

Modern Human Origins

Lecture 1: Anatomical and Behavioral Modernity

Yonatan Sahle Hugo Reyes-Centeno Christian Bentz

WS 2018/2019, 22 October 2018







Organization

Lecture Mondays, 12-14:00 c.t. Institut für Naturwissenschafliche Archäologie, Rümelinstraße 23, Room 703

Instructors

Christian Bentz (linguistics) Hugo Reves-Centeno (paleoanthropology) hugo.reves-centeno@uni-tuebingen.de Yonatan Sahle (archaeology)

chris@christianbentz.de yonatan.sahle@uni-tuebingen.de

Course website

http://www.christianbentz.de/teaching.html

<u>Written exam</u>

mix of multiple-choice, short-answer, and essay (90 minutes)

Students in linguistics (Faculty of Philosophy) can use this for one of the following modules: (1) BA Linguistics: Variation, Evolution & Change; (2) MA Linguistics: Language, Variation & Change; (3) MA Linguistics: Research Trends 1.

If you want to get course credits, please sign up at Campus Portal



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	Year	Role	Торіс	Туре	Institution University of Tübingen							
	2017/2018	Lecturer	Modern Human Origins	Lecture								
	2017	Lecturer	Typology: Analyzing Linguistic Diversity	Seminar	University of Tübingen							
	2016/2017	Lecturer	Typology II: Languages of the World	Seminar	University of Tübingen University of Tübingen							
	2015/2016	Lecturer	Typology I: Languages of the World	Lecture								
	2014/2015	Teaching assistant	Foundations in Statistics in R	Course	University of Cambridge							
	2014/2015	Teaching assistant	Basic Quantitative Analyses in R	Course	University of Cambridge							
	2013/2014	Teaching assistant	Bivariate Association in R	Course	University of Cambridge							
	2013/2014	Teaching assistant	Linear Regression Part A in R	Course	University of Cambridge							
	2013/2014	Teaching assistant	Linear Regression Part B in R	Course	University of Cambridge							
	2013/2014	Tutor	History of English (Part II)	Lecture	University of Cambridge							
	2013/2014	Tutor	History of English (Part I)	Lecture	University of Cambridge							
	2012/2013	Teaching assistant	Replication Workshop in R	Course	University of Cambridge							

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If you would like to listen in on the talks please send an e-mail with your full name to chris@christianbentz.de

Details at: http://www.wordsandbones.uni-tuebingen.de/symposium2018/







Modern Human Origins and Dispersal ca. 50 000 and 200 000 years ago



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https://www.youtube.com/watch?v=PUwmA3Q0_OE

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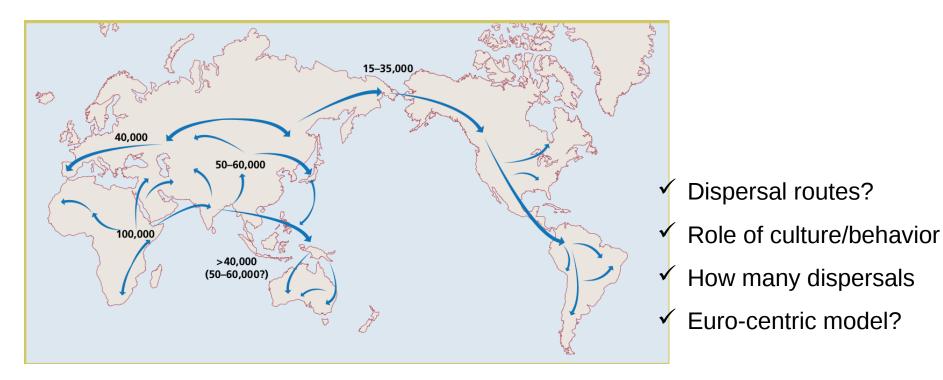
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Consensus/conundrum









The study of human origins

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22/10/2018

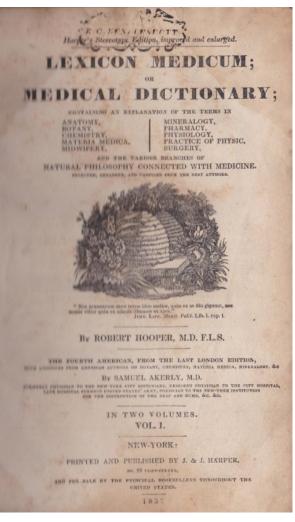






 Anthropos (ανθρωπος) human/people

Génis (γένης) birth, origin (genesis)



Hooper 1839

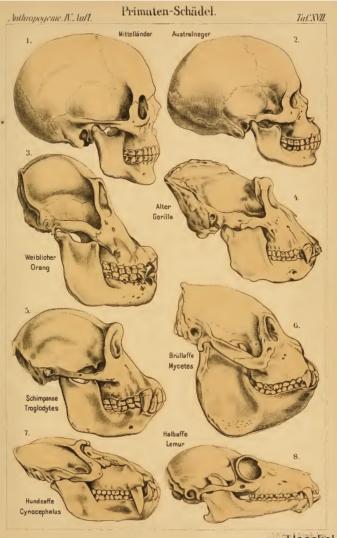






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Haeckel 1891







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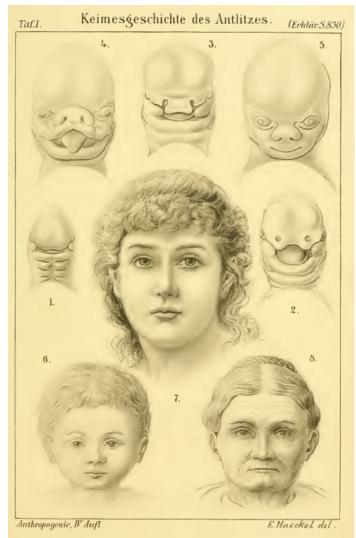
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Haeckel 1891







Anthropos (ανθρωπος) human/people

Génis (γένης)
 birth, origin (genesis)

SCIENCE

Friday, January 13, 1933

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Societies and Meetings: The Texas Academy of Science: H. B. PARKS. The Oklahoma Academy of Science: HORACE J.

HARPER

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THE NEW ANTHROPOGENY: TWENTY-FIVE STAGES OF VERTEBRATE EVOLUTION, FROM SILURIAN CHORDATE TO MAN'

By Professor WILLIAM K. GREGORY

COLUMBIA UNIVERSITY AND AMERICAN MUSEUM OF NATURAL HISTORY

The subject of anthropogeny, as it was developed at the hands of Ernst Hacekel, involved an attempt to read the earlier stages of prehuman evolution largely from the data supplied by human and comparative embryology. Thus its main postulate was the socalled "law of recapitulation." But the attacks of modern zoologists on this "law" seem to have led, in this country at least, to a loss of confidence in Hacekel's chief conclusions. In certain quarters there has sprung up a regular epidemie, which may be named *Hacekelophobia*.

Meanwhile the new anthropogeny has been gradually

³ Address of the vice-president and retiring chairman of Section II—Authropology, American Association for the Advancement of Science, Atlantic City, December 29, 1932. taking shape. But before speaking of its origins and tentative results to date, it might be well to note that a humble exponent of the new doctrine is liable to experience a slightly guilty feeling if he finds himself obliged to speak in any official gathering of his seientific brethren. For example, the brethren of the orthodox anthropologist seet are always piously busy, wielding their magic measuring wands and ringing the bells on their magic ealenlators, or thinking machines, while the poor anthropogenist stands isly by and must confress that he is not primarily bent on measuring or counting anything, but only in piecing together the broken story of the "big parade" that nature has staged across the ages.

Another contrast between the anthropogenist and

Gregory 1985







- Anthropos (ανθρωπος) human/people
- Génis (γένης)
 birth, origin (genesis)
- Center for Academic Research & Training in Anthropogeny (CARTA), University of California – San Diego



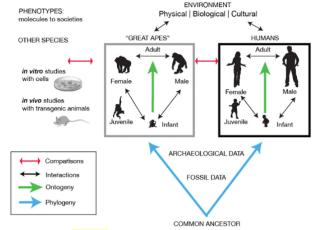


FIGURE 9.1 A systematic approach to Anthropogeny. Updated by P. Gagneux, from Varki, A., Nelson, D., 2007. Genomic differences between humans and chimpanzees. Annual Review of Anthropology 36, 191–209.

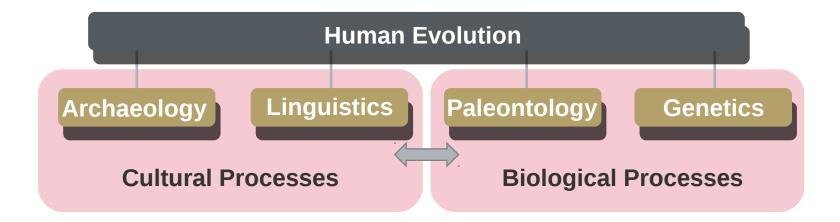
Varki & Gagneaux 2017







Co-evolution in anthropogeny

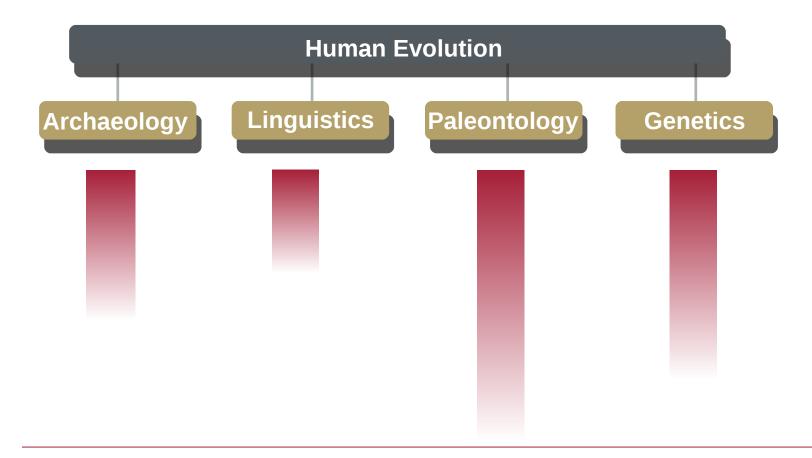








Co-evolution in anthropogeny









Defining modernity

What does it mean to be a modern human?

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22/10/2018







Defining modernity

Dictionary definition (Oxford) adj. Present-day, contemporary, present-time, current, twenty-firstcentury, latter-day, recent, latest

Historical framework Renaissance 17th century and postmodern time after WWII?

Defining modernity

Anatomical, genomic, archaeological, and linguistic frameworks

□ Models of anthropogeny

What model of modern human origins is best supported with the current evidence?







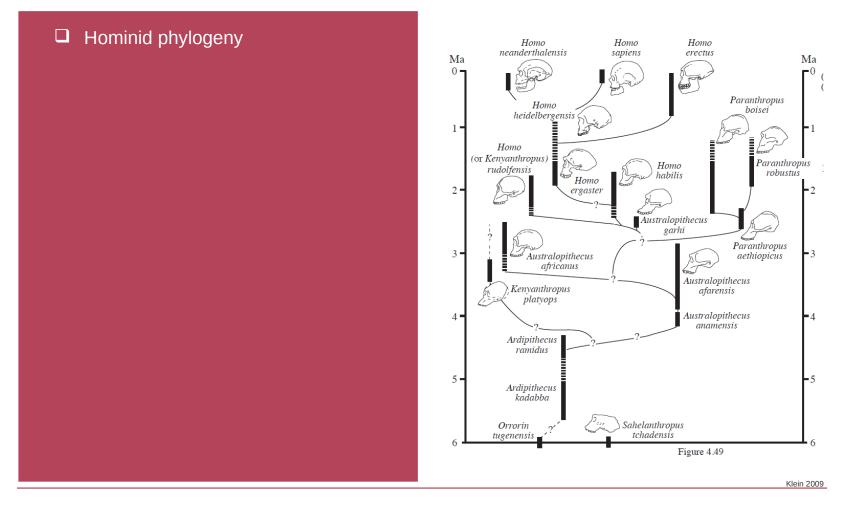
Defining modernity

















Hominid phylogeny

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CAROLI LINNÆI, SVECI,

PER

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articles

New hominin genus from eastern Africa shows diverse middle Pliocene lineages

Meave G. Leakey*, Fred Spoor†, Frank H. Brown‡, Patrick N. Gathogo‡, Christopher Kiarle*, Louise N. Leakey* & lan McDougall§

Division of Palaeontology, National Museums of Kenya, P.O. Box 40658, Nairobi, Kenya

† Department of Anatomy & Developmental Biology, University College London, WCIE 6 JJ, UK ‡ Department of Geology & Geophysics, University of Utah, Salt Lake City, Utah 84112, USA

Research School of Earth Sciences, The Australian National University, Canberra ACT 0200, Australia

Most interpretations of early hominin phylogeny recognize a single early to middle Pliocene ancestral lineage, best represented by Australonitheous afarensis, which have rise to a radiation of taxa in the late Plincene. Here we report on new fossils discovered west of Lake Turkana. Kenya, which differ markedly from those of contemporary A. afarensis, indicating that hominin taxonomic diversity extended back, well into the middle Pliocene. A 3.5 Myr-old cranium, showing a unique combination of derived facial and primitive neurocranial features, is assigned to a new genus of hominin. These findings point to an early diet-driven adaptive adiation, provide new insight on the association of hominin craniodental features, and have implications for our understanding of Plio-Pleistocene hominin phylogeny.

The eastern African hominin record between 4 and 3 Myr is bone with a more cylindrical articular eminence and deepe represented exclusively by a single species, A. afarensis, and its mandibular fossa. It differs from A. anamensis, A. afarensis possible ancestor, Australopithecus anamensis, which are commonly thought to belong to the lineage ancestral to all later hominins^{1,2}. This apparent lack of diversity in the middle Pliocene contrasts markedly with the increasingly bushy phylogeny evident in the later nominin fossil record. To study further the time interval between 4 and 3 Myr, fieldwork in 1998 and 1999 focused on sites of this age at Lomekwi in the Nachukui Formation, west of Lake Turkana, New hominin discoveries from Lomekwi, as well as two mandibles and isolated molars recovered previously3 (Table 1), indicate that multiple species existed between 3.5 and 3.0 Myr. The new finds include a tubular, long and crestless tympanic element, and a small, external well-preserved temporal bone, two partial maxillae, isolated teeth, acoustic porus. *Kenyanthropus* lacks the suite of derived dental and and most importantly a largely complete, although distorted, ranium. We assign the latter specimen to a new hominin genus on the basis of its unique combination of primitive and derived

Description of Kenyanthropus platyops

Order Primates LINNAEUS 1758 Suborder Anthropoidea MIVART 1864 Superfamily Hominoidea GRAY 1825 Kenyanthropus gen. nov.

Etymology. In recognition of Kenya's contribution to the understanding of human evolution through the many specimens recovered from its fossil sites.

Generic diagnosis. A hominin genus characterized by the following morphology: transverse facial contour flat at a level just below the nasal bones; tall malar region; zygomaticoalveolar crest low and curved; anterior surface of the maxillary zygomatic process positioned over premolars and more vertically orientated than the nasal aperture and nasoalveolar clivus; nasoalveolar clivus long and both transversely and sagittally flat, without marked juga; moderate subnasal prognathism; incisor alveoli parallel with, and only just anterior to, the bicanine line; nasal cavity entrance stepped; palate oof thin and flexed inferiorly anterior to the incisive foramen; upper incisor (I¹ and I²) roots near equal in size; upper premolars (P³, P⁴) mostly three-rooted; upper first and second molars (M¹ and M2) small with thick enamel; tympanic element mediolaterally long and lacking a petrous crest; external acoustic porus small. Kenyanthropus can be distinguished from Andipithecus ramidus by its buccolingually narrow M2, thick molar enamel, and a temporal

A. africanus and A. garhi in the derived morphology of the lower face, particularly the moderate subnasal prognathism, sagittally and transversely flat nasoalveolar clivus, anteriorly positioned maxillary zygomatic process, similarly sized I1 and I2 roots, and small M1 and M2 crowns. From A. afarensis it also differs by a transversely flat midface, a small, external acoustic porus, and the absence of an occipital/marginal venous sinus system, and from A. africanus by a tall malar region, a low and curved zygomaticoalveolar crest, a narrow nasal aperture, the absence of anterior facial pillars, cranial features found in Paranthropus aethiopicus, P. boisei and P. robustus (Table 2), and the derived cranial features of species indisputably assigned to Homo (For example, H. erectus s.), and H. sapiens, but not H. rudolfensis and H. habilis)4.

Type species Kenyanthropus platyops sp. nov. Etymology. From the Greek platus, meaning flat, and opsis, mean

ing face; thus referring to the characteristically flat face of this species

Specific diagnosis. Same as for genus. Types. The holotype is KNM-WT 40000 (Fig. 1a-d), a largely complete cranium found by J. Erus in August 1999. The paratype is KNM-WT 38350 (Fig. 1e), a partial left maxilla found by B. Onyango in August 1998. The repository is the National

Museums of Kenva, Nairobi, Localities. Lomekwi localities are situated in the Lomekwi and Topernawi river drainages in Turkana district, northern Kenya (Fig. 2). The type locality LO-6N is at 03° 54.03' north latitude 035° 44.40' east longitude.

Horizon. The type specimen is from the Kataboi Member, 8m below the Tulu Bor Tuff and 12 m above the Lokochot Tuff, giving an estimated age of 3.5 Myr. The paratype is from the lower Lomekwi Member, 17 m above the Tulu Bor Tuff, with an estimated age of 3.3 Myr.

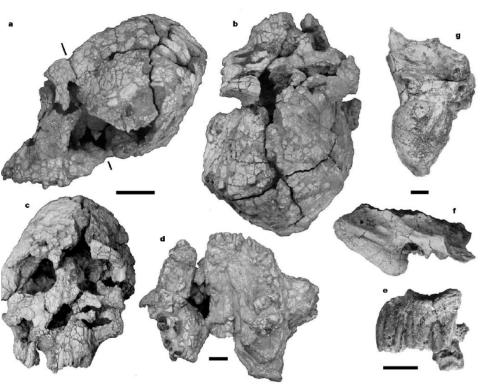
Cranial description and comparisons

The overall size of the KNM-WT 40000 cranium falls within the range of A. afarensis and A. africanus. It is preserved in two main parts, the neurocranium with the superior and lateral orbital margins, but lacking most of the cranial base; and the face, lacking

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Ire 1 Holotype KNM-WT 40000 a, left lateral view (markers indicate the plane rating the distorted neurocranium and the well-preserved face). b, Superior view. c, Anterior view. d, Occlusal view of palate. Paratype KNM-WT 38350. e, Lateral view. KNM-WT 40001. f, Lateral view. g, Inferior view. Scale bars: a-c, 3 cm; d-g, 1 cm.

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22/10/2018







Classification and taxonomy

features.

Description of *Kenyanthropus platyops*

Order Primates LINNAEUS 1758 Suborder Anthropoidea MIVART 1864

- Superfamily Hominoidea GRAY 1825
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Cranial description and comparisons

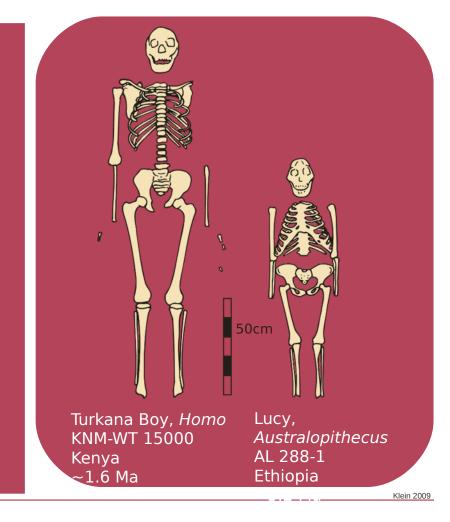
The overall size of the KNM-WT 40000 cranium falls within the range of A. afarensis and A. africanus. It is preserved in two main parts, the neurocranium with the superior and lateral orbital margins, but lacking most of the cranial base; and the face, lacking Leakey et al. 2001







- □ Hominid phylogeny
- **Emergence of** *Homo*



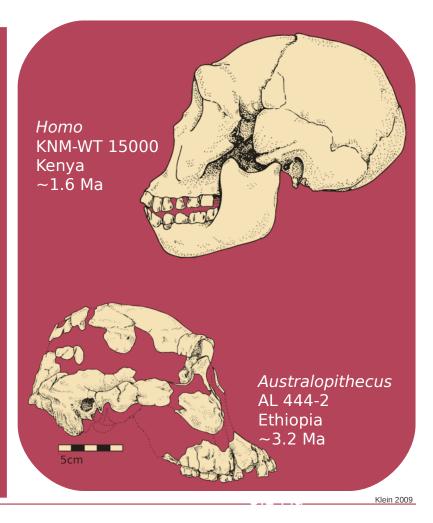






□ Hominid phylogeny

Emergence of *Homo*

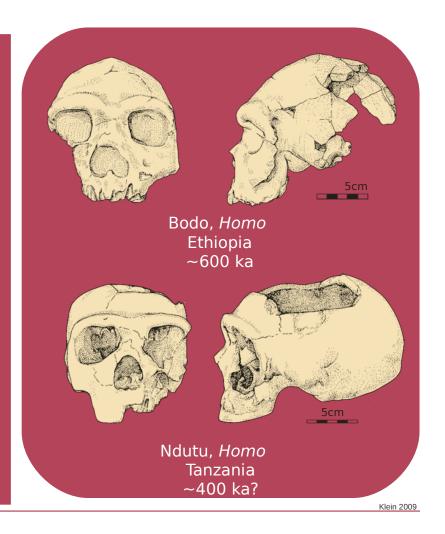








- □ Hominid phylogeny
- □ Emergence of *Homo*
- □ Emergence of modern face?

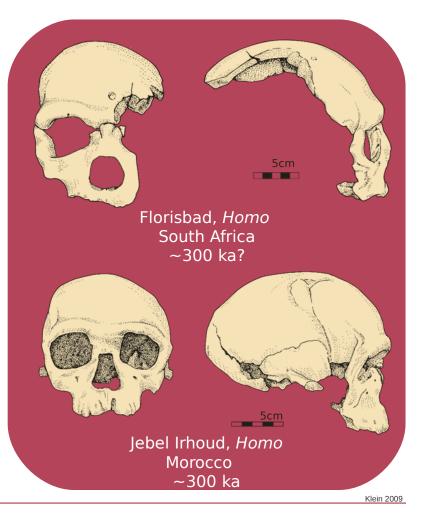








- □ Hominid phylogeny
- □ Emergence of *Homo*
- □ Emergence of modern face?

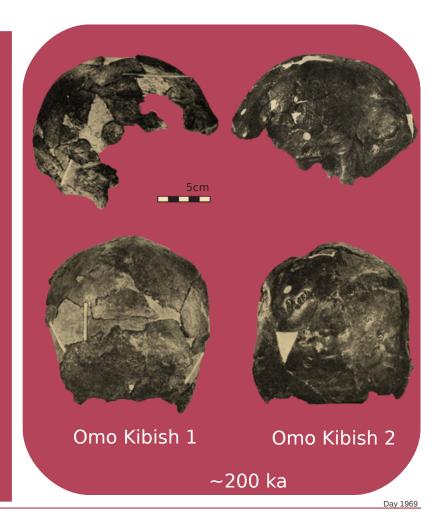








- □ Hominid phylogeny
- □ Emergence of *Homo*
- □ Emergence of modern face?
- □ Emergence of modern neurocranium











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Human origins

Moroccan remains push back date for the emergence of Homo sapiens PAGES212,289 & 293

MODELLING DEMOCRACY Can mathematics put a stop to gerrymandering? A THING S OF BEAUTY Exploring the cracks in the standard model MBS 214.27

SWEET TASTE OF SUCCESS Kay components of glucose regulation resolved Mation 254,254,27



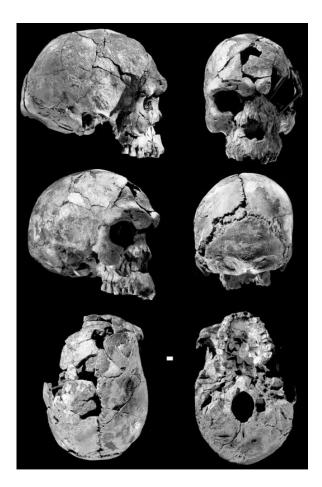
30 | Modern Human Origins, Lecture 1

Hublin et al. 2013









Methods

Order Primates L., 1758 Suborder Anthropoidea Mivart, 1864 Superfamily Hominoidea Gray, 1825 Family Hominidae Gray, 1825 *Homo sapiens idaltu* subsp. nov.

Etymology. The subspecies name 'idàltu' is taken from the Afar language. It means 'elder'. **Holotype.** BOU-VP-16/1 (Fig. 1), an adult cranium with partial dentition. Holotype and referred material are housed at the National Museum of Ethiopia, Addis Ababa. Holotype from Bouri Vertebrate Paleontology Locality 16 (BOU-VP 16); differentially corrected GPS coordinates: 10°15.5484' N and 40°33.3834' E.

Referred material. BOU-VP-16/2 cranial fragments; BOU-VP-16/3 parietal fragment; BOU-VP-16/4 parietal fragment; BOU-VP-16/5 child's cranium; BOU-VP-16/6 R. upper molar; BOU-VP-16/7 parietal fragment, BOU-VP-16/18 parietal fragments; BOU-VP-16/42 upper premolar, BOU-VP-16/43 parietal fragment.

Stratigraphy and age. Bouri Formation, Upper Herto Member. Dated by ⁴⁰Ar/³⁹Ar to between 160,000 and 154,000 years ago (ref. 6).

Diagnosis. On the limited available evidence, a subspecies of *Homo sapiens* distinguished from Holocene anatomically modern humans (*Homo sapiens sapiens*) by greater craniofacial robusticity, greater anterior-posterior cranial length, and large glenoid-to-occlusal plane distance. *Homo sapiens idaltu* is distinguished from the holotype of *Homo rhodesiensis* (Woodward, 1921) by a larger cranial capacity, a more vertical frontal with smaller face, and more marked midfacial top ography (for example, canine fossa). We consider the holotypes of *H. helmei* and *H. njarasensis* too fragmentary for appropriate comparisons.

Received 21 November 2002; accepted 14 April 2003; doi:10.1038/nature01669.

White et al. 2003







At the dawn of our species

- The archaeology of *H. sapiens*

-What separates our species from predecessors?

-Is "modern" as "modern" looks OR does?

-Evolution OR revolution?







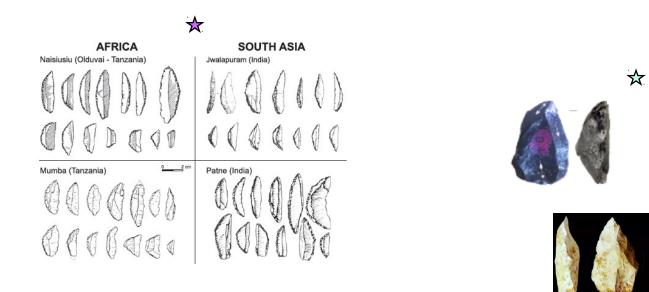




Tracking the "Out-of-Africa"

Does similar tool forms = migration?





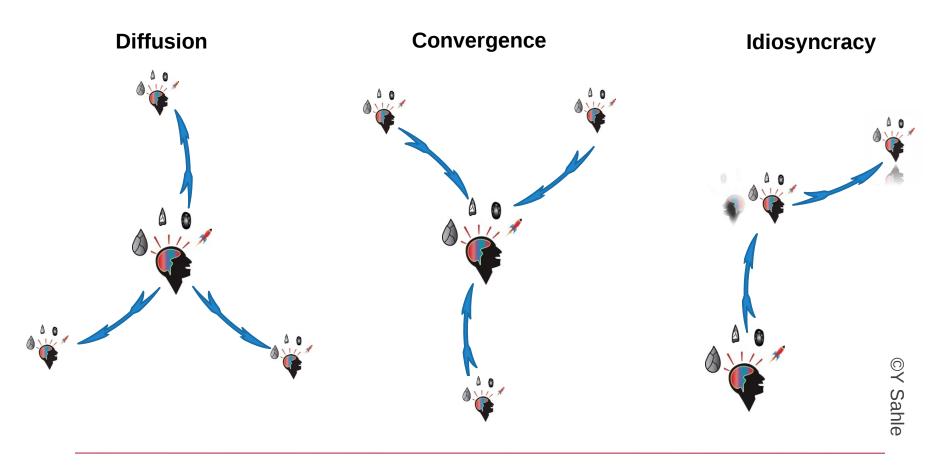
Mellars (2006); Armitage et al. (2011); Rose et al. 2011







Paleolithic innovations



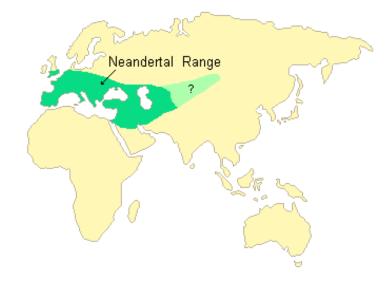






Advent in Europe

- Meeting, replacement
- $\hfill\square$ Us and them





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Conard (2010); Zilhão et al. (2010)







What is Human "Modernity"? -The Linguistic View



simplest speculation about the evolution of language. Within some small group from which we are all descended, a rewiring of the brain took place in some individual, call him *Prometheus*, yielding the operation of unbounded Merge, applying to concepts with intricate (and little understood) properties. Chomsky (2005). Some simple evo devo theses: how true might they be for language?







Who is Prometheus?



First, why are there any languages at all? Second, why are there so many languages? According to what seems to be a fairly general scientific consensus, the questions are very recent ones in evolutionary time. Roughly 100,000+ years ago, the first question did not arise, because there were no languages. By about 50,000 years ago, the answers to both questions had been settled. By then our ancestors began to leave Africa, soon spreading over the entire world.

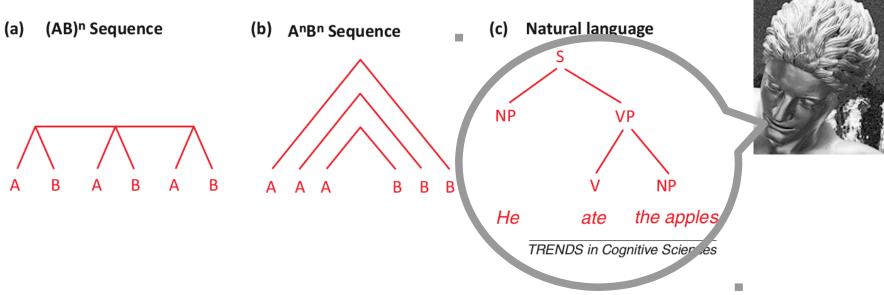
Chomsky (2005). Some simple evo devo theses: how true might they be for language?







What is Language?



[...] the unified nature of human language arises from a shared, speciesspecific computational ability. This ability has identifiable correlates in the brain and has remained fixed since the origin of language approximately 100 thousand years ago.

Berwick et al. (2013). Evolution, brain, and the nature of language.

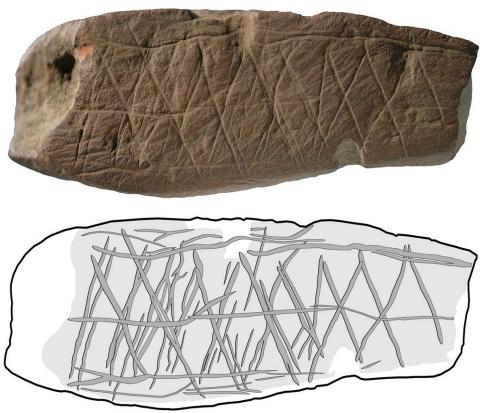






Does language fossilize?

These finds demonstrate that ochre use in the MSA was not exclusively utilitarian and, arguably, the transmission and sharing of the meaning of the engravings relied on fully syntactical language [...]



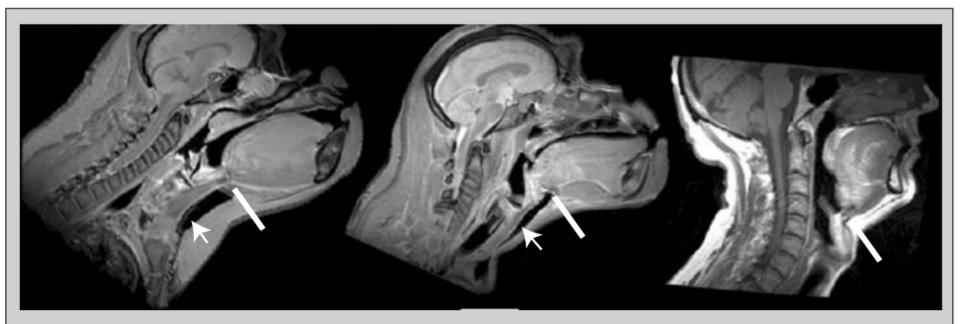
Henshilwood et al. (2002). Emergence of Modern Human Behavior: Middle Stone Age Engravings from South Africa.







Preadaptations to language (speech)



A. Orangutan

B. Chimpanzee

C. Human

Fitch (2010). The Evolution of Language.

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Predecessors of language: gesture, vocalization?



Kalan and Boesch (2018). Re-emergence of the leaf clip gesture during an alpha takeover affects variation in male chimpanzee loud calls. https://peerj.com/articles/5079/







Schedule

Jan 7, 2019 Adaptive and Non-adaptive Theories of Language Evolution

Jan 14, 2019 Preadaptations to Language (Speech)

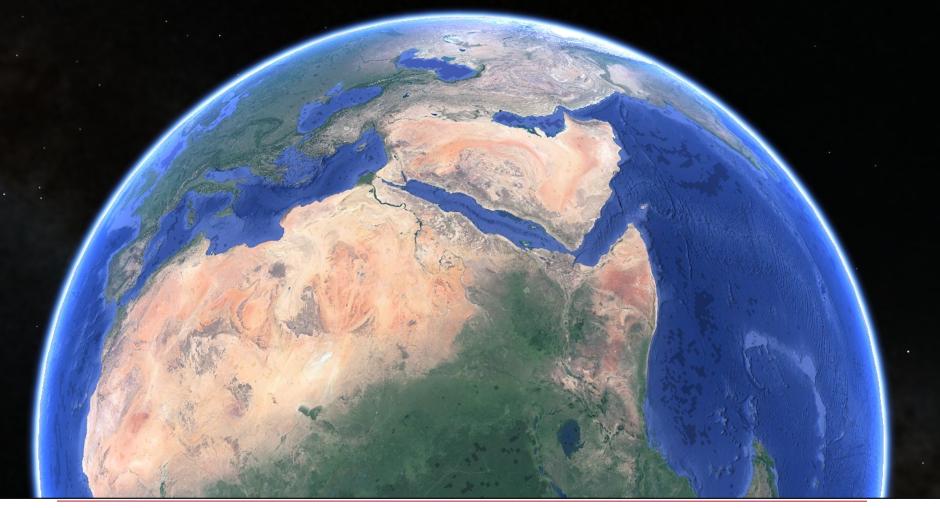
Jan 21, 2019 Interfaces with Archaeology and Palaeoanthropology







Thank you... and see you next week.











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