1911
“On the Unity and Antiquity of the Human Race”

“the evolutionary speculator...is no longer impelled to assume behind the high type of man whose remains in the postglacial deposits are the first intimation of the presence of man on earth, an almost illimitable series of lower and ever lower types of man through which gradually the brute struggled up to the high humanity, records of whose existence alone have been preserved to us. And he is no longer required to postulate immense stretches of time for the progress of this man through paleolithic, neolithic, and metal-using periods...”

Benjamin Breckenridge Warfield (1851-1921);
Evangelical American Presbyterian;
Charles Hodge Chair of Christian Theology at Princeton Seminary
Piltdown, 1908-1915

1908: Workmen digging at Barkham Manor, Piltdown, strike a “coconut”

Charles Dawson, local archaeologist, begins excavations…
The Piltdown Men

Sir Arthur Keith, Hunterian Professor, declares the fossil authentic, “Dawson’s dawn man”.

Eoanthropus dawsoni

Sir Arthur Keith, Hunterian Professor, declares the fossil authentic, “Dawson’s dawn man”.
V. Australopithecines: south & east Africa, mid-1900’s

V. a: South Africa

Taung
Autumn, 1924: Taung child

Discovered by quarry workers at Buxton Lime Works (?

Originally hypothesized to have been killed by other hominids; punctures around orbits match predatory bird claw pattern.

Raymond Dart (1893-1988)
Prof. Anatomy, University of Witwatersrand

Dart christens the fossil: *Australopithecus africanus*, “southern ape from Africa”
South Africa

Sterkfontein, South Africa
Sterkfontein

Curator, Ron Clarke, preparing australopithecine skull

“Mrs. Ples”: *Plesianthropus transvaalensis* christened by Robert Broom, 1938

--Now included within *Australopithecus*

Sts 5, Sterkfontein
Member 4
Pelves:

Sts 14
Chimp

Modern human

South Africa

Swartkrans, Sterkfontein, Kromdrai
Kromdraai & Swartkrans: *Paranthropus robustus*

Described & christened by Robert Broom, late 1930’s, initially on specimens from Kromdraai

V. b: East Africa
Louis Leakey (1903-1972)

Mary Leakey (1913-1996)
Olduvai Gorge, N. Tanzania

Louis Leakey began work: 1931, with Hans Reck…

Olduvai Gorge
Paranthropus (Zinjanthropus) boisei

Discovered 1959 by Mary Leakey
Olduvai Gorge, site FLK 1
Dates on volcanic ash layers in FLK 1 at 1.75 million yrs.

Olduvai hominid 5 (OH 5)
Photo courtesy U.S. National Museum

Paranthropus boisei

Known from several E. African sites:
Olduvia & Peninj, Tanzania;
Koobi Fora & West Turkana, Kenya;
Omo Shungura & Konso Gardula, Ethiopia
Possibly from Malawi as well.

Characterized by massive face, diamond-shaped in frontal view; dished on side view.
Large cranial crests and zygomatic arches.
Paranthropus aethiopicus

KNM WT 17000: the "Black Skull". Collector: Alan Walker, August 1985

Specimens have been collected from: West Turkana, Kenya; Omo, Ethiopia.

What do we know about Paranthropus?

• Time span: 2.5 to 1.3 m.a.
  – Contemporaneous with E. African Homo sp.
• Endocranial volumes between 400 and 550 cm³
• Small incisors & canines; large-crowned, heavily enameled premolars and molars (most-developed in P. boisei): “Megadonty”.
• Postcranially: small; retain basic australopithecine body plan: ape-like upper body on a bipedal lower body.
<table>
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<tr>
<th>Time (millions of years before present)</th>
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<tbody>
<tr>
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<td>P. boisei</td>
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<td>K. platyops</td>
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R. Stearley, redrafted from several sources

**Homo habilis**

KNM 1813, collected by Kamoya Kimeu, at Koobi Fora, Kenya, 1973
**H. habilis**: type specimen, 1960

Types: OH 7: 2 dozen bones and 14 teeth
       OH 8, foot
Discovered by Jonathan Leakey, November 1960

Bones exhibit gnawing by carnivores
--probably hyenas; distal ends of toes gnawed away!

Type of foot, OH 8, demonstrates parallel alignment of metatarsals,
unlike apes or australopithecines, with fully-developed double arch on lower surface.
Ankle designed for weight-bearing.

BUT: OH 62, discovered 1986 in Olduvai Gorge, demonstrates arm bone
proportions which are like those of chimpanzees.

---

**H. habilis** reconstruction

Cranial capacity: 590-700+ cm³

Westfalisches Museum
**Homo rudolfensis (?)**

Skull KNM ER 1470,
Discovered by Bernard Ngeneo, 1972
Age 1.9 m.a.

ECV: 700 cm³

Reconstruction, 2007 by T. Bromage et al.

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</table>
Oldowan tools (“Mode I”)

“Chopper”, formed from quartzite pebble, Swaziland

Oldowan tools span time frame 2.6 m.a. to 1.6 m.a.; known from E. Africa and S. Africa only
Overall Progression

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VI. A: H. erectus: in SE Asia

Zhoukodian skull, composite

Age of deposit: 780,000 to 400,000 yrs.

Photo courtesy U.S. National Museum
“Lantian man”, *Sinanthropus lantiensis*

Discovered by J. K. Wu, 1963 & 1964
Chinese Institute of Vertebrate Paleontology & Paleoanthropology

1982: referred to *H. erectus*

Biostratigraphy & paleomagnetic stratigraphy
Places the cranial remains around 800,000 yrs. before the present—early than Zhoukoudian remains.

Central Java

![Map of Central Java with Solo River Sites and Sangiran marked](image-url)
Back to Java: Ngandong

Described by G.H.R. Von Koenigswald, late 1930’s

Ngandong 7

Photo courtesy U.S. National Museum

H. erectus

Sangiran 17, discovered Sept. 1969. Cranial capacity: 1029 cm³

Photo courtesy U.S. National Museum
**H. erectus/H. ergaster:**
cranial characters

**Brain size:**
ECV 600 to 1100 cm³ in specimens > 1 million yrs.
ECV 750 to 1200 cm³ in specimens < 1 million yrs.

**Locomotor/balance:**
Ant. & post. semicircular canals enlarged
Median nuchal line, indicating nuchal ligament (new feature)

**Facial reorganization:**
Margins of nasal cavity everted
Orbital region of face is wider than midface
Musculo-skeletal comparisons

From Bramble & Lieberman, 2004

Nariokotome Boy,
KNM-WT 15000

Discovered by Kamoya Kimeu, August 1984

Third molars not erupted;
milk canines present in upper jaw

Degree of fusion in epiphyses in upper arm
and pelvic bones, if similar to modern,
yield age estimates in young teens.

Stature: 1.73 meters.

Long bone element ratios are like those
of modern humans
(e.g., relative arm length to leg length)
Narrow hips; barrel-shaped chest
“Lucy”
A. L. 288-1

Nariokotome Boy,
KNM-WT 15000

Musculo-skeletal comparisons

a and b: modern human

c: H. erectus

c and d: chimpanzee

d: Australopithecus

From Bramble & Lieberman, 2004
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Long bone element ratios are like those of modern humans
Early 1970’s: Prospecting the Afar Triangle, Ethiopia

1972 and 1973: Donald Johansen, Maurice Taieb, & Yves Coppens begin Exploration near Hadar, Ethiopia

“Lucy”  
A. L. 288-1

Discovered November 1974, by Donald Johansen  
Hadar, Ethiopia: Adult female, 3.5 feet tall

Christened: *Australopithecus afarensis*

*A. afarensis* currently known from over 400 specimens, from Tanzania, Kenya, Ethiopia.

Trackway at Laetoli, Tanzania
Australopithecus afarensis

Estimated body weight: 26-29 kg.

Trunk region pyramidal

Thigh cannot rotate backward as fully as in Homo

Toes small; foot lacks arch; Big toe rotated slightly outward

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<td>Ardiplithecus kadabba</td>
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<tr>
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R. Stearley, redrafted from several sources
Late 1980’s: Renewed Prospecting in the Afar Triangle, Ethiopia

1989: Berhane Asfaw Invites Tim White, Giday WoldeGabriel & Gen Suwa to an exploration near Hadar

West side, Middle Awash River Valley

Daam Aatu basaltic tuff, 4.42 m.a.

Gaala vitric tuff, 4.42 m.a.
Ardipithecus ramidus

(originally: Australopithecus ramidus)

Afar word “ramid” = “root”.

Ardipithecus: “ground ape”, from Afar word for “ground”.

ARA-VP-6/500
Excavated 1994-95

Est. ECV: 300 to 350 cm$^3$
VIII. Current Discussion and Controversies

• New finds in Chad and elsewhere
• Status of *H. habilis*?
• What about them Neanderthals?
• Origin of anatomically-modern humans
• Cognition in fossil hominids
• Genetic connections

* Sahelanthropus tchadensis *

From lake-margin sediments, dated at 6 to 7 million yrs.

Discovered Central Chad, 2001, by Michel Brunet, Adoum Mahamat, Djinboumalbaye Ahounta and Gongdibe Fanone, and Alain Beauvilain
Status of *H. habilis*?

Neanderthal as caveman

Image by Frantisek Kupka, 1909, based on Boule’s interpretation
What about them Neanderthals?

Origin of anatomically-modern humans
Origin of anatomically-modern humans

Herto, Ethiopia. BOU VP 16/1
Anatomically-modern form
160,000 yrs.

Skhul V, Israel.
Robust archaic modern human,
80,000 to 120,000 yrs.

Cognitive levels?

---More to come, this month
Discussion on Stearley, 2009,
Online at Am. Scientific Affiliation website
Psalm 8, vs. 3-5

“When I consider your heavens,
The work of your fingers,
The moon and the stars,
    which you have set in place,
what is man that you are mindful of him,
    The son of man that you care for him?
You made him a little lower that the heavenly beings, and crowned him with glory and honor.