Homo NalediControversies

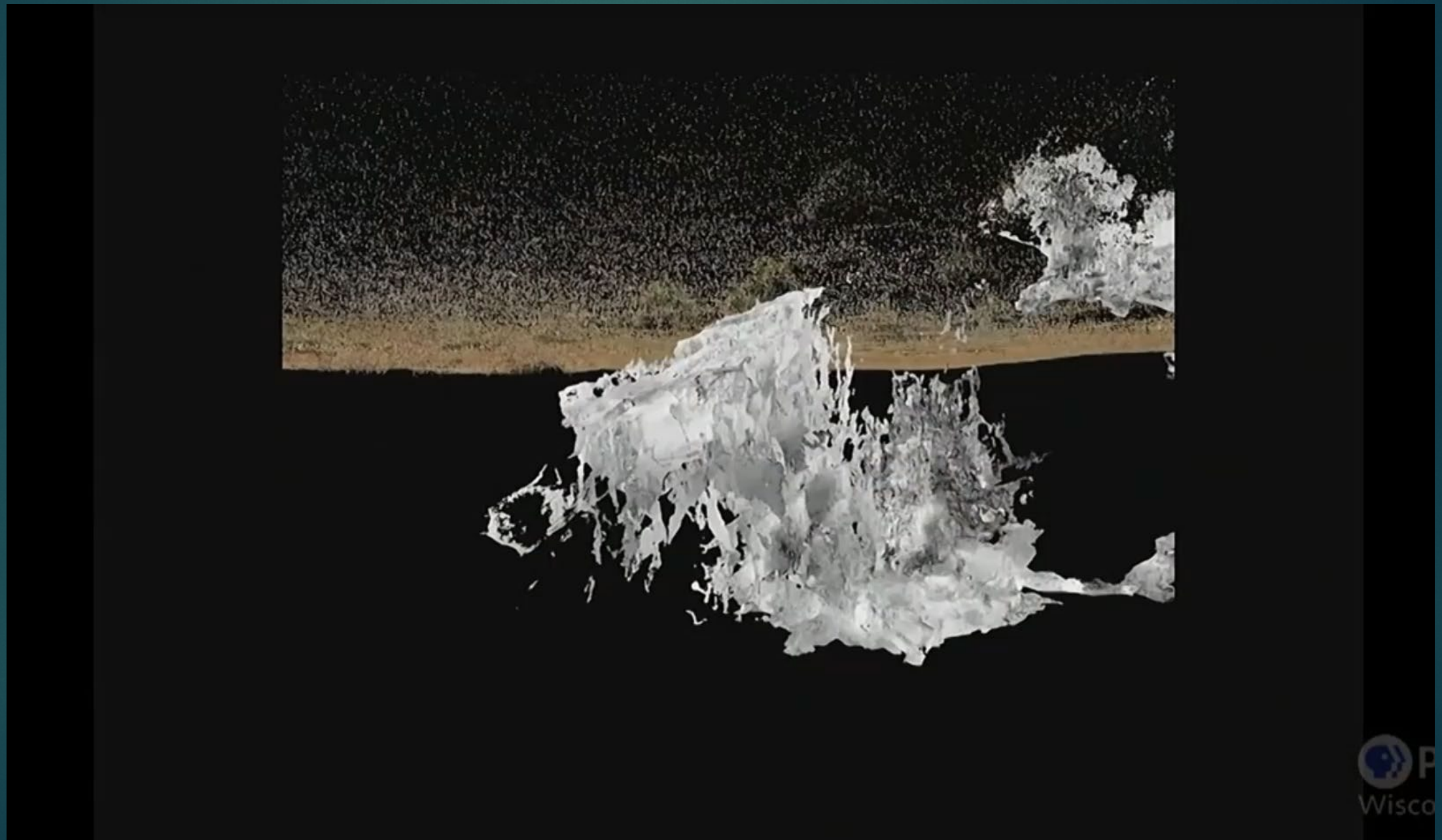
November13, 2024

by

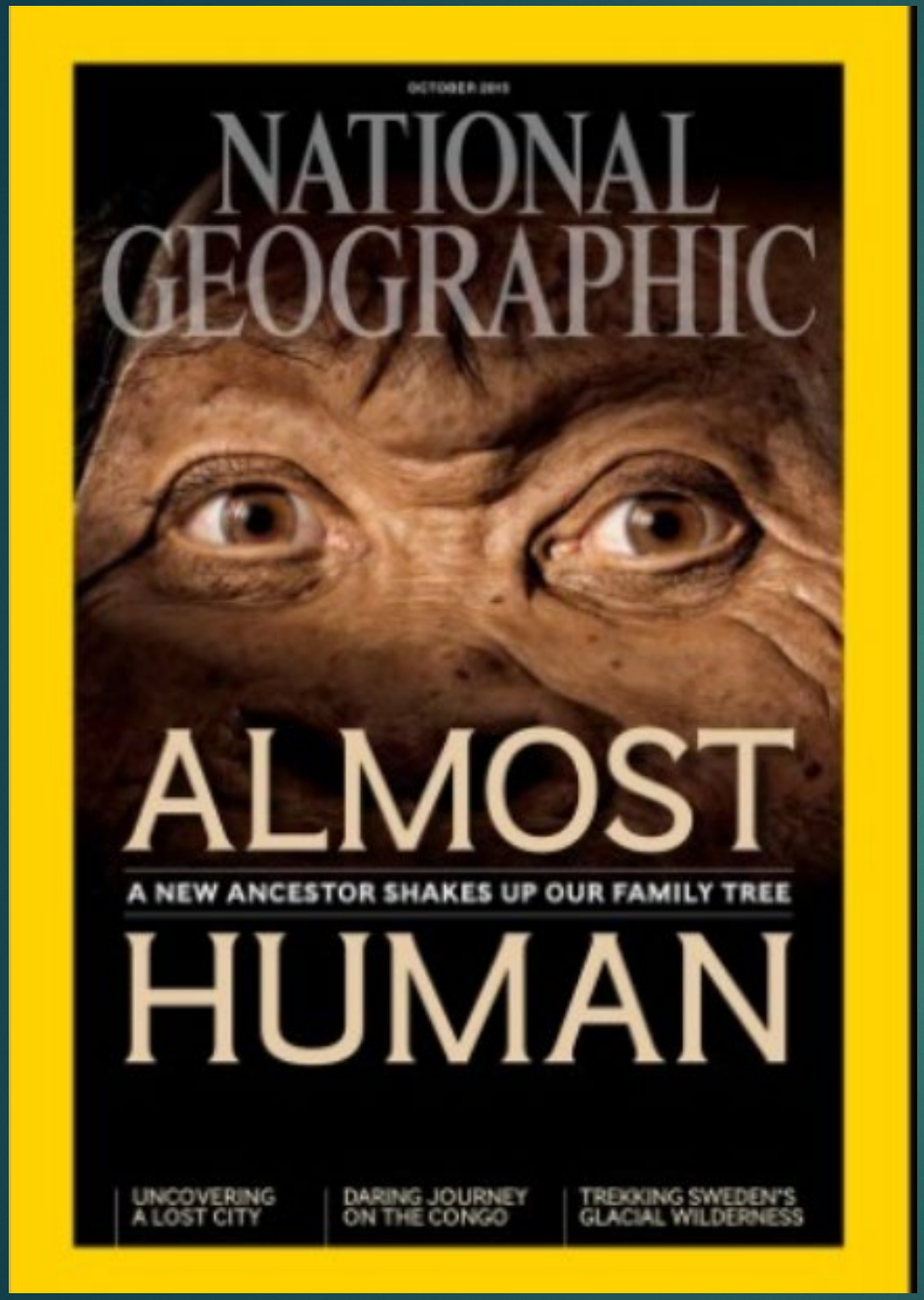
Charles J Vella, PhD

John Hawks lecture: land above Rising Star Cave System

Rising Star Cave System: 3 Kms of passages



Dinaledi Chamber



2015 - *Homo naledi*

Homo naledi

The “King Tut’s Tomb” of Hominin Fossil Discovery: 2015

Rising Star Cave, Dinaledi Chamber

2015: More than one way to be human

Homo naledi, a new species of the genus *Homo* from the Dinaledi Chamber, Rising Star Cave, South Africa

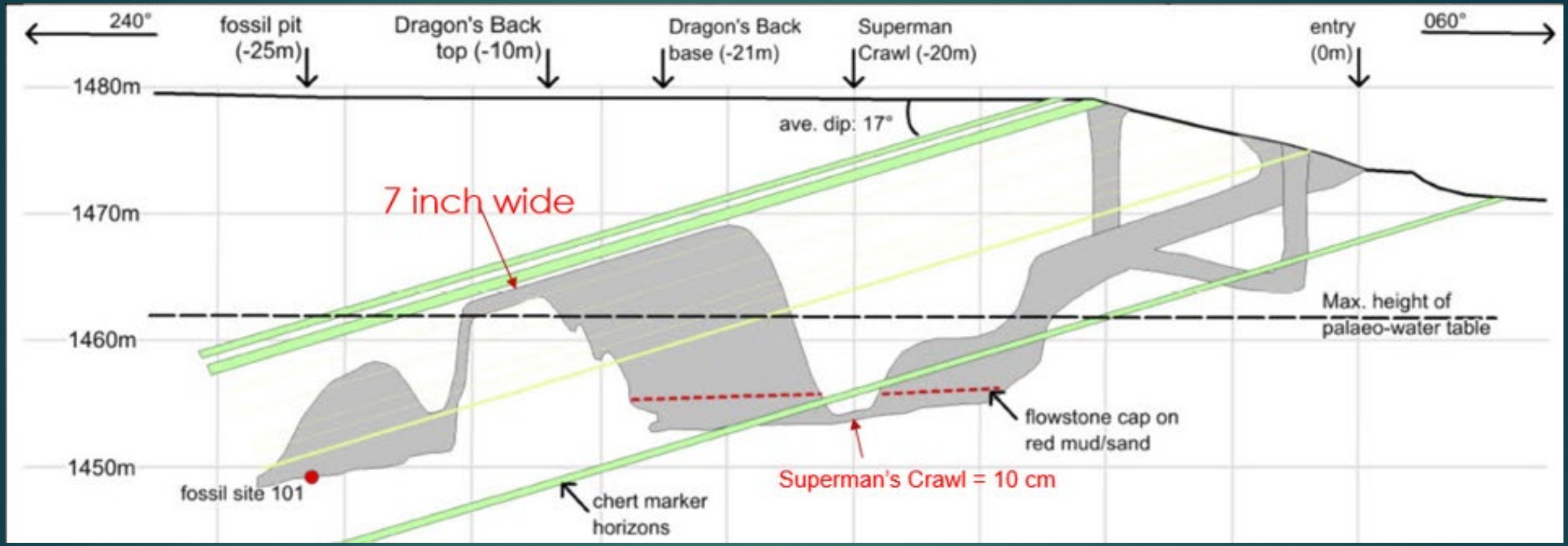
- "One of the most staggering finds in the history of paleoanthropology"
- Discovered by Lee Berger's team at the University of the Witwatersrand

http://elifesciences.org/content/4/e09560#sthash.ZMyt0Qr5.dpuf

Homo naledi

- The Dinaledi collection is the richest assemblage of associated fossil hominins ever discovered in Africa
- It has one of the most comprehensive representation of skeletal elements across the lifespan, and from multiple individuals, in the entire hominin fossil record.
- For comparison, 50 years of excavations at Olduvai = 100 hominin fossils
- H. naledi has doubled the total African fossil record.

2013: Rising Star Cave in South Africa: Discovery of *Homo naledi*



One passage is 50 feet long and 7 inches wide in places

2 Spelunkers in 2013:
Steve Tucker, an accountant
Rick Hunter, a Mensa member, who was kicked out of high school for blowing up a chemistry lab; a construction worker

Rising Star Cave on one evening; after 4 hours of cave exploring; Steve rests on and then descends the Chute

Rick thru Superman's Crawl and down the Chute

Bottom hole of the Chute

Prior discovery

- Steve and Rick were not the first ones in the Dinaledi cave.
- Among all of the fossils, they found old survey pegs left behind in this chamber, and evidence that some of the fossils on the floor surface had been moved and broken (white ends).
- Berger never talks about these facts

First sight, 2013: bones on surface

Recent dead human?

Berger sent
this photo
to John Hawks &
Steve Churchill.

Facebook: American Association of Physical Anthropologists
October 6, 2013

- “Dear Colleagues,
- I need the help of the whole community to reach out to as many related professional groups as possible. We need...individuals with excellent archaeological/palaeontological and excavation skills for a short-term project...The catch is this - the person must be skinny and preferably small. They must not be claustrophobic, they must be fit, they should have some caving experience, climbing experience would be a bonus. They must be willing to work in cramped quarters, have a good attitude and be a team player....we will cover flight…field accommodations, food…[no pay!]
- Anyone interested please contact me directly...”
- Many thanks
- Lee Berger

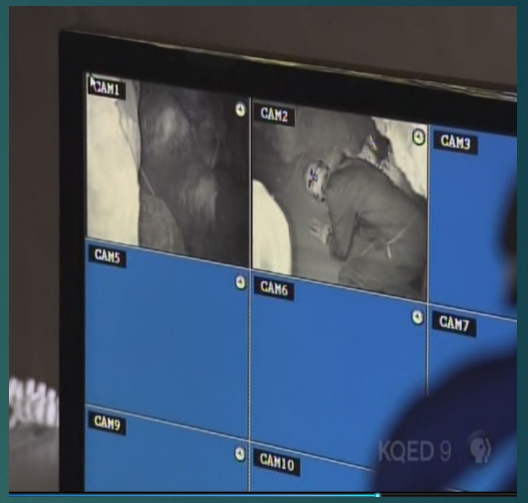
Underground astronauts of the Dinaledi Chamber

All 6 were larger than largest *H naledi* males.

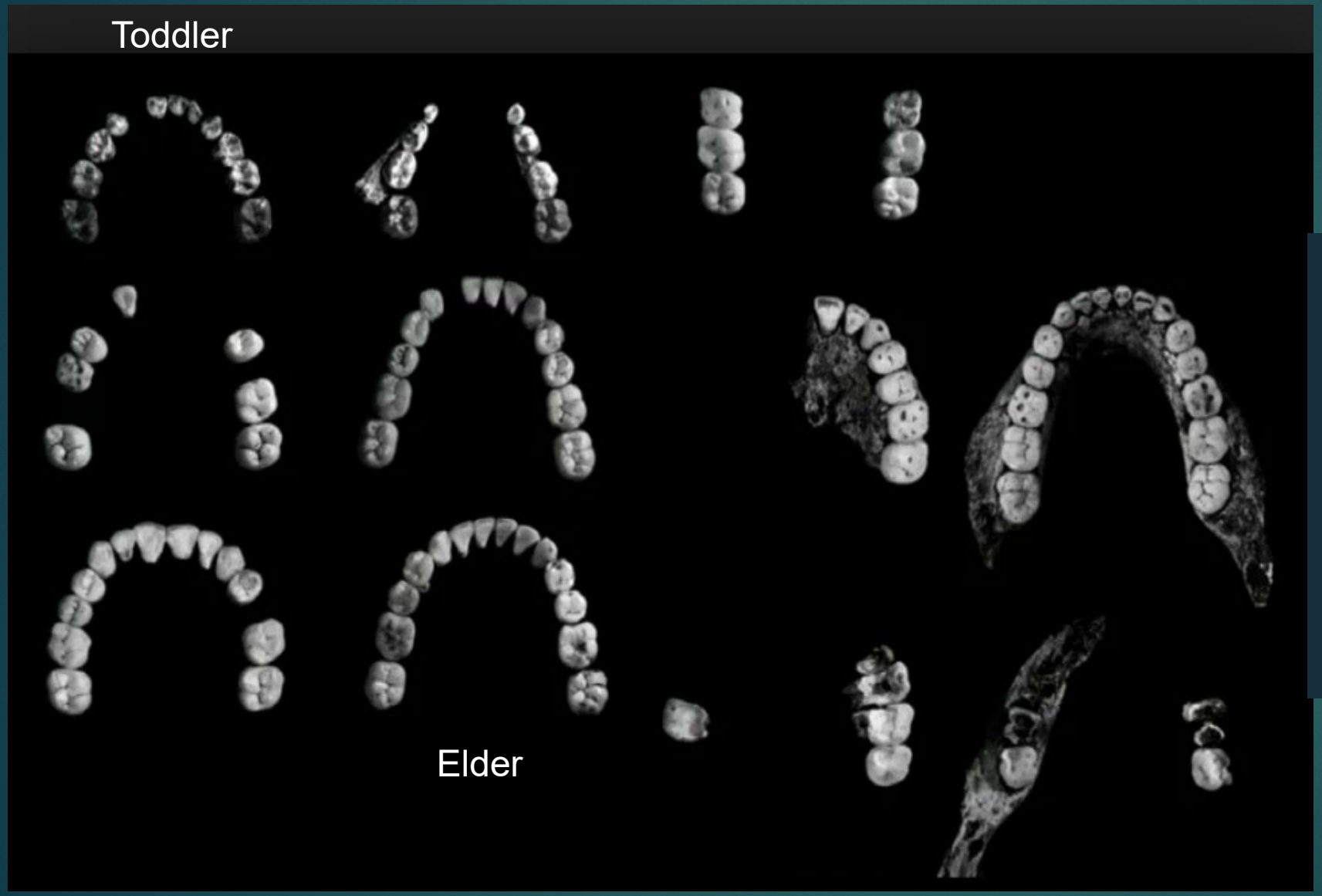
All-female early career team – Hannah Morris, Marina Elliott (1st down the chute), Becca Peixotto, Alia Gurtov, Lindsay Eaves and Elen Feuerriegel – were drawn from Australia, Canada and the US. All worked for free.

They brought out the largest assemblage of fossil human relatives ever discovered in the history of the continent of Africa.

Lee Berger (& J. Hawks) were too big to fit in cavern; so supervised it all on HD TV monitor.



190 Teeth: multiple complete sets



Infants (top left) to very old (30s) (bottom right)

Silt, not concrete like breccia: Used toothpicks, not pneumatic hammers

Climbing in and out twice a day resulted in…

Majority of analysis team were early career paleontologists

September, 2015 – The Big Announcement

The New York Times

Thursday, September 10, 2015 Today's Paper Video 75°F CAC 40 -0.71%

World U.S. Politics N.Y. Business Opinion Tech Science Health Sports Arts Style Food Travel Magazine T Magazine Real

Afghans See U.S. General as Crucial to Their Defense

By ROD NORDLAND and MUJIB MASHAL 5:00 AM ET

Although Afghanistan's forces and officials are supposed to be running the war, Gen. John F. Campbell's prominent role is being widely taken as a sign that the fight against the Taliban is not going well.

Justice Dept. to Put Focus on White-Collar Criminals

By MATT APUZZO and BEN PROTESS

New policies prioritize the prosecution of individual employees and put pressure on corporations to turn over evidence against their

A reconstruction of the skull and hand of Homo naledi, a human ancestor discovered in South Africa.
Naashon Zalk for The New York Times

A New Species of Human Ancestor Is Found

By JOHN NOBLE WILFORD 5:02 AM ET

A cave in South Africa yielded the discovery of a previously unidentified member of the early human lineage — Homo naledi, a new hominin species who seem to have buried their dead.

Your Thursday Briefing

By ADEEL HASSAN 59 minutes ago

Here's what you need to know to start your day

The Opinion Pages

A Senseless Delay on the Iran Deal

By THE EDITORIAL BOARD

Republicans seem determined to drag out the fight, even it means neglecting other business.

- Blow: Hillary Is Hobbling, for Now
- Obama's Syrian Nightmare
- Collins: A Presidential Primary Cheat Sheet

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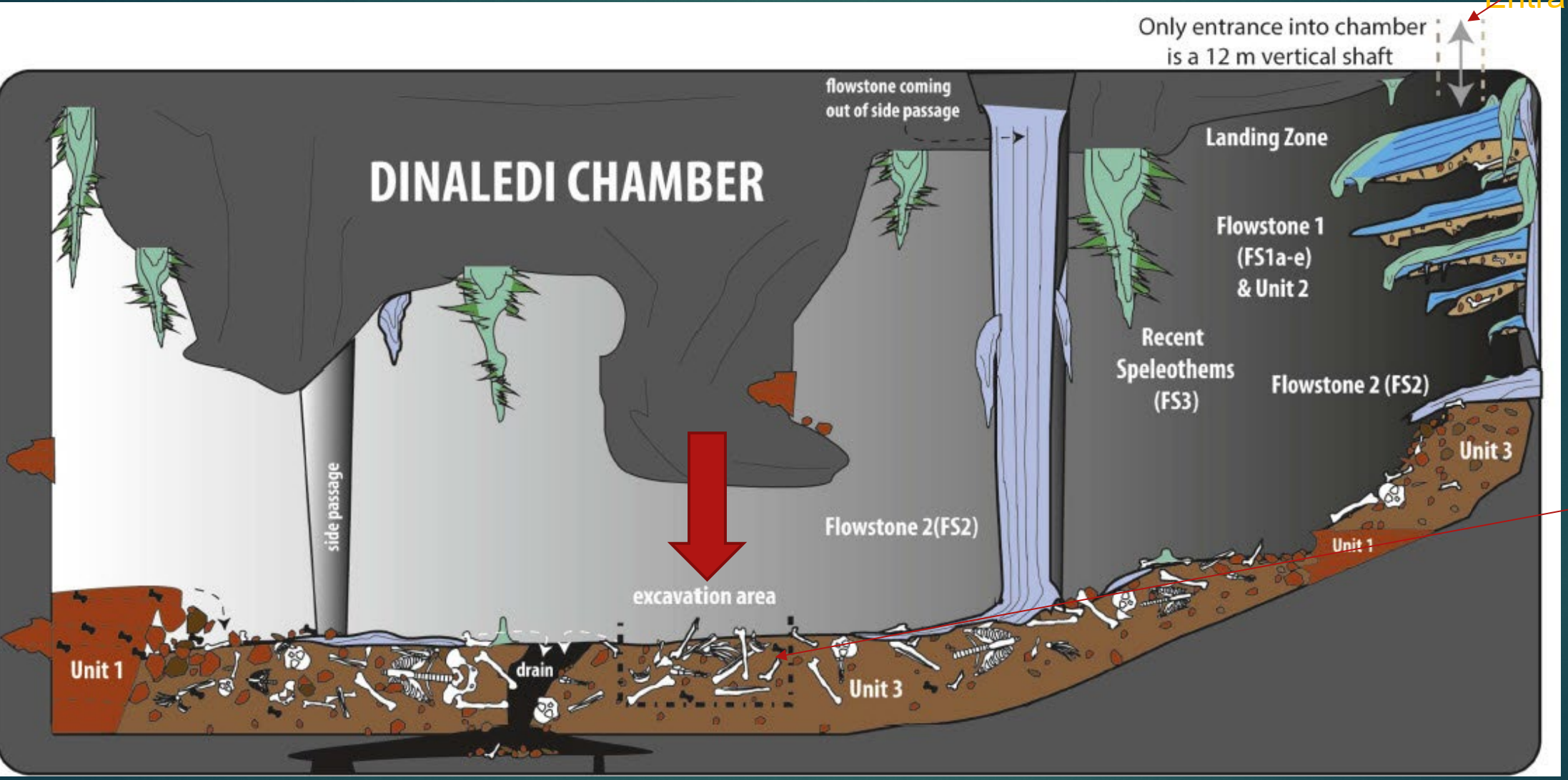
Watching

7h BMI, the music licensing agency, plans to an
exceeded **$1 billion** in annual revenue for th
The New York Times

8h A 21-year-old New Jersey man pleaded guilty
court to planning to travel abroad with other
York and New Jersey to **join the Islamic Stat**
The New York Times

2015: Dinaledi Chamber (“chamber of many stars”)



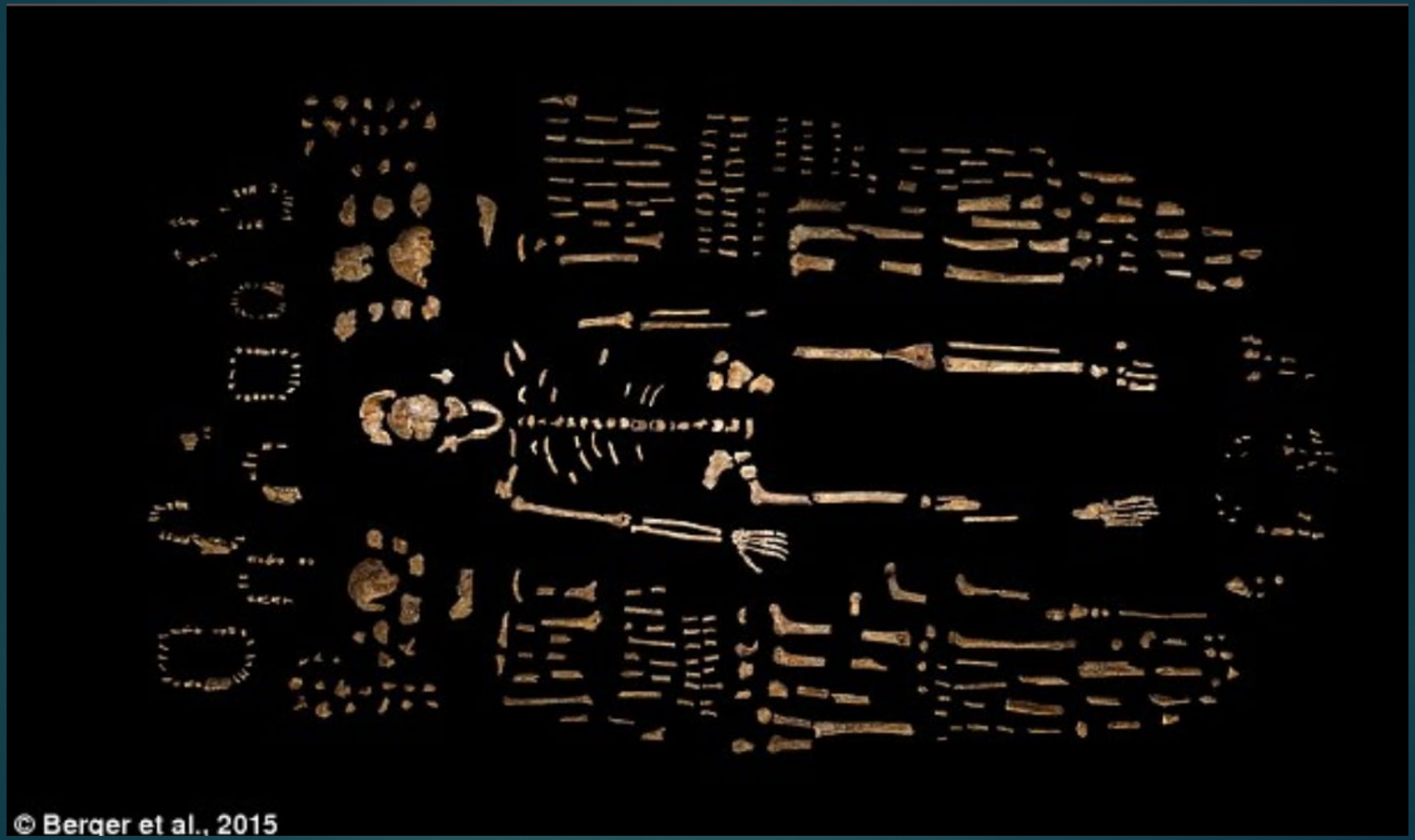
Only Entrance

Red unit 1 is Oldest; no bones

1 square meter excavation area

2014: *Homo naledi:*

- 15 separate individuals in1550 bones:
  - collected in first sweep of surface (400 bones)
  - an excavation of 1 square meter x half a foot (1150 bones)
- 737 partial or complete anatomical elements
- As of 2022, 25 individuals; 2500 bones
- Sterkfontein: 700 bones in 70 years


© Berger et al., 2015

Homo naledi: Multiple samples of same bone

Parts of 5 Skulls. Jaws.

150 hand bones
48 rib bones
40 pelvic bones

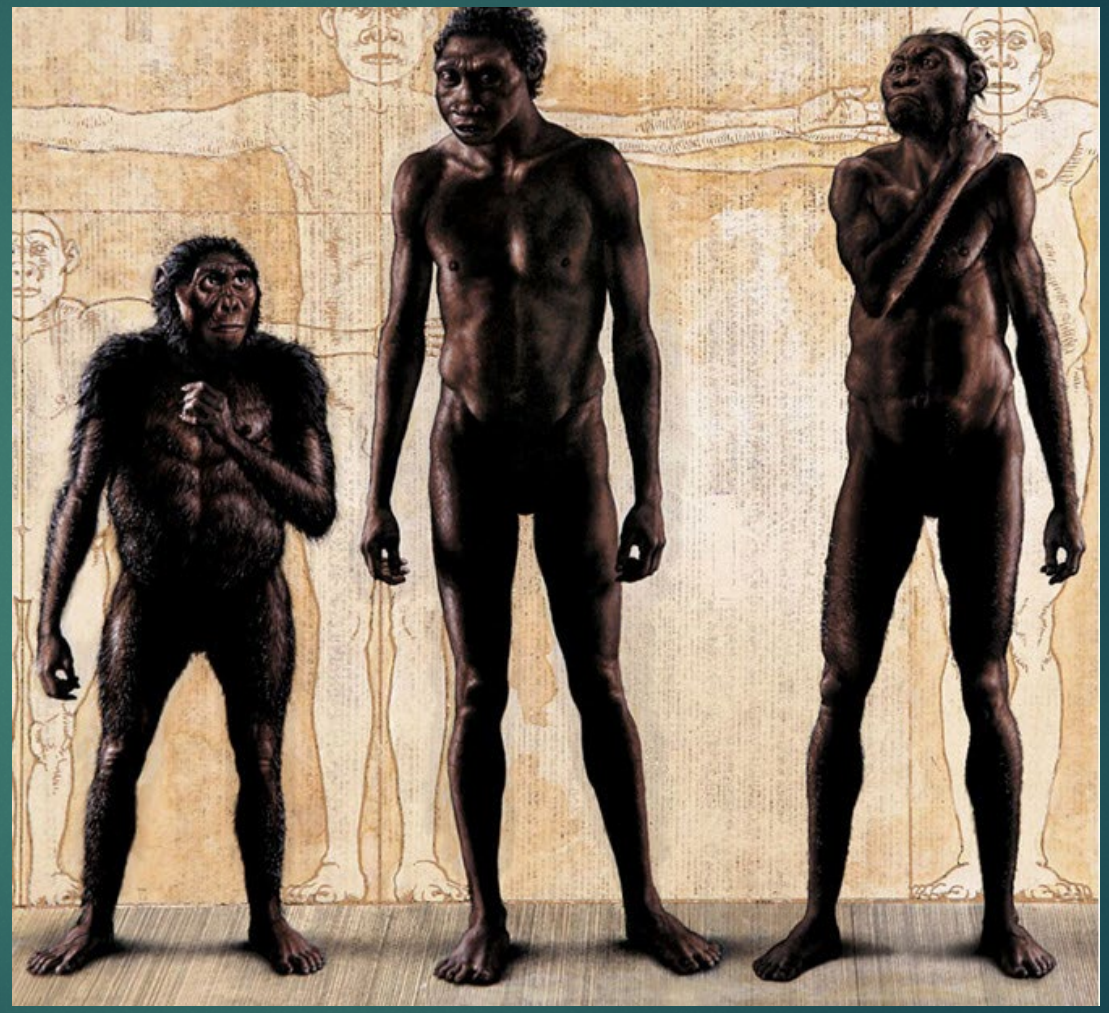
190 teeth = 25 individuals.

100 foot bones: A nearly complete foot.

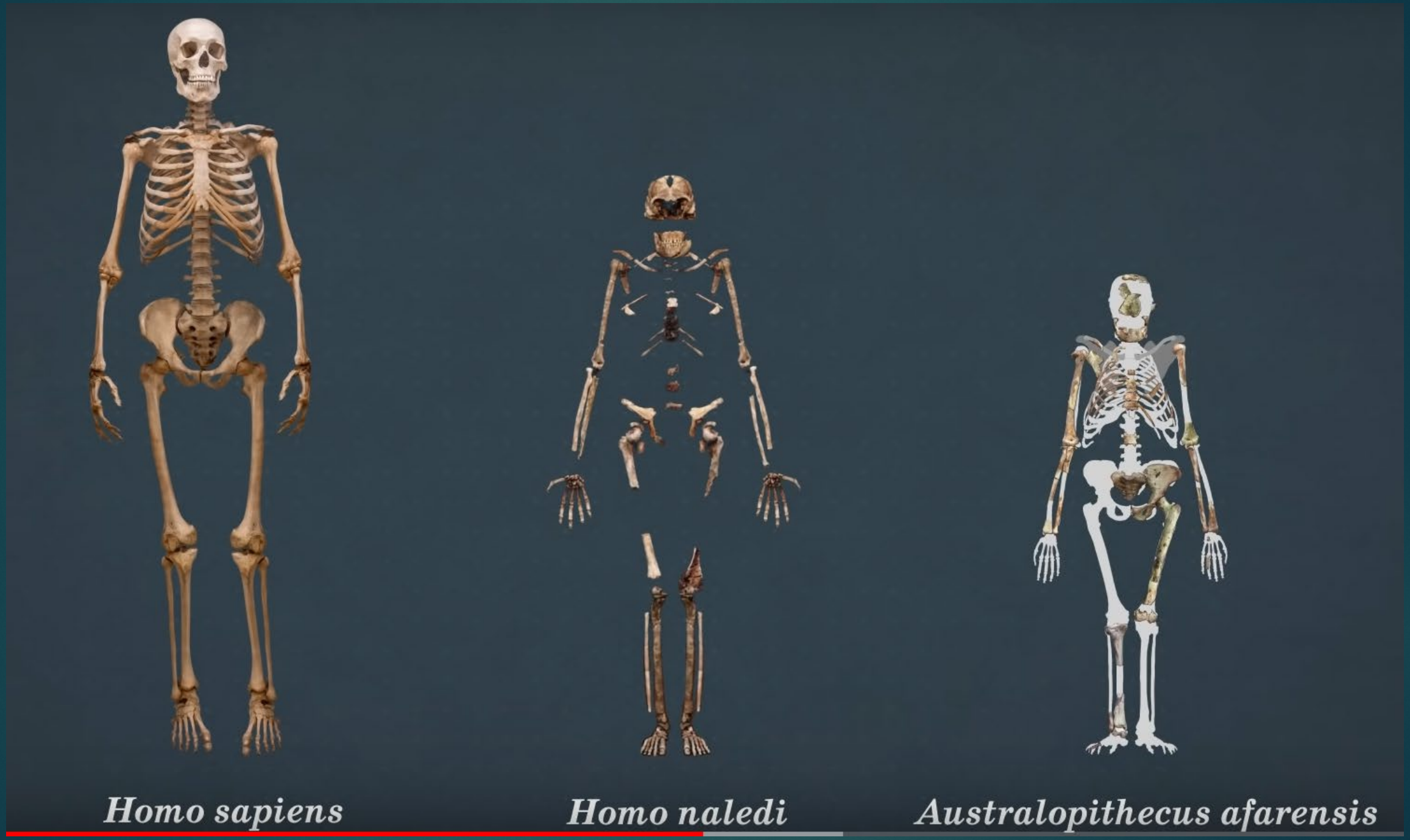
3 bones of the inner ear.

Homo naledi: 1.5 Meters (5 feet) tall, 100 lbs

Skinny, humanlike arms, apelike thorax, ancestral pelvis, long legs, humanlike feet



"Lucy"	"Turkana Boy"	"Rising Star Hominin"
Australopithecus afarensis	*Homo erectus*	*Homo naledi*
3.2 million years ago	1.6 million years ago	Date Unknown
Adult Female	Adolescent Male	Adult Male
3 ft 8 in	5 ft	4 ft 10 in
60-65 lbs	110-115 lbs	100-110 lbs


Homo sapiens
Homo naledi
Australopithecus afarensis

Age distribution:

- Originally 13 (now 25) individuals of practically every developmental age, from neonate to elderly:
  - 3 infants (1 fetus; Infants were identified by their thimble-size vertebrae),
  - 3 young juveniles,
  - 1 older juvenile,
  - 1 sub-adult,
  - 4 young adults
  - 1 old female adult
- 8 of 13 were not adult (implication: not repeated cave exploration by socially isolated adult males)

No march of progress in human evolution

- The existence of such anatomical mosaics is not a problem; they are an expected result of evolution.

- Anthropologists once assumed that the species of *Homo* could be placed in a rough order of increasing brain size. But this 'march of progress' assumption has now been falsified.

- Species with small brains lived both early and late in the evolution of *Homo: H. habilis, H. naledi, H. floresie*nsis, *H. luzonensis*.,

H. naledi: a mosaic

- *H. naledi* exhibits mosaic traits:
  - Ancestral anatomical features shared with *Australopithecus*,
  - Derived features shared with *Homo*,

- This anatomical mosaic is reflected in different regions of the skeleton.

- The overall morphology of *H. naledi* places it within the genus *Homo*. Although this conclusion is contested.

H. naledi is humanlike: Feet, hands, teeth: anything that interacts with environment is *Homo,* derived

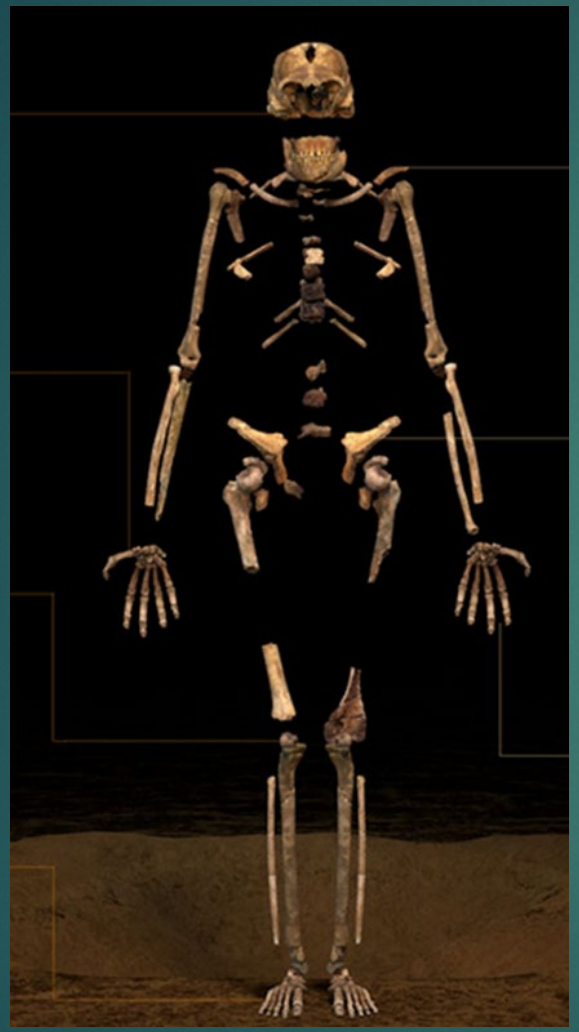
Like Australopithecine: Everything that is central (the trunk, architecture of vertebral column, & small brain) is ancestral; as if evolution was crafting it from the outside in.

Skeleton: *H. naledi* vs. *A. sediba*: mirror reversal mosaics

H. naledi:

Derived:
skull,
teeth
legs
feet,
hands

Ancestral;
shoulders
thorax,
pelvis
curved
fingers
small brain



A. sediba:

Derived:
skull,
pelvis

Ancestral:
Feet
hands

Movement: bipedal and arboreal

- *H. naledi* anatomy indicates that:
  - though they had a humanlike stride and gait,
  - they were more arboreal than other *Homo;*
  - better adapted to climbing and suspensory behavior in trees than endurance running.

Homo naledi cranium

NEW HUMAN SPECIES:
Homo naledi raises questions about the origin and evolution of our genus. In this replica of the composite skull, white areas indicate missing bone.

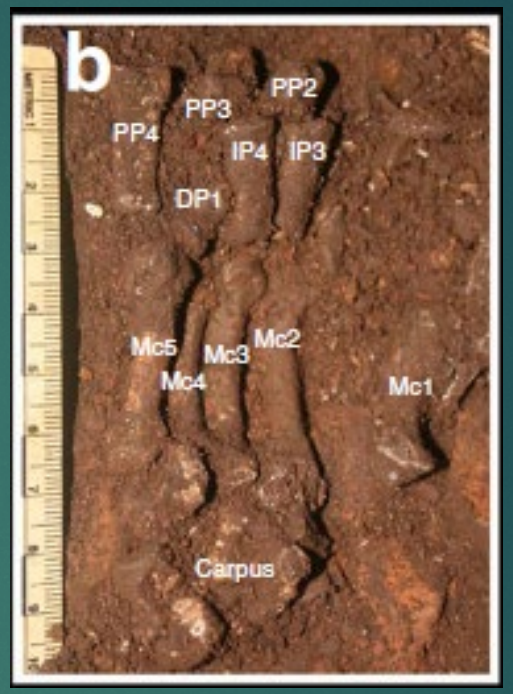
DH1: Holotype of *Homo naledi*

Holotype: original specimen used to describe a new species for the first time.

Homo naledi: Cranium 465-610 cc compared to *H. sapiens*

- Five partial skulls had been found—two male, two female.
- Cranial morphology is advanced enough to be called *Homo*.
- But the braincases were tiny—610 cc for the males and 465 cc for the females. Size of an orange.
- Only the smallest specimens of *H. habilis*, one single *H. erectus* specimen, and no *H. floresiensis* overlap with these values.

Homo naledi: most complete hand in fossil history



Found in situ in semi-articulation with the palm up and fingers flexed.

Australopithecine-like arboreal climbing capable, extremely curved fingers (joints are curved; more curved than almost any other species of early hominin; but longer thumb and wrist are stiffer like Homo, suggesting tool-using capabilities

Foot of *Homo naledi:* meant for walking - upright biped; the feet were "Nike-ready," as *National Geographic* put it; most complete foot in history of paleoanthropology; 1 of 6

10 cm = 4 in
Woman's
Size 4

Found articulated as seen here

Foot very similar to *H. sapiens.*

It possessed some ancestral features: a flatter arch, curved toes and a heel less robust than ours

Homo naledi by John Gurche

A reconstruction of Homo naledi's head by paleoartist John Gurche, who spent some 700 hours recreating the head from bone scans

Image is from the 10/2015 issue of National Geographic

Continual Controversy --Berger:
Bodies were “deliberately disposed”: Burial?

Reasons for deliberate body deposition conclusion.

- Only *H. naledi* fossils found in chamber (only a small number of leg bones of a bird, and teeth and isolated bones of rodents).
- Exceptional preservation of bones
- Bones are lightly mineralized
- Sediments in chamber are not from external source
- Bodies were intact on arrival/ no green fxs.
- No evidence of some catastrophe which killed all the individuals inside the chamber

Why conclusion for deliberate body deposition.

- No evidence of predation on bones.
- No evidence of living occupation of chamber.
- No evidence of flooding/water transport (being introduced by water flow).
- The bodies were not all deposited at the same time = Site was used repeatedly for burials
- Last two controversial: flowstones require water to form; unclear how last conclusion was reached

Alternative theory: Death trap

- The remains of *H. naledi* could have accumulated as a result of a classic catastrophic event during which a large group of animals is trapped in the cave:
  - during a single event when a large number of hominin individuals were in the chamber,
  - or in a death trap scenario over a period of time as individuals repeatedly entered the Dinaledi Chamber and died.

- Neither hypotheses can be ruled out.

Bones of Contention: *H. naledi* contrarians

- A number of scientists are advising caution.
- They're not denying the importance of the find; the fossils, they say, are invaluable. But they contend that the bones may not represent a new species.
- Berger submitted twelve papers to *Nature*. Asserted that the cave fossils represented another new species—*Homo naledi*, or Star Man.
- After an anonymous peer-review process, the papers were not accepted. The editors asked Berger to heavily revise them. After several back-and-forths, he withdrew them.
- Published in *eLife* which is peer reviewed; open journals accept around 25 percent, compared to the 7 percent acceptance rate of *Science. eLife* charges $2,500 to publish a paper.

Alternative explanations

- Briana Pobiner:
  - “Dead people smell bad and attract predators. A cave would be a good place to keep them far away from where you hang out, too, so I can see chucking bodies into the cave so you wouldn’t be the next one eaten for dinner.”
- Tegobo Makhubela, UJ lecturer: ***
  - "I think they went into the cave running away from danger of veld fires, heavy rainfalls with thunder or being chased away by predators and they were trapped down there unable to leave the place and ended up dying in the cave. I think they were alive because they do not have any indications of being attacked or killed.“
- CJV: Group got lost and trapped in chamber. Could 5’ creature climb wall back up to the 50 foot chute?

Bones of Contention

- Questions raised:
- How old are the fossils? Failure to date the find in 2015
- Rush to publish; research done hastily – no official peer review as of 2024
- Is it a new species? Or *Homo erectus*
- Controversial theory that species might have disposed of its dead
- Untrained eyes of early researchers
- Too much media
- Was there damage done to fossils?

Tim White vs Lee Berger

- Tim White, UCB, took 15 years to publish his findings on “Ardi”.
- He believes *H. naledi* might be a variant of *H. erectus.*
- The fossils come not from a single specimen, but from as many as 15 different individuals; it is therefore difficult to identify which bone came from which individual, and even whether they lived in the same period.

Tim White

- Photos taken of the find demonstrate to White that many of the fossils were “very disturbed, perhaps by earlier cavers, in the geologically recent past.”
- “One tibia, for example, was white on one end, a clear indication it had been snapped off in the recent past,”
- White on Berger’s burial theory: “The only evidence seems to be ‘We can’t think of anything else.’ This is not evidence.”
- Berger’s response: This is White’s opinion. Let him publish a scientific rebuttal.

Bones of Contention 4:

- John Hawks counters*:* body is unlike *H. erectus*; form of skull looks like early *erectus*, but premolar teeth unlike *erectus*; only 1 *erectus* brain is as small as *naledi; (*CJV: 4 of 5 Dmanisi erecti are under 600 cc)

- The field is split, largely between those who consider Berger
  - a visionary for publicly sharing data vs.
  - those who consider him a hype artist.
  - “Intentional corpse disposal is a nice sound bite, but it’s more spin than substance,” the paleoanthropologist William Jungers,

2015: Just scratched the surface: Unanswered questions

- Only 1 meter of 12 meters excavated so far.
- Provisionally assigned to the genus *Homo*
- Where does *H. naledi* fit phylogenetically in human evolution?
- How did the remains arrive deep within the cave system?
- Is it a variation of *Homo erectus?*

New dating surprise: Late Middle Pleistocene = H. naledi, 235-336 Ka

H. sapiens; Jebel Irhoud, Morocco
6800 miles

Broken Hill, Zambia
800 miles away

Naledi, South Africa

2017: *Homo naledi* dated to 236-335 kya

- New dating doesn't, however, answer questions about how long ago the species first appeared and when it died out.

- Attempts to extract DNA from Dinaledi fossils have so far failed.

2013-2017: New discoveries: Lesedi Chamber

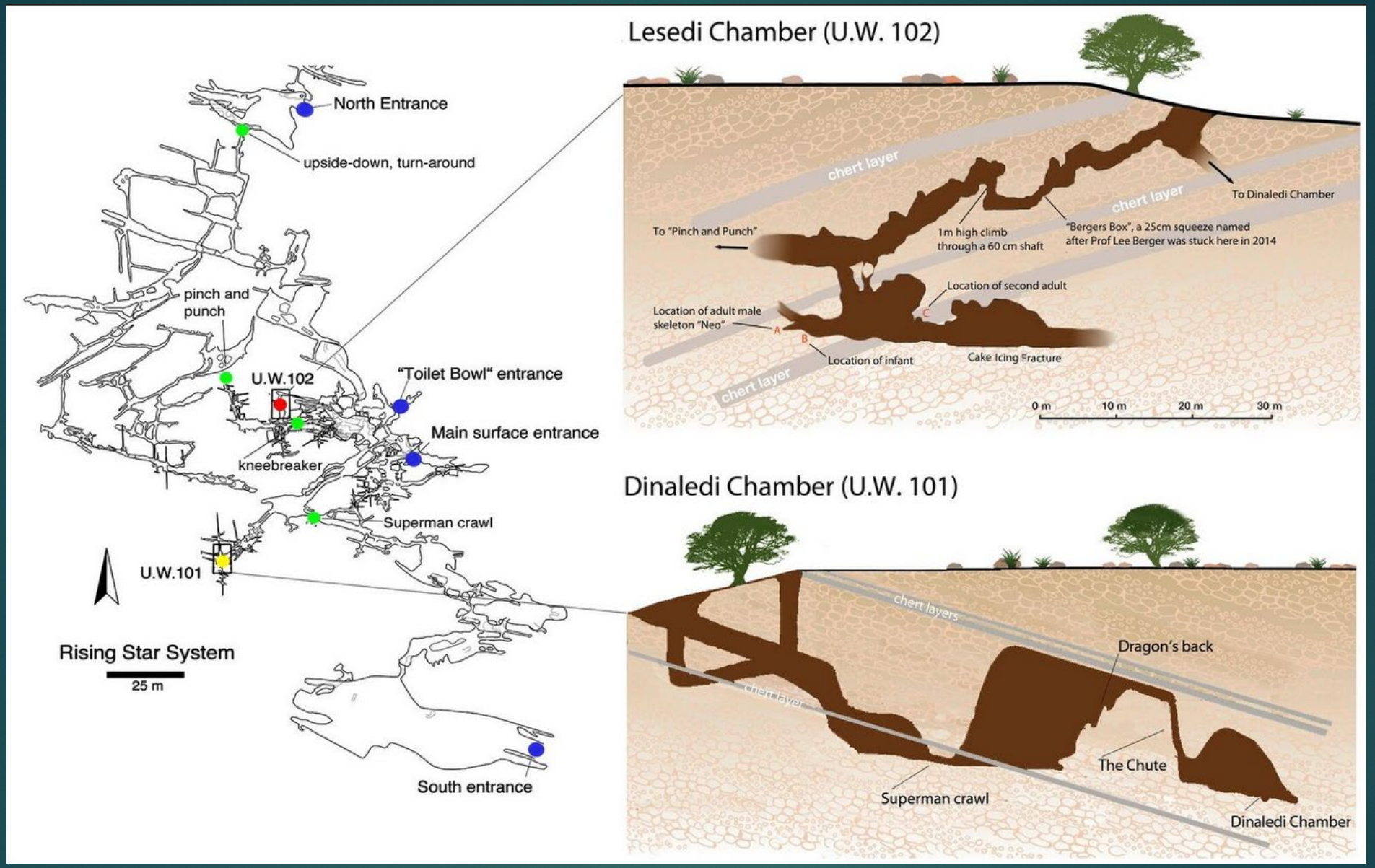
- Additional fossil hominin material was subsequently discovered in the Lesedi Chamber of the cave system in November 2013 by Rick Hunter and Steven Tucker. Only published in 2017.

- The second cavern, called the Lesedi chamber, is a mere 80 lateral meters from the now-famous Dinaledi chamber,

- No direct geological connection to the Dinaledi Chamber.

New Lesedi chamber: 3 more individuals

- 2500 bones in both chambers; Of the 206 bones in the human body, only about 20 are not represented in the cave.
- "[The second] chamber has the remains of an additional three individuals at least as of 2017; 131 fossil bones in 3 collection sites
- Includes a partial (40%) skeleton with a skull. Named "Neo ("nay-oh")" which means *gift* in Sesotho, a language spoken in South Africa.
- Lesedi fossils are notably similar to the Dinaledi fossils in shape and morphology.
- 2020: 25 individuals total (via number of same teeth) in both chambers



Lesedi Chamber is located about 80 meters from the Dinaledi Chamber.
Both chambers are extremely difficult to access

Challenges to conventional theory: issue of variation

- The persistence of small-brained humans for so long in the midst of bigger-brained contemporaries revises the previous conception that a larger brain would necessarily lead to an evolutionary advantage,
- Their mosaic anatomy greatly expands the known range of variation for the *Homo* genus.
- Evolution depends on adaptation to ecological variation and not to larger brains.
- Remember the earlier discovery of the temporal simultaneity (2 Ma) of larger brained *H. erectus* and smaller brained *P. robustus* in same area

Leti, age 4-6; isolated area

Lee Berger holds a reconstruction of Leti's skull. Wits University

LES1 Cranium – Neo: 610 cc

LES1, with an endocranial volume of ~ 610 cc; 9 percent larger than the brain size estimates for the previously discovered Dinaledi fossils

LES1 Cranium

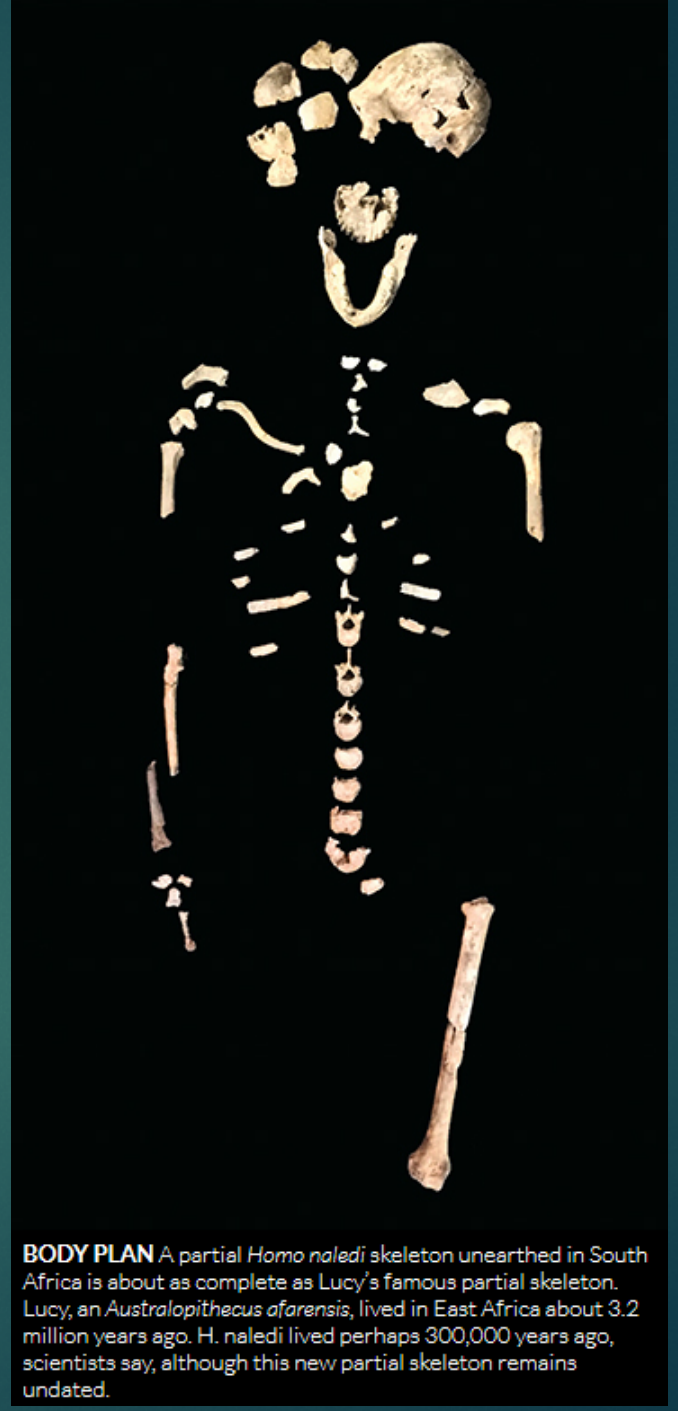
Neo from Lesedi

DH1 from Dinaledi

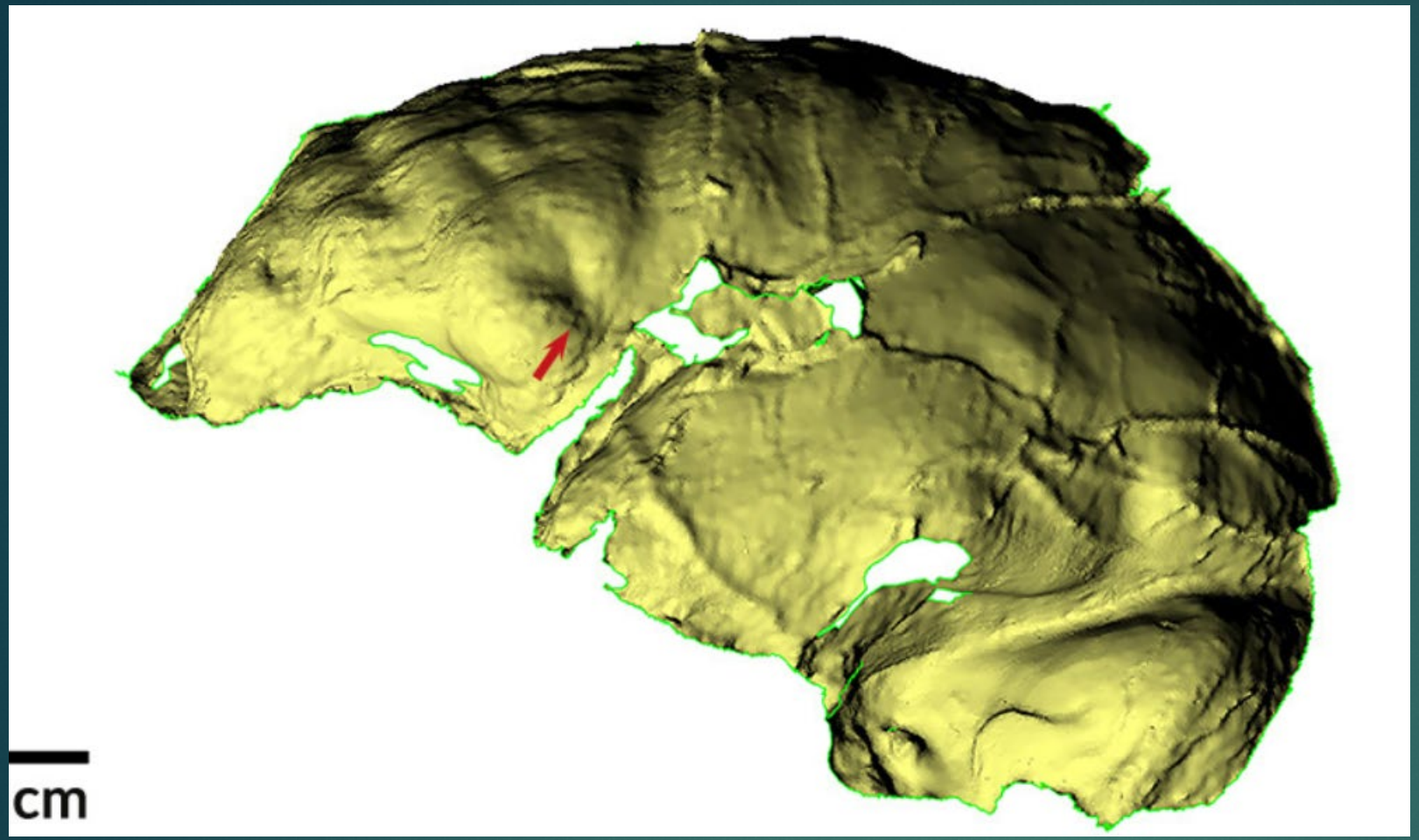
"Neo" skull (left) compared to DH1 skull of Homo naledi (right). Photo credit: John Hawks CC-BY

Lucy and Neo

Neo is one of the most complete skeletons ever found.



BODY PLAN A partial *Homo naledi* skeleton unearthed in South Africa is about as complete as Lucy's famous partial skeleton. Lucy, an *Australopithecus afarensis*, lived in East Africa about 3.2 million years ago. H. naledi lived perhaps 300,000 years ago, scientists say, although this new partial skeleton remains undated.



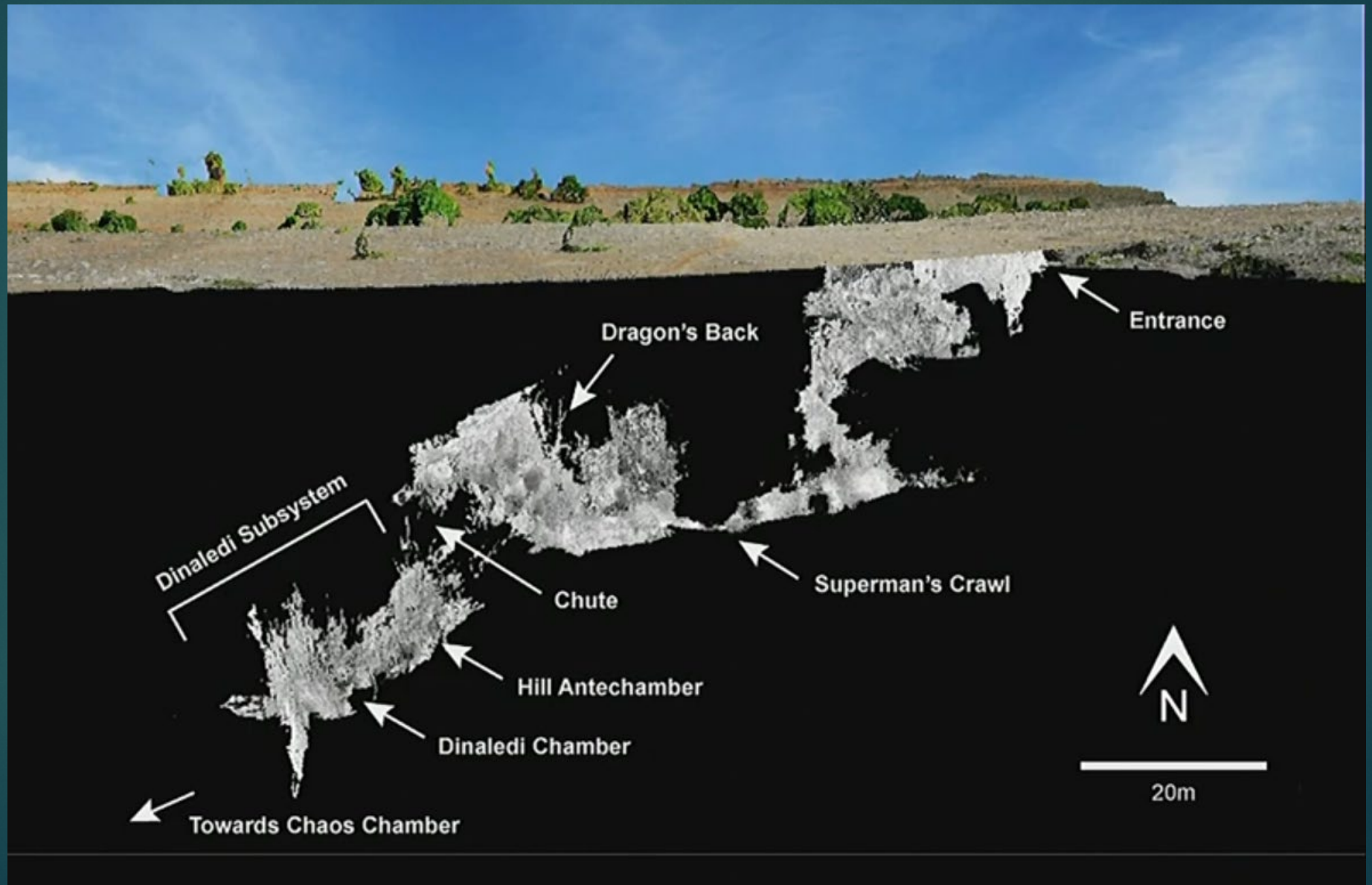
DH3: inferior frontal gyrus that was more human-like than primate-like.

Hurst & Hollowell: GO FOR BROCA -- A virtual cast of *Homo naledi*'s brain surface contains clues to the presence of a region (pointed to by red arrow) that may correspond to Broca's area in present-day people. This language-related neural region enhanced social emotions and communication, per Hollowell. Falk disagrees. Also left posterior hemisphere longer = right handedness

Shawn Hurst & Ralph Hollowell

Neo reconstruction

2022: Dragon’s Back: 40 feet up; to get to the Chute

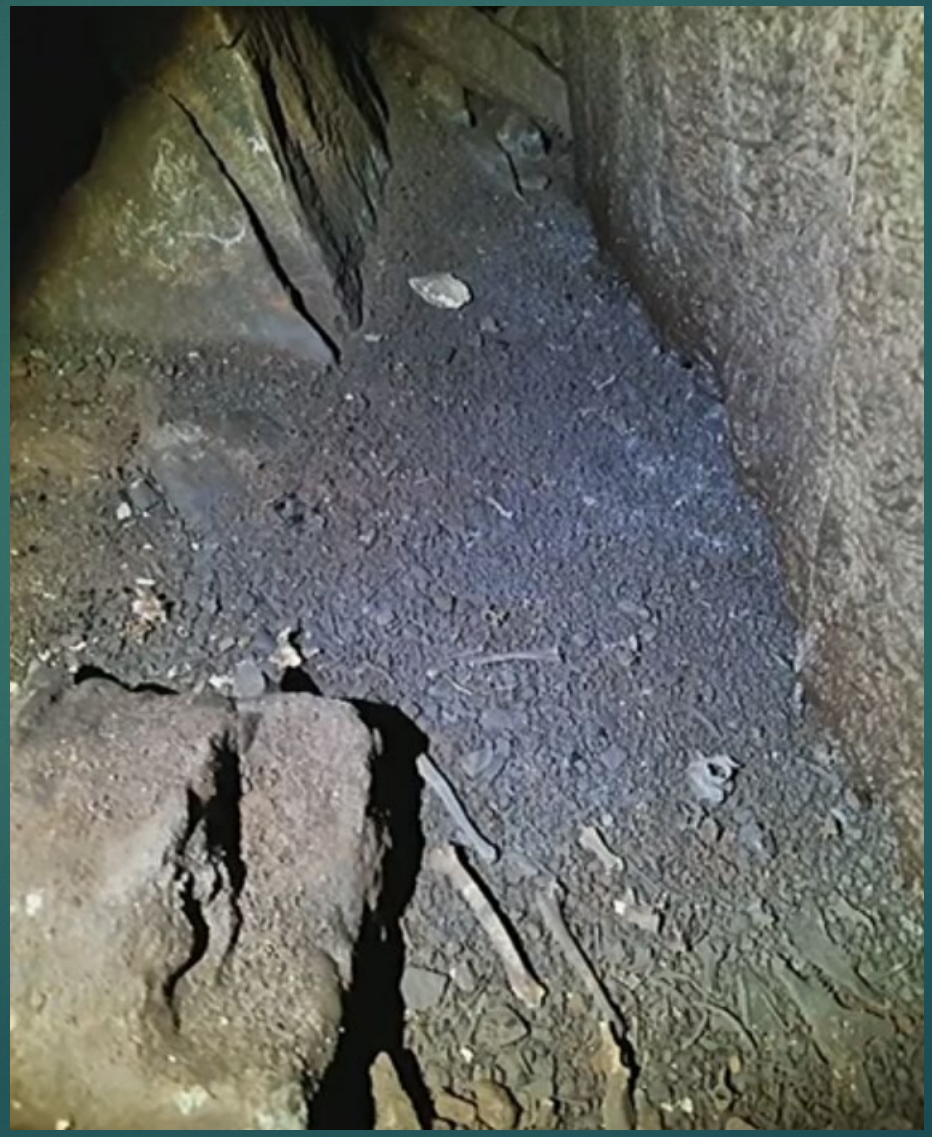


2022: New excavation of Dragon’s Back Chamber – only access to Dinaledi

Evidence of charcoal and fire; and charred animal bones – By whom?? Dates??

Same in Lesedi Chamber: charcoal

Scatters of ash and animal bones – by



2017: Dinaledi discovery of Feature: extracted

Synchrotron-aided microCT of Feature

The Homo naledi "Burials" are Highly Improbable – M. Christie, 2017

- Berger & Dirks claims made:
- a. H1. No evidence of Occupation in the Dinaledi Chamber.
- b. H2. No evidence of Water transport (flood or significant current). There is evidence of slumping.
- c. H3. No evidence of Predator accumulation in the Dinaledi Chamber, but many in Dragon's Back chamber. Also no damage indicative of intra-species fighting or cannibalism.
- d. H4a. Mass fatality (catastrophic) no evidence of flood, massive roof collapse or other catastrophes. Deposits show amazingly little signs of perturbation.
- e. H4b. Death trap (attritional). Never an open pit. A death trap scenario considered unlikely.
- f. H5. Evidence of Deliberate disposal of dead con specifics by Homo naledi. ("No other explanation", L. Berger in an interview).
- According to the authors very poor fit or contradiction with facts make H1-3 inviable, H4a very improbable, H4b and H5 as more likely, but they clearly favored H5, deliberate disposal (burial).

Comments on the six original hypothesis considered by Dirks et al. [2]

- I assume an overall premise that natural explanations are more parsimonious that those requiring intentional, deliberate intervention of any kind.

- Hypothesis 1, Occupation: Deliberate burial has practical flaws

- H2. Water transport: ‘no evidence’ again refers only to the Dinaledi Chamber, and to high-energy flows. They do not seem to consider the possibility of passive transport of floating rotting carcasses that may have drowned inside the water-filled chambers

- H3 & H4 (predators & mass fatality): OK
- H4b. Death trap (attritional). This is a key issue. allude exclusively to pit-fall traps which are often bone-traumatic. Two other options must be considered: pit-slide traps and ‘maze’ traps, both of which are not bone-traumatic. The slanting narrow chute into the Dinaledi Chamber makes it a potential slide-trap. The sheer complexity of the floor plans of both the Dinaledi and the Lesedi Chambers, and of the cave system as a whole, make them potential maze-traps. Even speleologists get lost in unfamiliar caves.
- H5. Deliberate disposal. I see little positive evidence for burial. The absence of alternative explanations cannot be considered ‘evidence’ in favor of this one. The most frequently cited objection is the difficulty of access to the Dinaledi Chamber.

Death cause?

- Also, if there is absolutely no evidence of trauma of any sort, what did these individuals die of? Starvation, disease, snake bite, drowning, old age? To be bone-trauma free they must have died of non traumatic causes inside the cave.
- Dirks et al. conclude that the Dinaledi Chamber hominin material was deposited between 236ka and 335ka, though there is some indication that part of the material could be even younger
- The first item that needs revision is the no occupation assumption, and the associated idea that deep exploration of the cave required fires or torches and so on. An impertinent troop of cave dwelling Chacma Baboon (Papio ursinus) has disproved this.

Baboons

- Chacma Baboons in South Africa's Cape area that use a deep cave as a sleeping refuge. Threat is leopard predation at night.
- The troop has discovered a cave system accessed by a small hole in the ground and an eight meter vertical drop. The cave has probably become accessible to them recently, via a rope left dangling.
- The baboons rappel into the pit at dusk and feel their way about, up to 100 m into the cave system in pitch darkness, where they sleep. They seem to have a mental map of the cave.
- It's very existence demonstrates that baboons, and presumably hominids, will take advantage of any situation that becomes available, will penetrate deep into the dark zone of a cave system without the need for torches or any other 'cultural' accessories, and will die in the cave in the absence of predation. A similar situation could easily have develop in the Rising Star system. If a troop periodically slept in Dragon's Back Chamber the probability of individuals occasionally stumbling into the Dinaledi Chamber's chute increases exponentially. Over the thousands of years involved fifteen such 'accidents', or even fifty, could easily occur. If this were correct no other explanation would be needed,
- Baboons did enter Dinaledi caves and one baboon tooth was recovered from the Dinaledi chamber

Time span

- The intentionality argument hinges on the implied improbability of over 15 independent rare events occurring in one spot.
- However, this is inversely proportional to time span. Thus the 99ka range (335-236ka) also argues against the burial hypothesis. Even with a restricted span of 20-50ka and an optimistic ~100 individuals, that's still 200-500 years interval per burial.
- In my opinion this is simply too low to speak of a cultural trait. How could such a cultural trait be passed on with intermittent appearances every 30 generations, or even a fraction of that? A modest population with a death rate of 1 or 2 per year would produce thousands of corpses in the time involved.

The predator-induced slide trap hypothesis

- So could the peculiar layout of the Rising Star Cave act as a species-specific predator-induced trap for hominins?
- The obvious candidate for the Dinaledi Chamber is to consider it a slide trap. In a nutshell: moving deep into the cave to escape predators, hominins clambered up the Dragon's Back, crammed at the top and occasionally into the chute, where some slipped down and ended up trapped in the Dinaledi Chamber.
- The 12 odd meter chute into the lower chamber is too narrow and slanted to produce a free-fall, so green fractures are not expected. The inaccessibility of the top of the chute would impede access to any would-be predator or scavenger (hyenas can't climb, lions are too big). Subsequent victims groping around the chamber before they succumbed would also add to the scattering and dry breakage of previous skeletons. These later victims are more likely to preserve articulated and in situ.

Trap

- Is the chamber a trap for healthy apes? Yes. Consider the plight of a lone hominin that dozed off in the chute or chamber. It wakes up in a soundless pitch black unfamiliar location, thirsty and hungry. It is just as likely to go down rather than up. Apes have descended from their sleeping tree-nests since time immemorial. If it wandered even a little in this sensory deprived chamber, just finding the outlet would be very difficult and escape virtually impossible. In all likelihood it would die long before it found the way out.
- Why so many? These events need only happen once per millennium to produce the 15 individuals estimated to lie in the chamber in only 100ka, even without an occasional mother-infant or pair of any sort. This is well within the estimated range of the deposits.

Sink-trap effect at Dragon's Back chamber

- Water entering the outer cave could flood Superman crawl area, making it impossible to escape.

- Water would not be in Dinaledi in this case.

Hauling corpses

- The physical difficulty of hauling corpses in is so obvious it is one of the most cited objections.

- Again, lack of trauma in such a large sample strongly argues against the notion that the individuals died prior to reaching the chamber
- I
- If 75% of deaths are bone-trauma free the likelihood of hauling 13 intact trauma-free skeletons into the chamber in a row drops below 1%.

The predator-induced Trap Scenario

- Several predators will follow prey into a cave and even into a narrow passages such as the Superman's Crawl. The possibility of an attack by pack hunters is relevant because a pack is more likely to persist on the hunt
- Early hominids lived most of their nights in total darkness and would be used to groping around in a tree, rock face or cave.

The flood-induced Trap Scenario

- The lack of evidence of flooding or significant current in the Dinaledi Chamber is expected because flooding of the upper cave would not show in the deepest chamber for two reasons. Dragon's Back chamber acts as a sink-trap for coarse sediments and rubble. If the water table is high enough to allow direct overflow from Dragon's Back to the lower chamber via the chute of the Dinaledi Chamber any inflow would be diffused throughout the chamber and could take months to drain out, so silt would be deposited evenly all over the chamber floor.
- Because Superman's Crawl is at 'floor' level and so low, even a modest flood from the first rains would seal the outlet forcing them up Dragon's Back or any other ledge in the chamber. Once trapped in this middle chamber the probability of one or several hominins finding their way to the top of Dragon's Back and into the chute is reasonably high. If the raised water level persisted even a few days any hominid caught inside would perish.

4 eLife anonymous reviews pre-2024

- Not one of the burials provides compelling evidence of a deliberately excavated pit. Indeed, the shallow cavities may not be dug pits at all, but natural depressions where the bodies accumulated and were later disturbed by trampling, or partial cave collapse.

- The alleged burials also fail to meet another fundamental criteria for deliberate burials: anatomical alignment of the body and articulation of skeletal remains.

- But perhaps the biggest barrier to confirming the status of the findings is that so far none of the alleged burials have been fully excavated. It's therefore impossible to assess the completeness of the bodies, their original position, and the limits of the purported pits.

- Scratches/"engravings": In the absence of dating, it's simply spurious to claim the engravings were made by *Homo naledi*, rather than by another species (and potentially at a much later date)

4 Reviews: Supporting a hypothesis rather than testing it

- The reviewers levied a variety of criticisms. Many pointed to insufficient evidence that the spatial displacement of the bones was a result of deliberate burial practices and not natural processes — with the analysis lacking consideration of joint disarticulation during decomposition, integration of geology and sedimentology into the interpretation of the finding, and rigorous elimination of other hypotheses for the bones' arrangement such as erosion and sediment slumping.
- The first reviewer wrote, "In its current form the paper … does not meet the standards of our field … The working hypothesis is that the features are intentional burials, and the authors seek to support this hypothesis throughout rather than test it."

All question intentional burial

- Another reviewer wrote, “There is a significant amount of missing information in the study presented here, which fails to convince me that the human remains described represent primary burials.”

- The starting null hypothesis should be that the bodies were naturally covered in sediment. Intentional burial requires extraordinary circumstances and requires multiple lines of solid evidence to support the hypothesis

- An analysis also needs to start by testing a null hypothesis, not deciding on the conclusion and setting out to "prove" it.

Reviewers 2 and 3

- Review 2: My main concern is that the study does not apply or cite the basic principles of archaeothanatology, which combines taphonomy, anatomy, and knowledge of human decomposition to interpret the arrangement of human bones
- Review 3: So bodies lying on the surface and slowly covered by the formation of the deposit and slowly moving towards the drains could perhaps account for the pattern observed, meaning burial is not needed to account for articulations. unless the team can provide some process that would have otherwise disarticulated these skeletons after the bodies arrived here and decomposed, their articulated state is not evidence of burial. As it is now, I did not see the argument in support of a burial pit.
- There is no evidence here of a pit (at all). And what if the body was stuffed down the chute and was resting on a slope and covered with additional sediments from the chute (or additional bodies) as it decomposed? It seems that this should be the starting point here rather than imagining a pit.

Paper is premature

- This paper is premature and that more excavation and the use of geoarchaeological techniques (especially micromorphology) are required to sort this out.

- Review 4: Missing data. PC analysis is wrong. Results are not replicable as currently reported. No micromorphological analysis of sediments

- There is no mention of infilled sediment from a pit and how this relates to the skeleton or the slope of the floor. It is therefore extremely unclear what the authors are meaning to describe without any visual or micromorphological supplementation to demonstrate a "bowl-shaped concave layer".

Engravings

- As an opening statement to introduce Dinaledi Feature 1, the authors state the interpretation and working hypothesis as fact before the authors present any evidence. Gives the impression that a hypothesis was formulated before data were collected.

- 3 Reviews of “engravings”: severe, scathing criticisms.

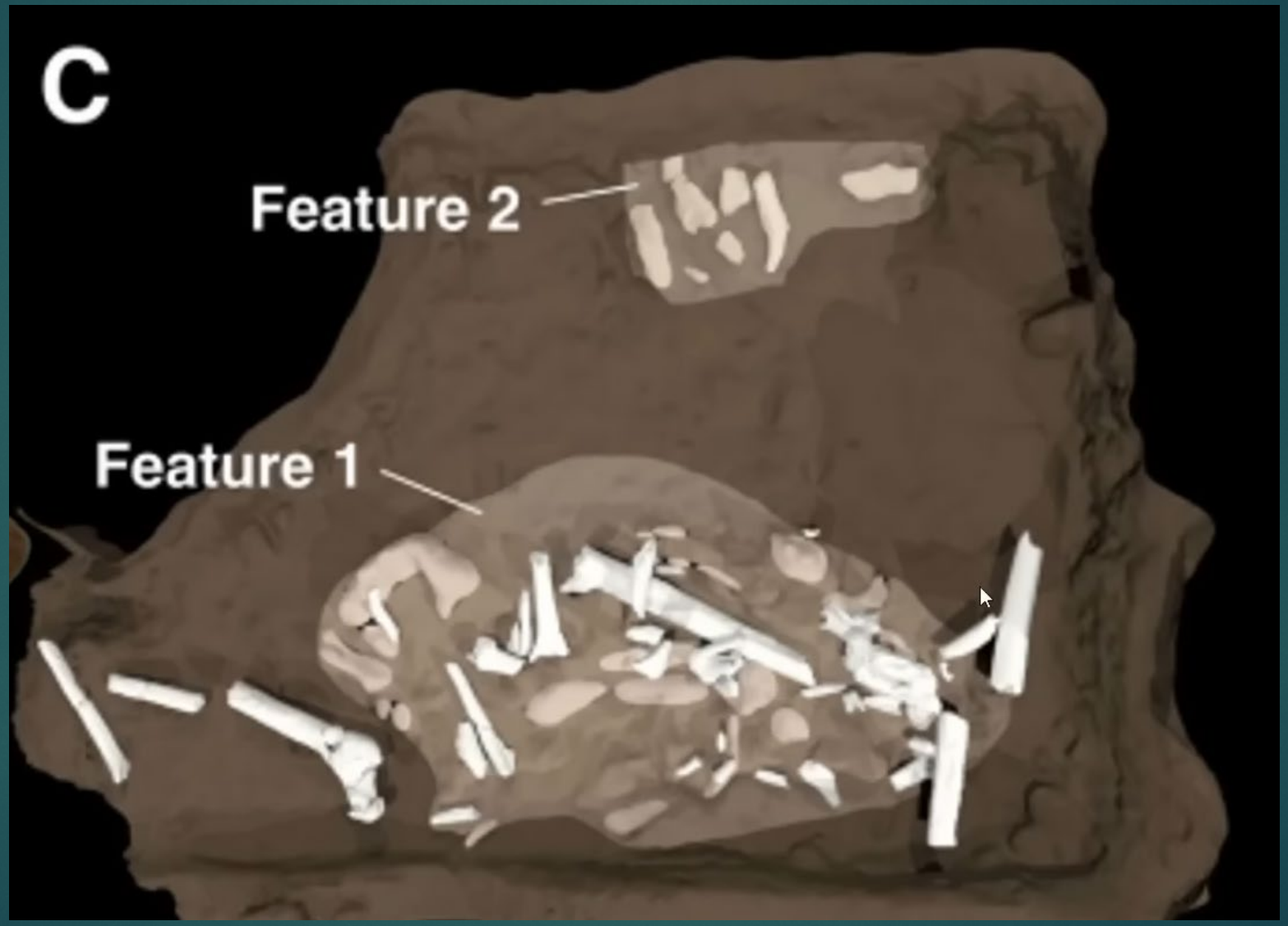
Berger summary of 4 reviews

1. The evidence: does not demonstrate a clear interruption of the floor sediments, thus failing to demonstrate excavated holes.
2. The sediments infilling the holes where the skeletal remains are found have not been demonstrated to originate from the disruption of the floor sediments and thus could be part of a natural geological process (e.g. water movement, slumping) or carnivore accumulations.
3. Previous geological interpretations by our research group have given alternative geological explanations for formation of the bony accumulations that contradict the present evidence presented here and result in alternative origins hypotheses.
4. Burial cannot be effectively assessed without complete excavation of the features and site.

Summary

1. The skeletal remains as presented do not conform clearly to typical body arrangement/positions associated with human (Homo sapiens) burials.
2. There is no evidence of grave goods or lithic scatters that are typically associated with human burials.
3. Modern Humans may have been involved with the creation of either the Homo naledi bone accumulations, the engravings, or both.
4. Without a date of the engravings, the null hypothesis should be the engravings were created by Homo sapiens.
5. The null hypothesis for explanation of the skeletal remains in this situation should be “natural accumulation”.

Flint Dibble critique: Look at image



Flint Dibble: Feature 1

- Just look at image: post depositional movement of bones outward; limbs scattered everywhere
- Totally ambiguous as to whether this is a burial
- They ignore evidence from earlier excavation: Feature 1 is right above 1 meter square Puzzle Box 1st excavation (which has 15 indiv; vertical elements; articulated bones) = all explained by post depositional movement due to slow mud flow, not burials; contradicts conclusions of newer papers
- Now want to claim not null hypothesis of natural burial, but cultural explanation is a better fit; and now want to explain original excavation of 2015 as being cultural burials of number of bodies over each other
- Well studied phenomena of multiple burials literature is uncited

Berger: Disagree with all 5 peer reviews

- Berger: Disagrees with all 5 peer reviews. Now reinterpret prior research as cultural burials, not post depositional movement
- Dibble: Arguments for rejection of paper:
- This is a very sloppily written paper.
- The lack of bibliography is playing a game. Instead of building a secure argument with parallels to other literature on how these are burials, it's seeing what citations the reviewers suggest. Then they can adapt around reviewer suggestions. They don't argue with the current literature; they wait for reviewers to identify which literature to argue against.
- This is lazy. Why should reviewers waste time doing so much work for them.

**** 4 major 2024 papers on H. naledi

- 1 - What we know and do not know after the first decade of Homo naledi -- Paul Pettitt & Bernard Wood
- 2 - Preprints, press releases and fossils in space: What is happening in South African human evolution research? -- By Robyn Pickering and Dipuo Kgotleng, 2024
- 3 - No Sedimentological Evidence for Deliberate Burial by Homo naledi – A Case Study Highlighting the Need for Best Practices in Geochemical Studies Within Archaeology and Paleoanthropology – K. Foecke
- 4 - Evidence for deliberate burial of the dead by Homo naledi -- Lee R Berger…J. Hawks, et al., Aug 12 2024, BioRx preprint

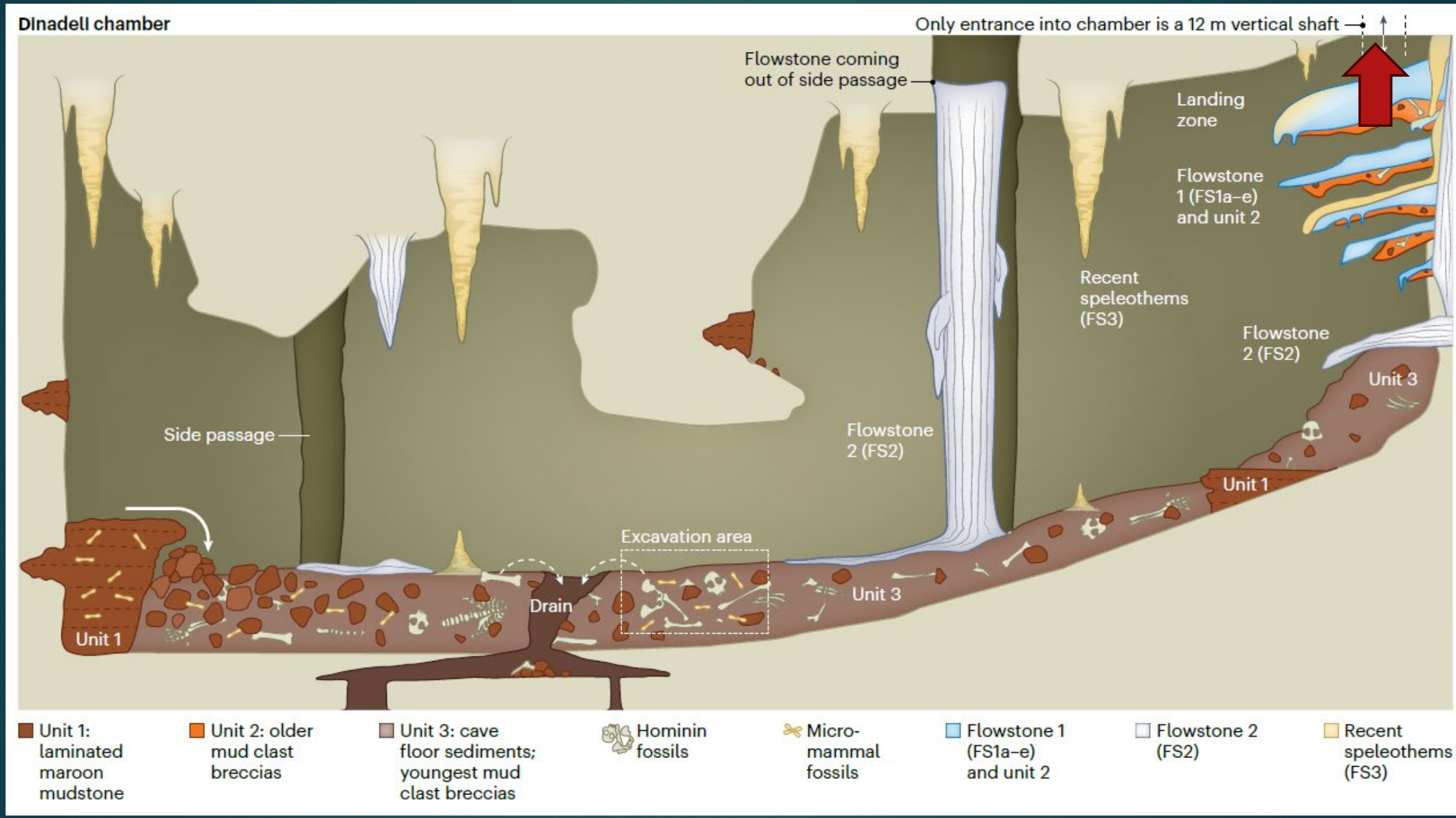
*** What we know and do not know after the first decade of Homo naledi -- Paul Pettitt & Bernard Wood, 2024

- It has been just over 10 years since the first fossils attributed to Homo naledi were recovered from the Rising Star Cave system in South Africa's Cradle of Humankind. The hominin fossil evidence for H. naledi displays a distinctive combination of primitive and derived morphology, yet for a time-averaged fossil sample it is remarkable for its relatively low level of variation.
- Thus—unusually for paleoanthropology—there has been little pushback against the decision to recognize a single novel taxon for all of the material recovered from the Rising Star Cave system.
- However, almost everything else claimed about H. naledi—its age, burial context and behavior—has been controversial.

1,550 fossils in Dinaledi Chamber

- The majority of the H. naledi material—1,550 reported fossils from a minimum of 15 individuals (bone and tooth fragments has been recovered from the Dinaledi Chamber, with additional fossils from the Hill Antechamber and locality U.W. 110.

- The rest of the evidence—131 fossils from at least three, and probably four, individuals—comes from the nearby, but separate, Lesedi Chamber.


Dinadeli chamber
Only entrance into chamber is a 12 m vertical shaft
Flowstone coming out of side passage
Landing zone
Flowstone 1 (FS1a–e) and unit 2
Recent speleothems (FS3)
Flowstone 2 (FS2)
Unit 3
Side passage
Flowstone 2 (FS2)
Unit 1
Excavation area
Drain
Unit 3
Unit 1
Unit 1: laminated maroon mudstone
Unit 2: older mud clast breccias
Unit 3: cave floor sediments; youngest mud clast breccias
Hominin fossils
Micro-mammal fossils
Flowstone 1 (FS1a–e) and unit 2
Flowstone 2 (FS2)
Recent speleothems (FS3)

Dinaledi Chamber

- The location of the H. naledi fossils in the upper part of subunit 3b are shown represented by white bone symbols. The age of the lower part of unit 3 suggests a maximum age of ~900 kyr for the H. naledi fossils in subunit 3b.
- A minimum age of ~250 kyr for them is provided by U–Th-dated flowstones (shown in blue) overlying unit 3b, and the direct ESR dates on the fossils themselves (teeth) of ~200–300 ka.

- If OSL dates for the sediments and averaged US-ESR measurements for the fossils are omitted due to unreliability (as discussed by Dirks et al.), H. naledi could be considerably older than 300 kyr old.

Depositional history

- The Rising Star Cave system as currently understood consists of at least 4,000 linear meters of passageways, plus other spaces of differing sizes and shapes, all within the Malmani subgroup dolomites.
- Currently there are four known entrances to the system, three open and one sealed.
- The Dinaledi subsystem, which is 30 m below surface and >70 m in a straight line from the nearest current opening, is connected to the rest of the Rising Star Cave system by the Chute.

Was Dinaledi isolated?

- They were also emphatic that the adjacent Dragon's Back Chamber is unlikely to have been the source of the hominin fossils in the Dinaledi Chamber.

- All this being said, it is possible, as others have suggested, that another entrance—now sealed—was how the sediments and hominin remains entered the Dinaledi subsystem.

- Karstic caves are dynamic systems, with the potential that substantially sized blocks could have fallen from the roof and blocked one, or more of any former entrances, located either to the south or to the west of he Dinaledi chamber

Difference from Cradle of Humanity fossils

- The high density of the H. naledi fossils in the Dinaledi Chamber, with almost no associated non-hominin fauna, contrasts with the sedimentary context of other hominin-bearing cave systems in the Cradle of Humankind, where hominins are but one component of a rich, but taphonomically degraded, mammalian faunal record that typically accumulated in debris cones subsequently brecciated by flowstone.

Difference from Cradle of Humanity fossils

- As suggested by the Rising Star project geologists, because its hominin fossils are mostly contained in unconsolidated reworked muddy sediments, with clear evidence of more than one episode of primary deposition, caution is called for when interpreting both the stratigraphy and the age of the fossils.

- Skeletal part representation of H. naledi and lack of associated non-hominin remains do not rule out natural accumulation.

Some things cannot be ruled out.

- The question is not whether periodic low-energy water transport occurred—it clearly did—but whether it moved hominin remains around within the cave's subsystems. [Berger denies this]

- The extent and pattern of bone breakage inflicted on the hominin fossils is inconsistent with minimal transport, but it could be explained if the hominin skeletal remains had entered the cave from another entrance. It is premature to assume that the location of the hominin remains is reliable evidence that corpses were dragged underground to this favored depositional location. Ingress via a now-sealed entrance, followed by natural deposition, cannot be ruled out.

How old is H. naledi?

- The initial paper addressing the geological and taphonomic context of H. naledi devoted a single five-line paragraph to the age of the fossils.
- The authors explained that because of the complex stratigraphy they were reluctant to ‘speculate’ on the age of the deposit, suggesting instead that they were working on developing dating methods that could ‘circumvent this problem’.
- Subsequent efforts to address the stratigraphic context and the dating of the H. naledi fossils concluded they are relatively recent.

Minimum age issue

- Used OSL, U-Th, ESR, paleomagnetism dating tech.
- The minimum date for the capping flowstones is 242 ± 5 kyr before present, and the researchers' best estimate of the age of H. naledi is the maximum US-ESR age of 253 (+82/−70) kyr,
- A more recent study suggesting the age of the H. naledi remains is between 335 kyr and 241 kyr.

Age issue

- But, given that many of these dates are minimum ages, both OSL and US-ESR can be unreliable, and dates for the formation of flowstones in the chamber suggest ages ranging from 500 kyr old to older than 780 kyr, the age of H. naledi is still a work in progress.

- The potential uncertainty about its age affects our understanding of the evolutionary position of H. naledi.

The nature and relationships of H. naledi

- The fossil record of H. naledi is informative about regions of the body—especially the spine, limbs, hands and feet—that are usually not well represented in the fossil records of the more established taxa sampled at southern African cave sites.

- The overall body plan of H. naledi is a distinctive combination of primitive (small brain and small body mass) and more derived (reduced body mass dimorphism and elongated lower limbs) features.

Features

- The cranium resembles early Homo/Homo ergaster but with an even smaller endocranial volume (approximately >550 cubic centimeters).
- The dentition, both permanent and deciduous, is a mix of modern human-like primitive and unusual features.
- The hand morphology is mostly derived in the direction of modern humans, and the pelvis and hip joint are relatively primitive, as are the curved foot phalanges, but the femoral morphology is unique among early hominins

Berger claims

- There is no obvious precursor to H. naledi and no evidence of any descendant taxon.

- Berger and colleagues contend that this small-brained hominin used controlled fire to illuminate a long and difficult-to-negotiate subterranean route through which it dragged corpses of its congeners in order to bury them in a chamber decorated with engravings.

The cognitive world of H. naledi

- With respect to fire, the authors admit to uncertainty about the mode and intensity of any fire used by H. naledi in the Dinaledi subsystem, so for now we must assume the use of fire is purely speculative.

- Arguments in favor of the deliberate burial of at least one individual rely on what is interpreted as sediment disturbance plus a statistically insignificant distinction between sediments within and without the assumed ‘grave’

Deliberate Burial?

- The authors also point to the very limited evidence of skeletal articulation, but this also occurs when any corpse decays, whether it is deliberately buried or not.

- The lack of any clear grave cutting and the presence within and around the ‘grave’ of remains from other individuals further weaken the ‘deliberate burial’ hypothesis, in our opinion.

Markings and stone tool

- Berger interpreted linear marks on a natural stone pillar between the Hill Antechamber and the Dinaledi Chamber as ‘crosshatched etchings’ of a deliberate (that is, engraved) nature. Marks like this, which are made when tectonic activity causes sharp rocks in breccia to score the cave wall, are visible in nearby caves.

- Berger also argues one individual was buried holding a stone tool; however, sediments in the cave are littered with exfoliated limestone, and others have contended that a more parsimonious explanation is that the ‘artefact’ is a rock splinter from the roof of the cave that is fortuitously ‘associated’ with this individual.

Where do things stand with *H. naledi* after a decade of discovery and analysis?

- Lee Berger should be commended for his success at locating an important new source of evidence and for taking on the considerable logistical challenge of recovering the evidence of H. naledi from deep underground.

- He has also offered opportunities to early-career researchers to take part in the description and analysis of the fossil evidence, and he has worked hard to disseminate casts of the fossils from the Rising Star cave system.

Genus Homo?

- The morphology of H. naledi is a puzzling combination of primitive and derived features. Presently, the implications of the fossil evidence have been assessed anatomically region by region, but a much more challenging task will be combining the regional evidence into a series of hypotheses about where, and how, H. naledi fits within existing, or modified, human evolutionary narratives.
- It remains to be seen whether after integrating all of this information it still makes sense to keep H. naledi in the genus Homo, and researchers need to explain why the H. naledi sample manifests so little morphological variation.

Importance of dating

- Despite arguments from Berger et al. to the contrary, the geological age of H. naledi does influence its interpretation. Reliable dates are not needed for deciding whether H. naledi is a good species, but they are needed for working out how H. naledi relates to pre-existing hominin species.
- If it is between 1 and 2 million years old, its unique mix of primitive and derived features could help us to understand the sequence in which regions of the skeleton evolved, but if it is between 300 and 200 kyr old, H. naledi probably represents a local relict population whose combination of features owes as much to genetic isolation as it does to the influence of deeper human evolutionary history.

Extraordinary claims need extraordinary evidence

- More controversial are the ways in which the researchers have approached interpreting the various lines of contextual evidence.

- Best scientific practice considers the relative likelihood of a series of alternative explanations for each observation, and extraordinary claims require extraordinary evidence to support them.

Extraordinary claims need extraordinary evidence

- The presence in nearby caves of ‘crosshatched etchings’ identical to the ones the Rising Star researchers claim could only be created with a hard, sharp tool is perhaps the most obvious example of such an extraordinary claim.

- The preference for explanations that infer the behavior of H. naledi in relation to that of modern humans is an example of what Butterfield referred to as ‘presentism’—the tendency of historians to reconstruct the past by reference to the present.

- We need to look at the world of H. naledi for its own sake, without constantly comparing it to our world

Pre-prints vs peer review

- This brings us to the way the results of research related to the Rising Star Cave system have been communicated to scientists and to the public.
- Traditionally, major discoveries at hominin fossil sites are published in high-impact journals that are extensively peer-reviewed. Subsequently, detailed analyses of the hominin fossils are communicated via papers in peer-reviewed specialist journals. Peer review does not eliminate controversy, but it does place controls on a tendency to over-interpret evidence.
- The principal researchers involved with the Rising Star research decided to publish the results of their research as unreviewed preprints or in journals rejecting traditional models of peer review before publication.

Severe criticism and need for more research

- Science assumes researchers will work hard at the task of being their own critics, and it is not surprising that the recent post-publication peer reviews have been harshly critical of many of the claims made by Berger and his fellow principal researchers.

- The publication strategy of the Rising Star Cave system team, with its emphasis on controversial interpretations and ensuing media attention, has had the unfortunate effect of deflecting attention from the real scientific importance of H. naledi.

*** No scientific evidence that *Homo naledi* buried their dead and produced rock art

- In November 2023, a peer reviewed paper by a group including Herries and María Martinón-Torres of CENIEH, who helped develop the x-ray fluorescence-based technique, argued the Berger team hadn't ruled out the possibility that the bones might have landed in the cave by natural means, such as washing in with flooding water.

Puzzles

- Two caves. There is no connection between the two.
- There are no stone tools.
- Did they fall in? Were they pushed? Why are they in two different chambers so difficult to access?
- The authors of the new articles would like us to believe they were put there by others of their kind, but there is a long way to go before we can be certain of that.

Potential Implications of *Homo naledi*

- The effect on the field is transformative.
- Evolution produced different types of humanlike creatures originating in parallel in different parts of Africa.
- Was there multiple early hybridizations?
- Is this a relic population that may have evolved in near isolation in South Africa? A dead end?
- Is there a point at which we became human or are there many ways to be human?

*** Potential Implications of *Homo naledi*

- Apart from our language capacity, no modern human uniqueness claim has survived unmodified for more than a recent decade since it was made:
  - Tool use, tool making, culture, food sharing, theory of mind, planning, empathy, inferential reasoning —
  - All have now been observed in wild primates.

- Frans de Waal: ““We are trying way too hard to deny that we are modified apes…We are one rich collection of mosaics, not only genetically and anatomically, but also mentally.”

Lessons to learn from *H. naledi*

- Some of the hallmarks of "being human" such as efficient bipedalism and fine motor skills are not dependent on a big brain.

- *Homo naledi* reaffirms that human evolution — like the evolution of all groups — is not patterned like a ladder, but rather like a very deeply pruned bush, with many branching lineages, most of which have died out.

- We should never expect a new fossil find to have a predicted set of traits that perfectly "links" it between two other species.

- Nor should we use value-laden terms such as "primitive" to describe species, most of which successfully made their way on Earth for far longer than our own species has existed.

H. naledi: challenges to traditional concepts

- Relationship of ancestral and derived traits; all recent finds are mosaics
- Cannot predict a new whole skeleton pattern from a fossil part of that skeleton, given mosaic blends in *A. sediba*, *H. floresiensis* and *H. naledi*
- Things we thought evolved together don't:
  - Teeth and brain do not evolve in parallel
  - Nor smaller teeth and bigger brain

Unanswered questions

- We do not know when *H. naledi* arose
- We do not know when *H. naledi* went extinct
- We do not know if *H. naledi* intermixed with other African hominin species
- Origin of African Middle Stone Age tools: who first made them at 300 Ka?
- If Naledi could just be discovered right next to Cradle of Humanity, what of other 90% of Africa that has not been explored paleontologically

Homo naledi burial?: Intentional burial from small brain

The argument for intentional burial hinges on several points:

1. Accessibility: The remote location suggests that bodies didn't arrive there by natural processes like water flow or predator activity.

2. Lack of Predation Marks: The bones lack marks from scavengers, indicating they weren't exposed on the surface before deposition.

3. Repeated Use of cave: The number of individuals suggests the chamber was used multiple times for the same purpose.

Skepticism

However, skepticism arises due to several factors:

• Alternative Explanations: Some scientists propose that the bodies could have ended up in the chamber through accidental falls or were dragged in by carnivores, although evidence for this is minimal.

• Absence of Burial Artifacts: Unlike later hominin burials, there's no evidence of grave goods or deliberate body positioning, which complicates claims of ritualistic behavior.

• Geological Processes: The cave's formation and sediment patterns might have contributed to the accumulation of remains without deliberate action.

Controversy

- The heart of the controversy is this: Does placement of bodies in a remote cave equate to intentional burial or ritualistic behavior?

- It's essential to consider that deliberate disposal doesn't necessarily mean ritual in the human sense. It could represent a practical solution to hygiene or predator avoidance. Yet, even this denotes a level of social organization and foresight unexpected in a species with such a small brain.

- This debate is part of a broader discussion on cognitive abilities in ancient hominins. It challenges the assumption that complex behaviors are exclusively tied to brain size. If Homo naledi also engaged in these behaviors, it implies that complex cognition evolved multiple times independently or was present in a common ancestor.

To visualize the spectrum of hominin brain sizes and associated behaviors:

Brain Size (cc)	Hominin Species	Associated Behaviors
400-600	Homo naledi	Possible body disposal
1200-1750	Neanderthals	Burials, symbolic artifacts
1300-1400	Homo sapiens	Art, rituals, advanced tools

Not a linear model

- This topic also resonates with how we perceive intelligence and culture. It nudges us to question the linear progression model of human evolution. Perhaps intelligence and cultural practices are not solely the domain of *Homo sapiens*, but a mosaic of traits that appeared in different forms across various hominin species.

- The intentional deposition theory suggests that **Homo naledi** repeatedly navigated this treacherous route to place their dead in the Dinaledi Chamber.

What cognitive capacities?

- This behavior implies several sophisticated capabilities:

1. **Cognitive Mapping**: Navigating complex subterranean environments requires spatial awareness and memory.

2. **Use of Light**: Deep cave areas are devoid of natural light. The implication is that they might have utilized fire or other light sources, evidencing control over fire.

3. **Social Structure**: Coordinated efforts to move bodies suggest communal practices and possibly established rituals.

4. **Symbolic Thought**: Deliberate placement may indicate a conceptual understanding of death and possibly an early form of respect for the deceased.

Alternative explanations

- However, the controversy thrives because alternative explanations exist:

- **Natural Entrapment**: Some scientists argue that the bodies might have been carried into the chamber by natural processes, such as water flow or predators dragging prey into dens or death trap scenario
- **Geological Changes**: Over the millennia, the cave system could have altered significantly. Passages that are now narrow might have been more accessible in the past.
- **Occam's Razor**: Critics suggest that assuming complex behaviors in an early hominin with a smaller brain size violates the principle of not multiplying entities beyond necessity when a simpler explanation suffices.

Human evolution

- Expanding beyond the burial practices, the discovery of **Homo naledi** opens up intriguing discussions about human evolution:

- **Anatomical Features**: They display a unique combination of more ancient and derived traits. For instance, their hands suggest dexterity suitable for tool use, while their shoulders and pelvis resemble those of earlier hominins.
- **Dating Mystery**: Dating **Homo naledi** has been challenging. Initial estimates suggested they could be over two million years old, but more recent dating places them between 236,000 and 335,000 years ago. This overlaps with early Homo sapiens, raising the possibility of interaction.
- **Cognitive Implications**: If a hominin with a brain size of about 560 cubic centimeters exhibited such complex behaviors, it challenges the notion that large brain size is a prerequisite for advanced cognition.

Cognition and Brain

- Stepping back, the controversy isn't just about whether **Homo naledi** buried their dead. It's about **reshaping the narrative of human evolution**. It's about acknowledging that the tree of human ancestry is more like a rich tapestry with interwoven threads rather than a straight line.

- **Cognitive Evolution and Brain Structure:** The complexity of behavior in *Homo naledi* raises questions about the relationship between brain size and intelligence:

  - **Brain Organization vs. Size**: It's not just the size but the internal organization of the brain that matters. *Homo naledi* might have had neural structures optimized for social behavior and problem-solving.

  - **Parallel Evolution**: Advanced behaviors could have evolved independently in different lineages, a concept known as convergent evolution. This suggests that similar environmental pressures can lead to comparable adaptations across distinct species.

*** Preprints, press releases and fossils in space: What is happening in South African human evolution research? -- By Robyn Pickering and Dipuo Kgotleng, 2024

- Fellow South African scientists criticize Lee Berger's conduct and call for community reflection
- South African paleoanthropologist Lee Berger has been accused of "exploiting" preprint publishing models to bypass scholarly peer review.
- The accusation comes in an opinion piece published in the South African Journal of Science on 27 March by two other South African paleo researchers. Berger had not publicly responded to the allegation as of 3 April.

Netflix fossil researcher accused of ‘exploiting preprint shortcut’

- In their article, Robyn Pickering, an isotope geochemist based at the University of Cape Town, and Dipuo Kgotleng, director of the University of Johannesburg’s Palao-Research Institute, criticize how Berger and his team handled findings related to Homo naledi, a hominin discovered in the Rising Star cave system outside Johannesburg.

- The controversial findings—which were featured in a Netflix documentary last year—assert that Homo naledi buried its dead and made art and stone tools.

- CJV: also a book C**ave of Bones** by Lee Berger and John Hawks, 2023

Critiques

- Berger and his team described these findings in three manuscripts that were published as preprints on the BioRxiv server in June 2023, having been submitted to the online journal eLife around a month earlier.

- According to Pickering and Kgotleng, the publication of the preprints was followed by “huge, coordinated and thorough media coverage”.

Critiques

- Then, in July, a documentary titled Unknown: Cave of Bones aired on Netflix, outlining the discoveries.

- This arrived just a few days after 11 peer reviews of the three manuscripts were published on eLife. Ten of the reviews rejected Berger's claims.

- In November, a peer-reviewed paper in the Journal of Human Evolution concluded that there was "no scientific evidence" that Homo naledi buried its dead or produced rock art. A subset of senior authors responded, but are yet to revise the original 3 manuscripts

eLife approach

- How did all of this happen? How could an unreviewed narrative enter the public realm in such a comprehensive way and then be almost unanimously rejected by peer review?
- The answer is eLife's new publishing approach, and what we view as the deliberate exploitation of this model by the Berger et al. research team.
- Immediately after the preprints were released, critical commentary emerged.
- Nature covered the response to the reviews, but the mainstream media that had disseminated the deliberate burial/art/tool narrative looked the other way when this interpretation was condemned by the scientific community.

‘Deliberate exploitation’

- Central to Pickering and Kgotleng’s critique is that neither the Netflix documentary nor a book published in October mention that the findings were preliminary and subject to review.

- Berger or his co-authors have not revised the original manuscripts to address the reviewers’ comments.

- “This appears to be a deliberate and well-planned exploitation of a new publishing model to shortcut the usual scientific process of academic publishing,” Pickering and Kgotleng write.

Documentary and JHE article

- The Netflix documentary appears to be a deliberate and well-planned exploitation of a new publishing model to shortcut the usual scientific process of academic publishing.

- On 10 November 2023, a peer-reviewed article was published in the Journal of Human Evolution titled ‘No scientific evidence that Homo naledi buried their dead and produced rock art’ in which Martinón-Torres et al. systematically dismantle every aspect of the three preprints and argue convincingly that the evidence provided by Berger and his team in no way supports their interpretations

Call for introspection

- In their article, Pickering and Kgotleng point to another much-criticized act by Berger, when he sought—and obtained—permission to launch hominin fossil bone (the holotype) into space on 8 September, a move critics branded a “publicity stunt”.

- “We call on this community, as well as on the funders, heritage practitioners, permit-granting agencies and government research bodies, to take a long, hard look at human evolution research and its associated disciplines in 2023 and consider where we want to be in 2024 and beyond,” they write.

Kim Foecke (“Fake-e”) critique

- The new critique, led by anthropologist Kimberly Foecke (“Fake-e”) of George Mason University, goes further.

- Foecke and her colleagues—including archaeometrist Alain Queffelec, who helped develop the XRF technique in a 2021 study of Africa's oldest human burial led by Martinón-Torres—say they couldn’t reproduce either the x-ray emission or particle size results, in part because the preprint had incomplete reporting … [that left out] what [x-ray] settings were used, how the data was actually acquired.

- Their criticism doesn’t imply H. naledi couldn’t have buried its dead—just that the evidence provided doesn’t support such a conclusion.

New technological method = XRF

- Berger's team turned to a new method that rests on comparing sediments near fossils with those farther away.

- Researchers bombard samples with x-rays to trigger x-ray fluorescence (XRF) that reveals chemical composition.

- If soil layers of different composition are neatly stratified far from the fossil but jumbled near it, that suggests someone dug out and refilled a pit.

Particle size distribution

- They also performed what's called a particle size distribution analysis and reported that the grain size of the sediments was more variable near these skeletons than elsewhere in the chamber, which might also indicate digging and infill.
- But in November 2023, a paper by a group including Herries and María Martinón-Torres of Spain's National Research Center for Human Evolution, who studies the dynamics of ancient burials, argued the Berger team hadn't ruled out the possibility that the bones might have landed in the cave by natural means, such as washing in with flooding water.