

TURKANA BASIN INSTITUTE

Science & Research in the Turkana Basin, Kenya



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MAP OF THE

TURKANA BA SIN

ETHIOPIA

BULUK

Ileret Village

TBI-ILERET

Sibiloi
National
Park

KOOGI FO RA

NORTH
ISLAND

LOMEKWI

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Who am I? Who are we, and what does the idea of “we” cover – our children, our families, our communities, our nation’s citizens or the entire global human existence? Could “we” include our ancestors? Recent ones or even very ancient ones?

This is surely the essence of the most fundamental question that is looked into by religions, scientists, shamans, philosophers and individuals all over the world. I have always been fascinated by this, and have devoted most of my life to recovering evidence to address one of the world’s great scientific questions.

The Turkana Basin is the repository for a large portion of the evidence of most stages of early humans. Nearly half of all fossil evidence for human evolution has been found in the Lake Turkana Basin. This includes the earliest certainty of bipedal walking (4.1 million years ago), the oldest known *Homo erectus* (1.9 million) as well as the almost complete skeleton of the Turkana Boy (1.6 million) and the oldest known *Homo sapiens* (195,000 years), from whose gene pool all people in the world sprang.

I founded the Turkana Basin Institute (TBI) as a springboard for the massive amount of research into the origins and evolution of humankind that needed to be done. I’m proud to say that TBI now represents a platform for unlocking the clues of human



beginnings by attracting the best relevant scientific skills from around the world. In addition, a central feature in everything we do is teaching and environmental education to ensure local community engagement at all levels. Having spent almost fifty years of my life working with my family and colleagues in this remote, challenging, yet remarkable region, the design of TBI facilities has been inspired and carefully crafted from on-the-ground experience gathered by three generations of my family’s work spanning decades in the field in East Africa.

TBI has established two field centers, one on either side of Lake Turkana (TBI-Illeret on the east side and TBI-Turkwel on the west), aided by Stony Brook University and by private donor funding. The TBI facilities provide food and accommodation for scientists, students and permanent staff. The centers also contain a range of laboratories, fossil preparation, storage facilities and classrooms for the TBI Field School as well as workshops to support all aspects of research. These facilities have completely transformed the way in which expeditions are mounted, by streamlining logistics and dramatically reducing costs. This has led to a steady increase in the number of research projects being undertaken with TBI’s infrastructure support. These range from the evolution of modern African animals, Miocene apes, and our own genus *Homo*, to the origins of stone tool culture, spread of modern *Homo sapiens*, and the beginnings of settled life through farming and animal husbandry.

It also enables scientists to devote a much larger portion of their field season, and each field day, to research—rather than to addressing the complexities of living in the deserts of northern Kenya. Under agreement with the Government of Kenya,

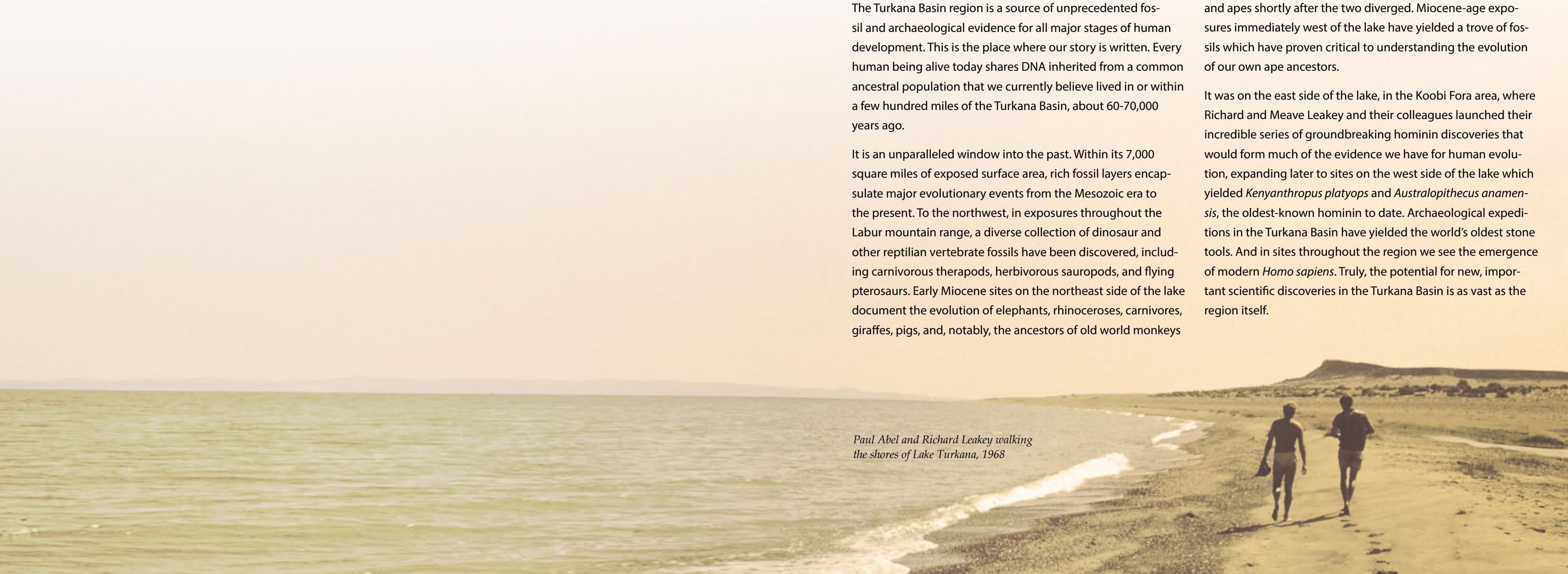
the TBI field centers also provide a repository for the heritage collections of the Lake Turkana area. These not only complement the work of the National Museums of Kenya, which is currently constrained by budgetary and space challenges, but also ensure that the fossils and heritage are preserved in their place of origin. The enthusiastic support of the Marsabit County Government and the Turkana County Government has been, and continues to be, critical to our success.

We have formed a distinguished International Advisory Board to help guide scientific and financing development. In addition, our continued collaboration with Stony Brook University and the Stony Brook Foundation* has provided much of the critical support for TBI activities to date. TBI also works with a growing range of academic institutions from around the world, with Stony Brook serving as the international academic headquarters. While construction of the existing facilities is nearly complete, sustaining a world-class enterprise will require additional investment.

Imagine what can be achieved in the next ten years with the appropriate investment! There are many discoveries just waiting to be uncovered that will tell us so much more about who we are, where we came from, and how we came to be the people that we are today. We are confident we have a world class team, a range of outstanding supporters and a profound story that will unfold in the coming years. I hope that you will join in supporting this exciting endeavor.

– Dr. Richard Leakey, FRS

I. OUR PAST



Global Importance of the Turkana Basin

The Turkana Basin region is a source of unprecedented fossil and archaeological evidence for all major stages of human development. This is the place where our story is written. Every human being alive today shares DNA inherited from a common ancestral population that we currently believe lived in or within a few hundred miles of the Turkana Basin, about 60-70,000 years ago.

It is an unparalleled window into the past. Within its 7,000 square miles of exposed surface area, rich fossil layers encapsulate major evolutionary events from the Mesozoic era to the present. To the northwest, in exposures throughout the Labur mountain range, a diverse collection of dinosaur and other reptilian vertebrate fossils have been discovered, including carnivorous theropods, herbivorous sauropods, and flying pterosaurs. Early Miocene sites on the northeast side of the lake document the evolution of elephants, rhinoceroses, carnivores, giraffes, pigs, and, notably, the ancestors of old world monkeys

and apes shortly after the two diverged. Miocene-age exposures immediately west of the lake have yielded a trove of fossils which have proven critical to understanding the evolution of our own ape ancestors.

It was on the east side of the lake, in the Koobi Fora area, where Richard and Meave Leakey and their colleagues launched their incredible series of groundbreaking hominin discoveries that would form much of the evidence we have for human evolution, expanding later to sites on the west side of the lake which yielded *Kenyanthropus platyops* and *Australopithecus anamensis*, the oldest-known hominin to date. Archaeological expeditions in the Turkana Basin have yielded the world's oldest stone tools. And in sites throughout the region we see the emergence of modern *Homo sapiens*. Truly, the potential for new, important scientific discoveries in the Turkana Basin is as vast as the region itself.

Paul Abel and Richard Leakey walking the shores of Lake Turkana, 1968

NATURE

Vol. 237 No 5353 Friday June 2 1972



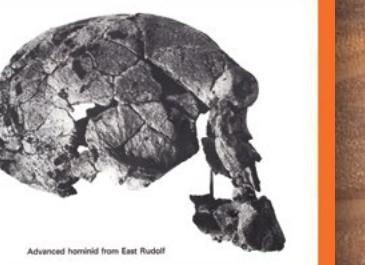
More hominids from Lake Rudolf

Protein released by motor nerves
Cortisol and sexual activity
Cell division
Active radio galaxies

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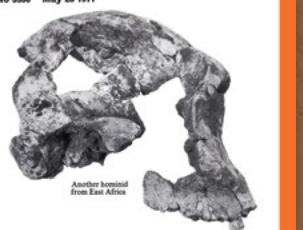
Vol. 242 No 5398 Friday April 13 1973



Advanced hominid from East Rudolf

NATURE

Vol. 231 No 5300 Friday May 28 1971



Survey of European science
Variations in radio en from M87
Races of Atlantic salmon distinguished
Australia antigen in u

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EARLY HOMO ERECTUS

nature

Vol. 281 No 5841 Friday June 17 1976 51p

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Vol. 321 No 6926 27 August 1998 \$4.75



Another hominid from East Africa

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Races of Atlantic salmon distinguished
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THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

9 August 2007 www.nature.com/nature \$10

HEAD TO HEAD

Were *Homo habilis* and *Homo erectus* contemporaries?

WAVE POWER
How cilia make your body work

DRUG REDISCOVERY
Scanning the back catalogue

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Dusting off Newton's old technique

NATUREJOBS
Love actually



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THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

21 March 2008 www.nature.com/nature \$10



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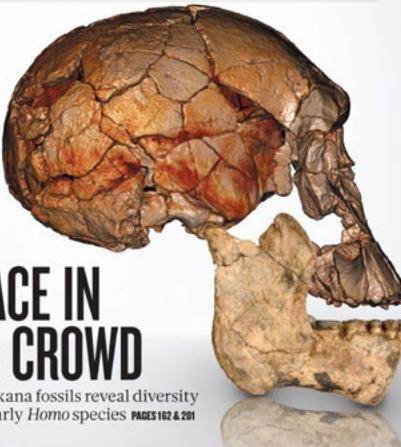
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Regulation needed to contain opiate-producing yeasts PAGE 287 & 281

CRYSTALLOGRAPHY
MAPPING OUT DISORDER
The next challenge for structure determination PAGE 283

nature

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A FACE IN THE CROWD

Lake Turkana fossils reveal diversity among early *Homo* species PAGES 162 & 201



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As the most important repository of fossil evidence for human evolution in the world, the primary research focus at TBI is human prehistory and related earth and natural science studies. Research findings from the Turkana Basin have been featured on the cover of Nature, one of the world's most prestigious scientific publications, on eleven separate occasions already, and more are on the way. There have been an additional 2,660 articles published since 2010 that make reference to the Turkana Basin – a clear indications of the region's global scientific importance.

Birthplace of Humanity

Mounting evidence over the last five decades suggests the Turkana Basin as the likely point of origin for the human species:

- DNA studies suggest a founding population in East Africa
- Earliest known *Homo sapiens* found in Omo Kibish area, 195 K

Discovered by Richard Leakey's team in a region of Ethiopia, north of Lake Turkana, in 1967, new dating techniques would put the dawn of modern humans 35,000 years earlier than previously thought.

- Earliest fully human footprints, 1.5 M

Found in 2007 by an international team of scientists, the hominin who made these prints, likely *Homo erectus*, had developed a foot and walking gait more or less identical to modern humans.

- Earliest Acheulian stone tools, 1.76 M
The oldest hand axes ever found from this industry were discovered just six miles away from the Turkana Boy discovery site.
- Earliest known *Homo erectus*, 1.9 M
This individual, known as KNM-ER 2958, was unearthed on the east side of Lake Turkana in 1974.
- Earliest stone tools, 3.3 M
Discovered in 2011, the world's oldest stone tools represent a new industry: the Lomekwian.
- Earliest evidence of bipedalism, 4.1 M
Not only is *Australopithecus anamensis* a likely ancestor of *Australopithecus afarensis*, a bone from this oldest-known hominin provides the first fossil evidence of bipedalism.



Origins of TBI

In 2005, Richard Leakey outlined to Stony Brook his concept for an institute that could provide the permanent infrastructure to enable year-round research in this remote area of sub-Saharan Africa. The University enthusiastically endorsed the idea of TBI, committing funds for the Stony Brook end of the project. Additional fundraising began in 2006; construction of temporary facilities for a long-term field camp on the east side of Lake Turkana (TBI-Illeret) commenced in 2007; the camp was fully operational by year-end and was the site for the first Kenya-based Human Evolution Workshop in 2008. Construction of the first full field center on the west side of the lake (TBI-Turkwell) was completed in 2012. Construction of permanent facilities at TBI-Illeret commenced in 2012, and is scheduled to be completed in 2016.

Formally, Turkana Basin Institute, Ltd. is the title holder for the fixed assets in Kenya known as TBI-Nairobi, TBI-Turkwell and TBI-Illeret (together known as "TBI Kenya") and is under an agreement with the Government of Kenya, through the National Museums of Kenya, to serve as a repository for the archaeological and paleontological heritage of the Lake Turkana region.

In 2013, Richard Leakey and Stony Brook University President, Samuel L. Stanley, established the **TBI International Advisory Board**. Comprised of prominent philanthropists and scientists from around the globe, this group meets twice a year to share ideas and discuss how best to ensure the success and secure the mission of the Institute. This dynamic group has assumed a lead role in TBI's fundraising efforts through their own generous contributions.



State-of-the-art lab at TBI-Illeret

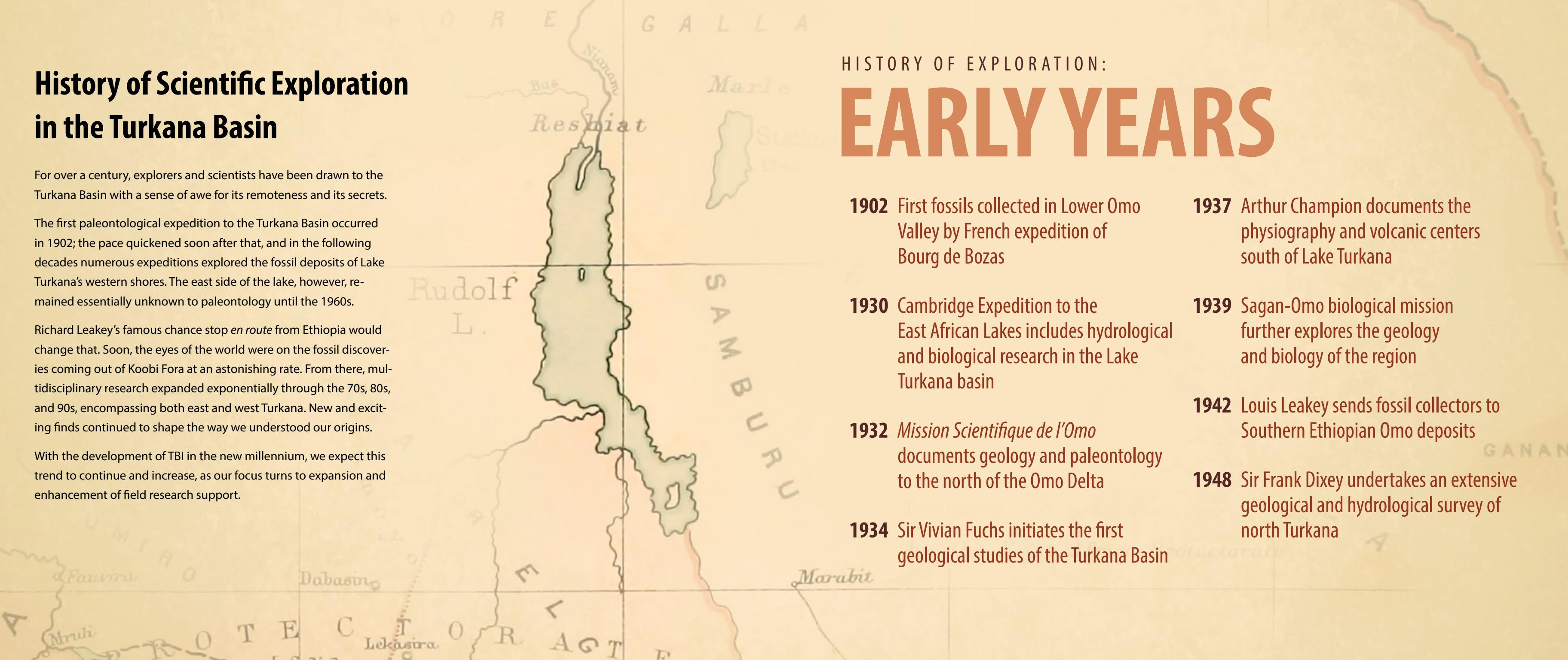
History of Scientific Exploration in the Turkana Basin

For over a century, explorers and scientists have been drawn to the Turkana Basin with a sense of awe for its remoteness and its secrets.

The first paleontological expedition to the Turkana Basin occurred in 1902; the pace quickened soon after that, and in the following decades numerous expeditions explored the fossil deposits of Lake Turkana's western shores. The east side of the lake, however, remained essentially unknown to paleontology until the 1960s.

Richard Leakey's famous chance stop *en route* from Ethiopia would change that. Soon, the eyes of the world were on the fossil discoveries coming out of Koobi Fora at an astonishing rate. From there, multidisciplinary research expanded exponentially through the 70s, 80s, and 90s, encompassing both east and west Turkana. New and exciting finds continued to shape the way we understood our origins.

With the development of TBI in the new millennium, we expect this trend to continue and increase, as our focus turns to expansion and enhancement of field research support.



HISTORY OF EXPLORATION:

EARLY YEARS

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1902 First fossils collected in Lower Omo Valley by French expedition of Bourg de Bozas</p> <p>1930 Cambridge Expedition to the East African Lakes includes hydrological and biological research in the Lake Turkana basin</p> <p>1932 <i>Mission Scientifique de l'Omo</i> documents geology and paleontology to the north of the Omo Delta</p> <p>1934 Sir Vivian Fuchs initiates the first geological studies of the Turkana Basin</p> | <p>1937 Arthur Champion documents the physiography and volcanic centers south of Lake Turkana</p> <p>1939 Sagan-Omo biological mission further explores the geology and biology of the region</p> <p>1942 Louis Leakey sends fossil collectors to Southern Ethiopian Omo deposits</p> <p>1948 Sir Frank Dixey undertakes an extensive geological and hydrological survey of north Turkana</p> |
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HISTORY OF EXPLORATION: 1960s

1964 Harvard University Expeditions

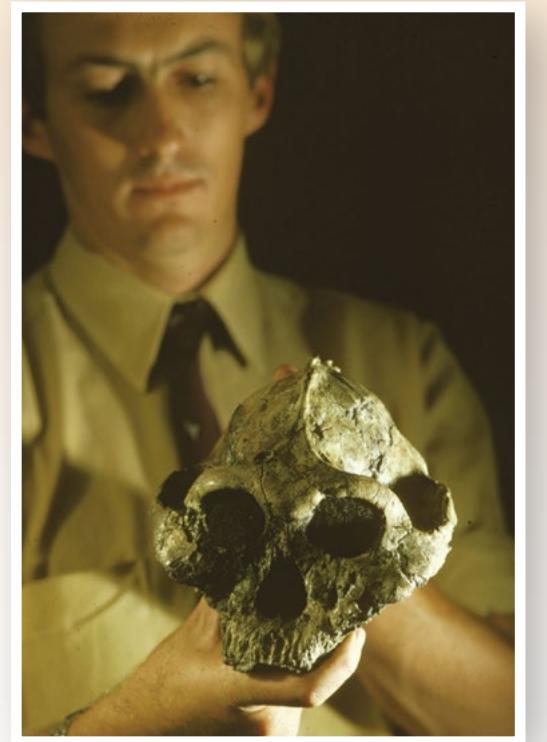
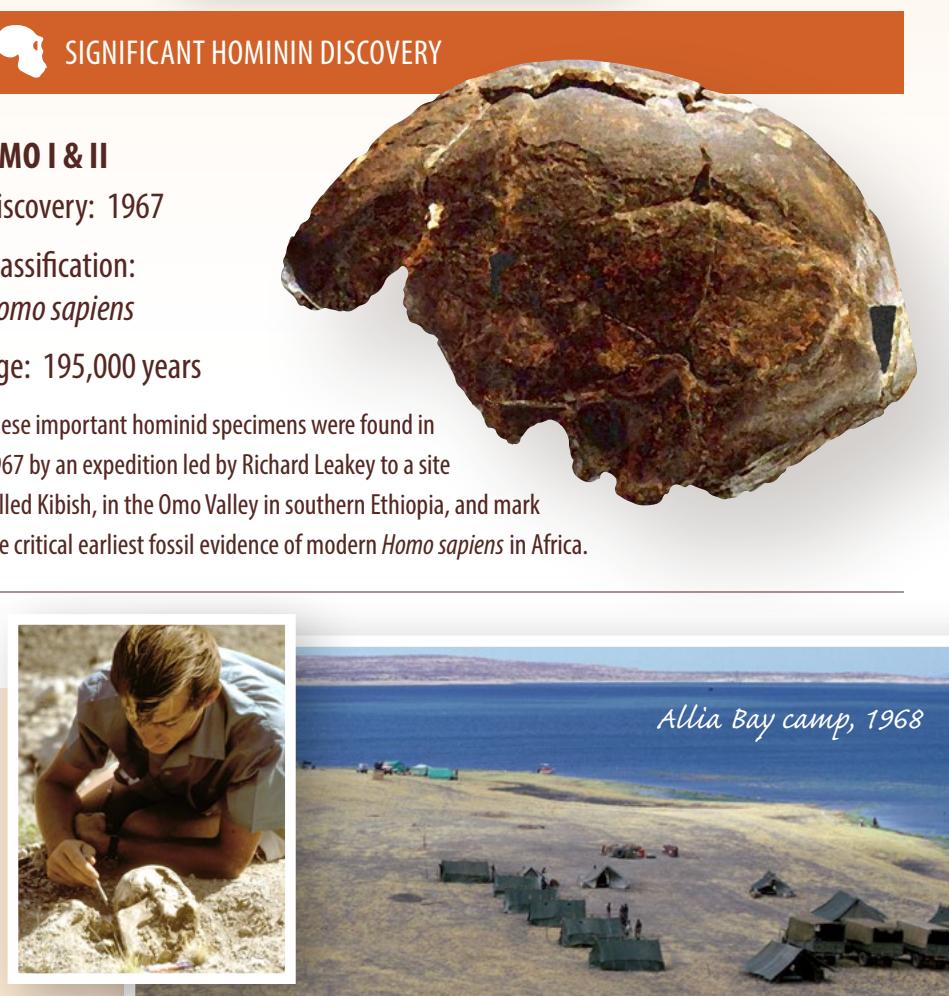
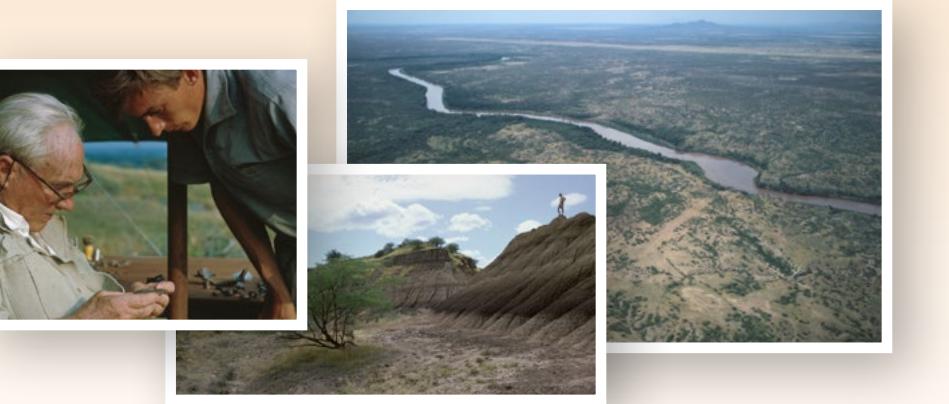
Bryan Patterson initiates a series of Harvard University expeditions to the region between the lower Kerio and Turkwel rivers, including Kanapoi and Lothagam.

1967 Omo Expedition

A joint French, American, and Kenyan expedition, led by Camille Arambourg, Yves Coppens, F. Clark Howell and Richard Leakey, explores Plio-Pleistocene exposures in the lower Omo Valley.

1968 Richard Leakey explores Turkana

The National Museums of Kenya mounts an exploratory expedition, led by Leakey, to east side of Lake Turkana. Fossils recovered included four fragmentary hominid specimens.



SIGNIFICANT HOMININ DISCOVERY

KNM-ER 406

Discovery: 1969

Classification: *Paranthropus boisei*

Age: 1.7 million years

Exploring the then-unknown sites of east Turkana near Ileret, Richard and Meave Leakey were walking along a dry sand river when they saw this skull looking directly at them.



1969 Koobi Fora Base Camp established

The base camp at the Koobi Fora sand spit, on the east side of Lake Turkana, is established.

1969 Stone tools discovered

Oldowan-type artifacts were recovered *in situ* from a volcanic ash layer that was subsequently named the Kay Behrensmeyer's Site (KBS) Tuff.



HISTORY OF EXPLORATION:

1970s

1970 East Rudolf Research Project established

The East Rudolf Research Project is established with Richard Leakey and Glynn Isaac as co-leaders.



1972 Archaeological record documented

Glynn Isaac and team complete excavations at a number of sites along the Karari Escarpment, documenting a wealth of stone artifacts.

1973 Sibiloi National Park created

The park was established by the Kenyan government to protect the fossil heritage and unique flora and fauna of the area.

1974 Paleomagnetic studies

Andrew Brock, University of Nairobi, initiates paleomagnetic studies of the region in conjunction with graduate student Joab Ndombi and Glynn Isaac.

1975 Lake Rudolf renamed Lake Turkana

The government of Kenya decrees that Lake Rudolf would henceforth be called Lake Turkana. The East Rudolf Research Project is renamed the Koobi Fora Research Project (KFRP).

1979 Ash layers analysis

Frank Brown of the University of Utah is invited to study the tuffs from the Koobi Fora region. His work with Thure Cerling and Craig Feibel resulted in a consistent stratigraphic framework throughout the northern half of the basin.



SIGNIFICANT HOMININ DISCOVERY

KNM-ER 1470

Discovery: 1972

Classification: *Homo rudolfensis*

Age: 1.9 million years



This hominin was discovered by Bernard Ngeneo and was reconstructed by Meave Leakey, who re-assembled the hundreds of broken fragments as they were brought back from the excavation site. It represents an almost complete skull of a species of early *Homo*.

SIGNIFICANT HOMININ DISCOVERY

KNM-ER 1813

Discovery: 1973

Classification: *Homo habilis*

Age: 1.9 million years



This small, delicate skull was discovered in 1973 by Kamoya Kimeu, who spotted several fragments of the upper jaw with beautifully preserved teeth just visible on the ground. With careful excavation by Richard and Meave Leakey, the cranium was reconstructed in the field.

SIGNIFICANT HOMININ DISCOVERY

KNM-ER 3733

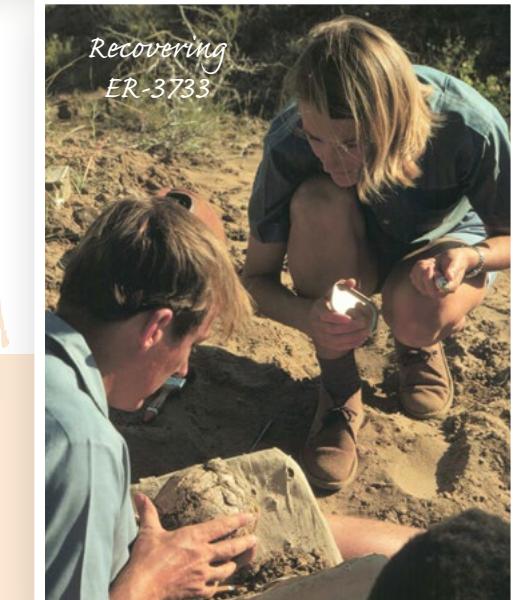
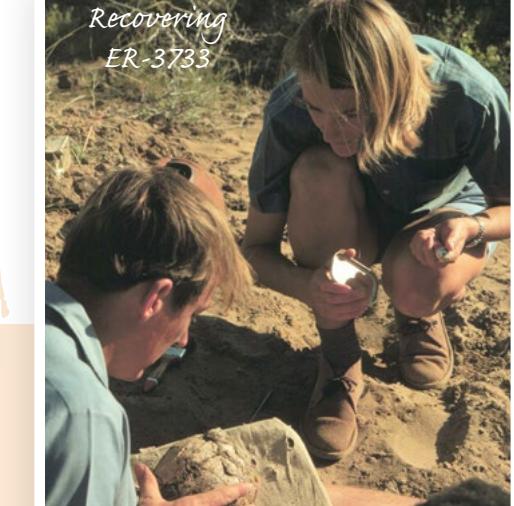
Discovery: 1975

Classification: *Homo erectus*

Age: 1.75 million years



This nearly complete cranium was found in 1975 by Bernard Ngeneo, the brow ridges above the eyes just visible above the ground. Richard Leakey excavated the fragile specimen over three days. It is one of the most complete skulls of *Homo erectus* from Africa, with a face and teeth.



HISTORY OF EXPLORATION: 1980s

1981 West side of Lake Turkana explored

The National Museums of Kenya expeditions, under the leadership of Richard Leakey, begin to explore sedimentary exposures on the west side of Lake Turkana.

1981 Hominid trackway discovered

Kay Behrensmeyer and Leo Laporte discover hominid footprints on the east side of the lake.



SIGNIFICANT HOMININ DISCOVERY

KNM-WT 15000 - "TURKANA BOY"

Discovery: 1984

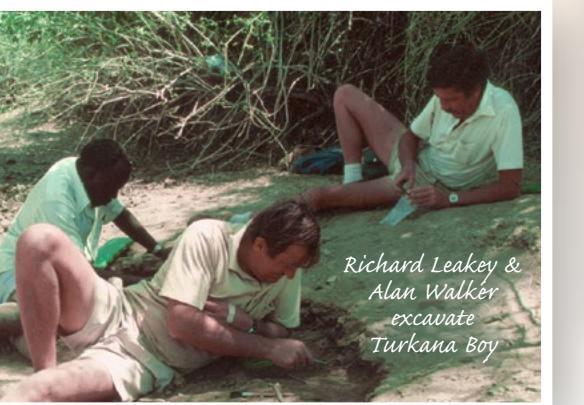
Classification: *Homo erectus*

Age: 1.53 million years

The "Turkana Boy" skeleton was discovered by Kamoya Kimeu as he was walking along the seasonal Nariokotome river on the west side of Lake Turkana. Due to its completeness, this skeleton provides unprecedented insight into the body shape, brain size and development of *Homo erectus*. The Turkana Boy was surprisingly tall (1.6 meters) although he was still an adolescent. He had a slender body adapted to living in a hot climate.



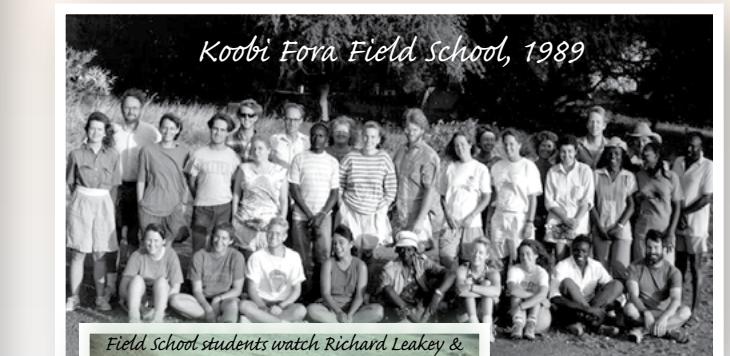
Richard Leakey's team begins to focus on the western shores of Lake Turkana, while a number of archaeological projects continue on the east side of the lake.



SIGNIFICANT HOMININ DISCOVERY

1985 Koobi Fora Field School introduced

The Koobi Fora base camp becomes the field headquarters of the Koobi Fora Field School, run jointly by the National Museums of Kenya and Harvard University.



1989 Richard Leakey joins KWS

In response to Kenya's national elephant and rhino poaching crisis, President Moi names Richard Leakey head of the newly-formed Kenya Wildlife Service (KWS). Meave Leakey assumes leadership of the Koobi Fora Research Project.



SIGNIFICANT HOMININ DISCOVERY

KNM-WT 17000 - "BLACK SKULL"

Discovery: 1985

Classification:
Paranthropus aethiopicus

Age: 2.52 million years

This relatively complete skull is very dark in color, earning it the nickname "Black Skull." This find was made by Alan Walker, in 1985, near Nariokotome, on the west side of Lake Turkana. The species is ancestral to *Paranthropus boisei*, but has a smaller brain and a protruding face.



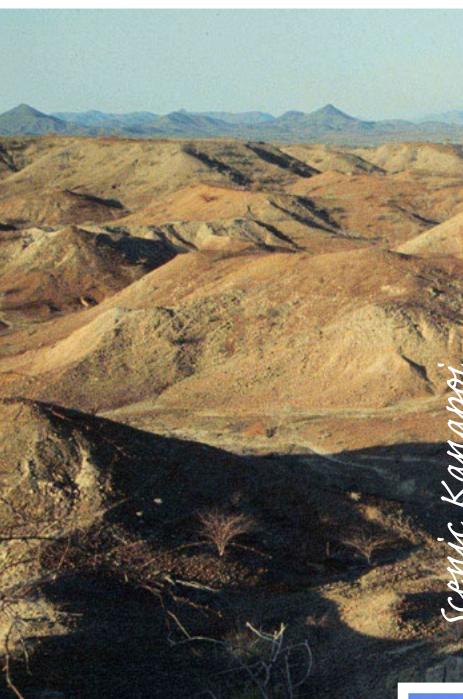
The Nariokotome region, where both Turkana Boy & the Black skull were discovered

HISTORY OF EXPLORATION: 1990s



The site of Lothagam, on the southwest side of Lake Turkana, was reworked from 1989 to 1993, and the results of this research published in 2003 in the monograph titled *Lothagam: The Dawn of Humanity in Eastern Africa* by Meave Leakey and John M. Harris.

During the 1990s, Koobi Fora Research Project expeditions concentrated on the southwest portion of the Lake Turkana basin, discovering new localities as well as revisiting Lothagam and Kanapoi.



Scenic Kanapoi



Meave in the field, Lomekwi

KNM-KP 29281

Discovery: 1994

Classification:
Australopithecus anamensis

Age: 4.1 million years

This extraordinary discovery was made by Peter Nzube, who spotted the teeth among the surface pebbles at the Kanapoi site in west Turkana. This type specimen of *Australopithecus anamensis* was named for the Turkana word "Anam," which means "Lake" in recognition of the proximity of Kanapoi to Lake Turkana.



The Kanapoi locality was reexplored from 1994-1997 by Meave Leakey and her team, resulting in a wealth of new fossil material, including those of a new hominin species: *Australopithecus anamensis*. As well as being the oldest hominin discovered to date, leg bones discovered from *A. anamensis* provides the earliest evidence for bipedalism.

SIGNIFICANT HOMININ DISCOVERY

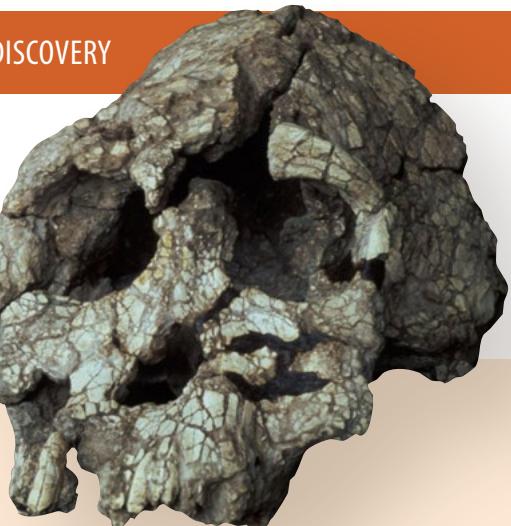
KNM-WT 40000

Discovery: 1999

Classification:
Kenyanthropus platyops

Age: 3.5 million years

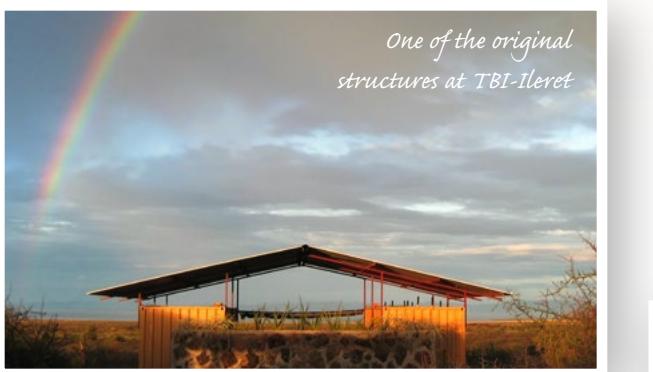
Fossil hunter Justus Edung found this specimen at a site called Lomekwi in west Turkana. Careful excavation by Meave Leakey led to the recovery of a fragile and distorted cranium which was painstakingly cleaned and reconstructed. It was named *Kenyanthropus* in recognition of Kenya, and *platyops* because of its flat face.



HISTORY OF EXPLORATION: 2000s

2005 TBI is formed

The Turkana Basin Institute, based in Kenya and the United States, is formed to facilitate research in the Turkana Basin.



2007 TBI-Ileret fully operational

TBI's Ileret Research Facility, on the east side of Lake Turkana, becomes fully operational. A workshop entitled "Prehistory of the Turkana Basin: Opportunities and Priorities for Future Field Research" is held in August at this location.



Fifth Human Evolution
Workshop, held at
TBI-Ileret in 2008

SIGNIFICANT HOMININ DISCOVERY

KNM-ER 42700

Discovery: 2002

Classification: *Homo erectus*

Age: 1.55 million years

This discovery from Ileret in east Turkana was made by Fredrick Manthi. This hominin fossil is significant as one of the smallest known skulls of *Homo erectus*; it also has several characters that were previously thought to define the Asian varieties of this species, such as a slight keel along the crest of the skull.



A new millennium, a new era for exploration in the Turkana Basin. Richard Leakey joins with Stony Brook University to create state-of-the-art research infrastructure.

SIGNIFICANT ARCHAEOLOGICAL DISCOVERY

OLDEST ACHEULIAN ARTIFACTS

Discovery: 2007

Age: 1.76 million years

Members of the West Turkana Archaeological Project discover what turn out to be the oldest hand axes ever discovered from the Acheulian Industry.



Construction at TBI-Turkwel, 2008



SIGNIFICANT HOMININ DISCOVERY

KNM-ER 60000

Discovery: 2009

Classification: *Homo rudolfensis*

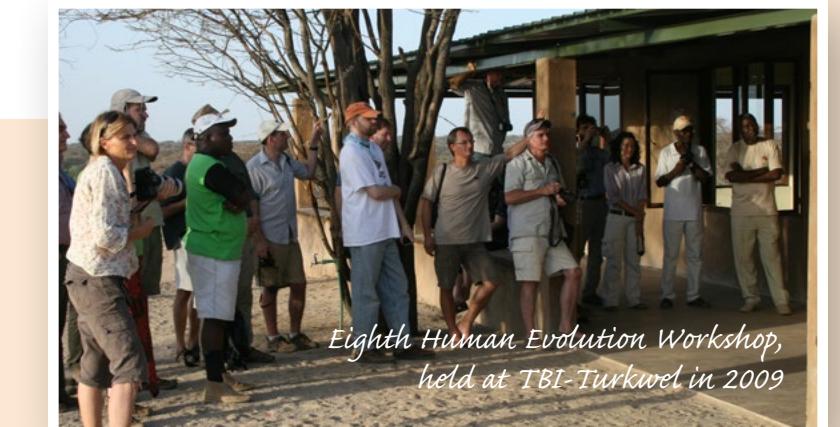
Age:
1.88 million years

This nearly complete mandible was discovered by Cyprian Nyete, who spotted the fossil eroding out of a hillside. This specimen is particularly noteworthy as it helped demonstrate conclusively that at least two other species of early *Homo* lived alongside *Homo erectus* during the early Pleistocene.



2009 TBI-Turkwel fully operational

TBI's Turkwel Research Facility, on the west side of Lake Turkana, becomes fully operational. A workshop entitled "Half a Century after Zinj - *Paranthropus boisei* in Context" is held in August at this location.

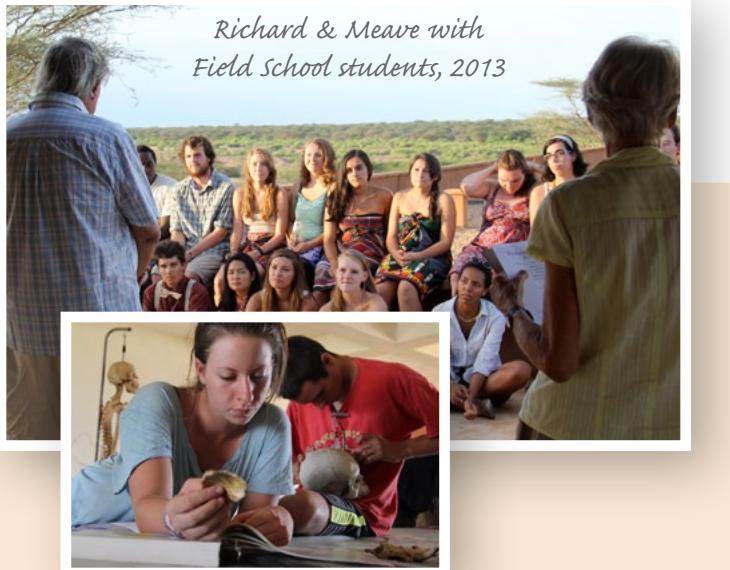


Eighth Human Evolution
Workshop, held at
TBI-Turkwel in 2009

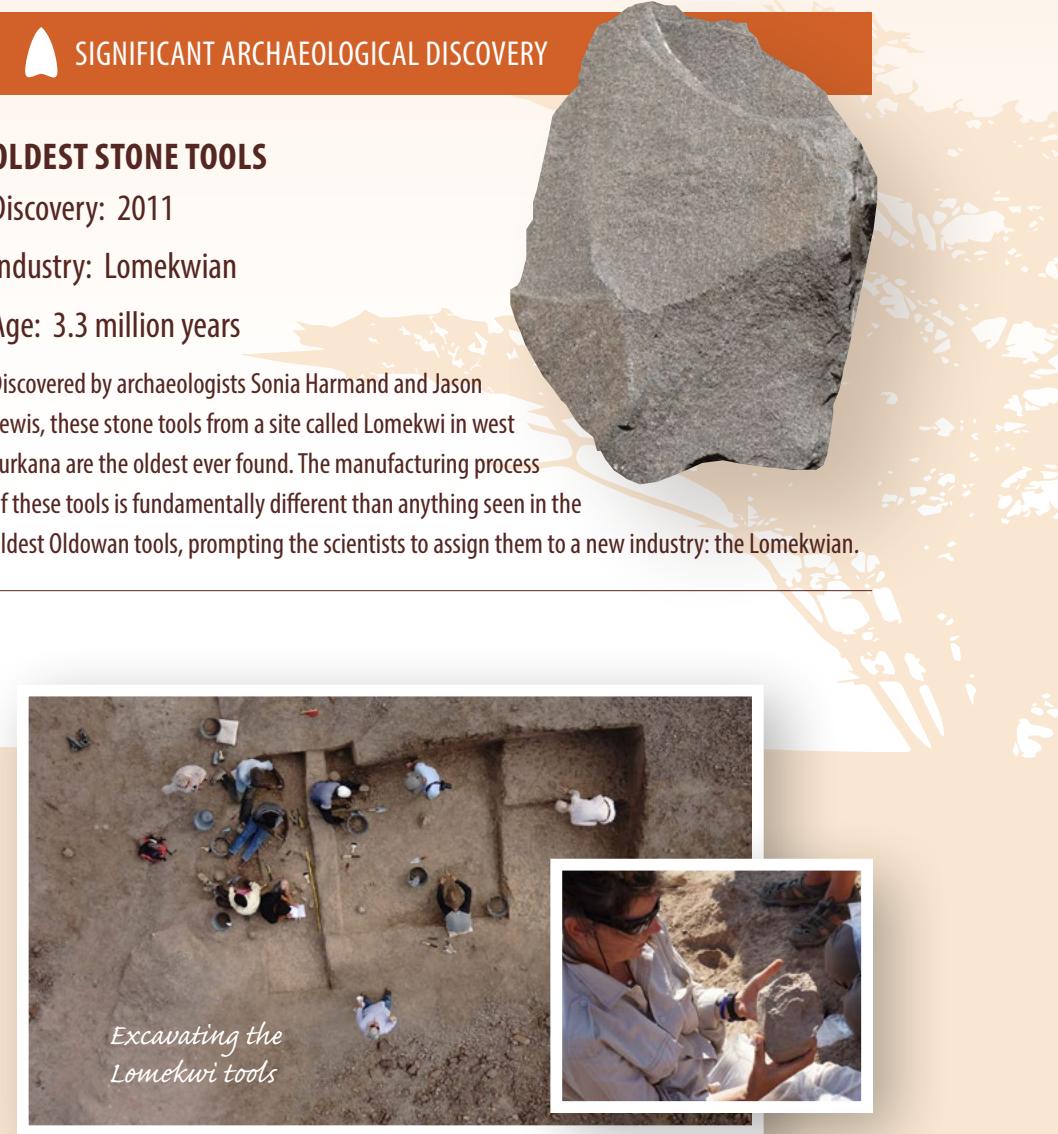
HISTORY OF EXPLORATION: 2010 & BEYOND

2011 TBI's first field school

TBI launches its Origins Field School based at TBI-Turkwel. Now operating out of both TBI-Illeret and TBI-Turkwel, the field school is taught by leading scientists and the program offers students an opportunity to be part of five remarkable decades of discoveries in the Turkana Basin.



As TBI completes construction of its two field research centers, focus shifts to the final phase of its development plan: expansion and enhancement of field research support.



OLDEST STONE TOOLS

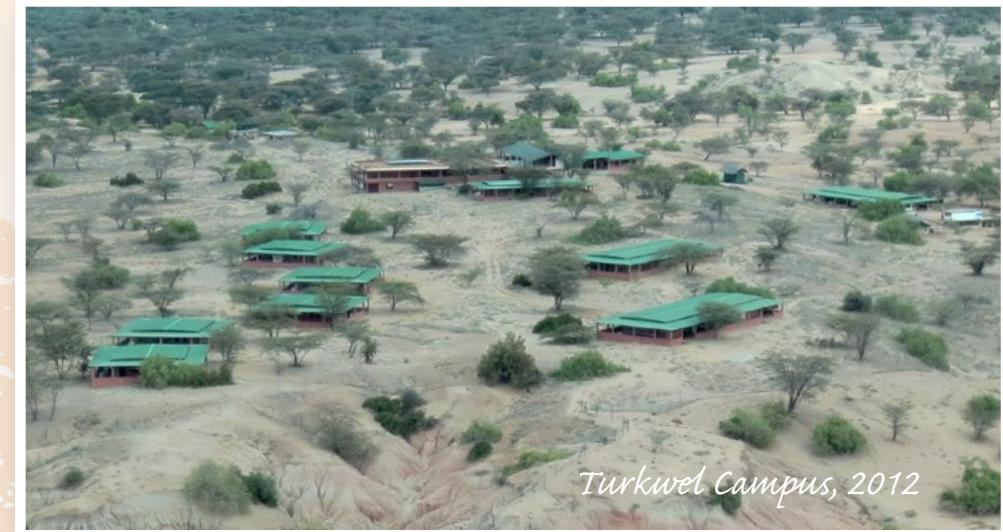
Discovery: 2011

Industry: Lomekwi

Age: 3.3 million years

Discovered by archaeologists Sonia Harmand and Jason Lewis, these stone tools from a site called Lomekwi in west Turkana are the oldest ever found. The manufacturing process of these tools is fundamentally different than anything seen in the oldest Oldowan tools, prompting the scientists to assign them to a new industry: the Lomekwi.

2012 TBI-Turkwel construction completed



Turkwel Campus, 2012



2016 Projected completion of TBI-Illeret construction



Illeret Campus, 2015



Heading into the field..

II. OUR PRESENT



TBI's Facilities

TBI has built research centers on both sides of Lake Turkana to reduce the enormous logistical challenge of accessing many of the most important sites in the vast and remote Turkana Basin, allowing year-round research to take place.

TBI-Illeret is situated about 3 miles from Illeret village, close to the Kenya-Ethiopia border, on the east side of the lake. Construction of the permanent campus at Illeret began in January 2012 and should be completed in 2016. **TBI-Turkwel** is situated on the west side of Lake Turkana, near the village of Nakochok on the Turkwel River. Construction was started in April 2008, and completed early in 2012. At full capacity, the camp can accommodate 60 to 70 people (including support staff), catering from two kitchens and two eating and recreational areas.

TBI has initiated an air charter service called **Air Turkana** that provides transportation to and from its facilities at cost for TBI affiliates and researchers, and is offered for commercial charter at other times with all profits being directed to support scientific research on the Kenyan origins of humankind.



Air Turkana's Cessna Grand Caravan EX



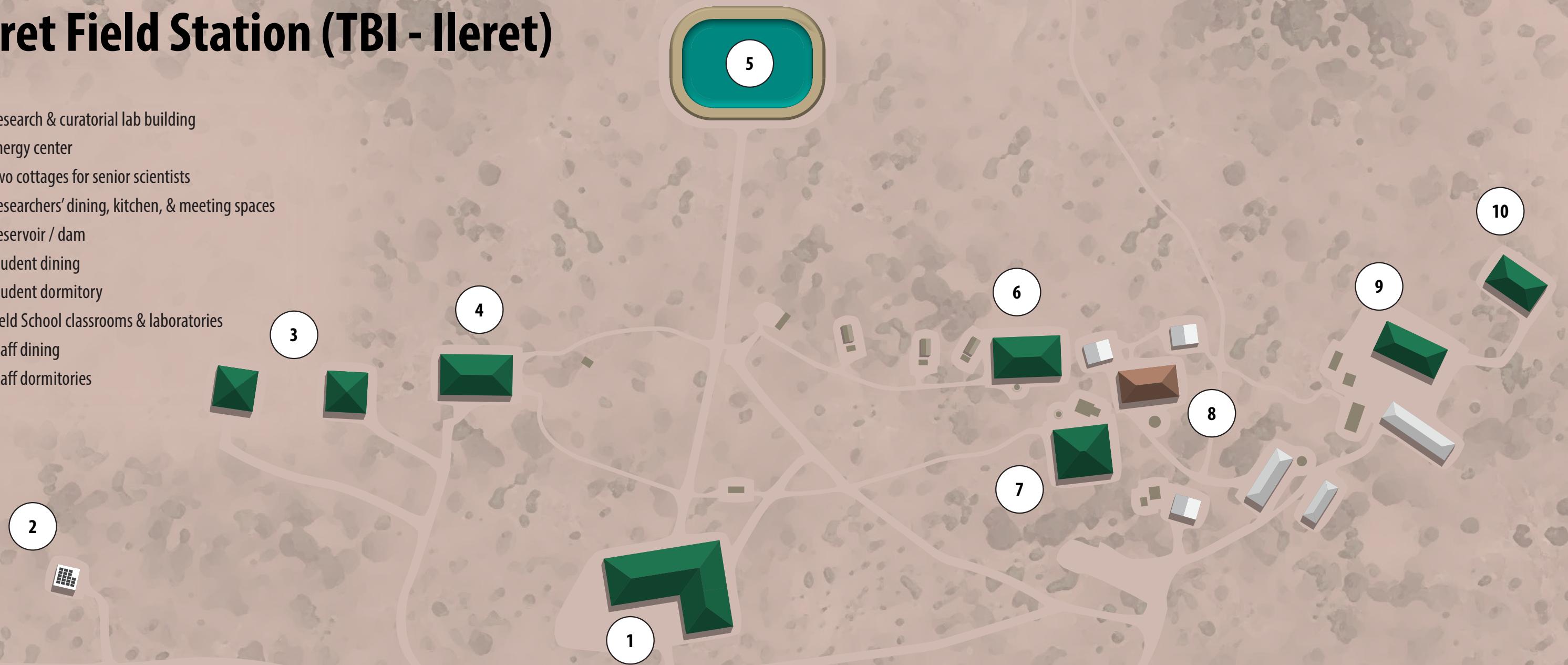
New lab at TBI-Illeret



TBI-Turkwel campus

Ileret Field Station (TBI - Ileret)

1. Research & curatorial lab building
2. Energy center
3. Two cottages for senior scientists
4. Researchers' dining, kitchen, & meeting spaces
5. Reservoir / dam
6. Student dining
7. Student dormitory
8. Field School classrooms & laboratories
9. Staff dining
10. Staff dormitories



100 Meters



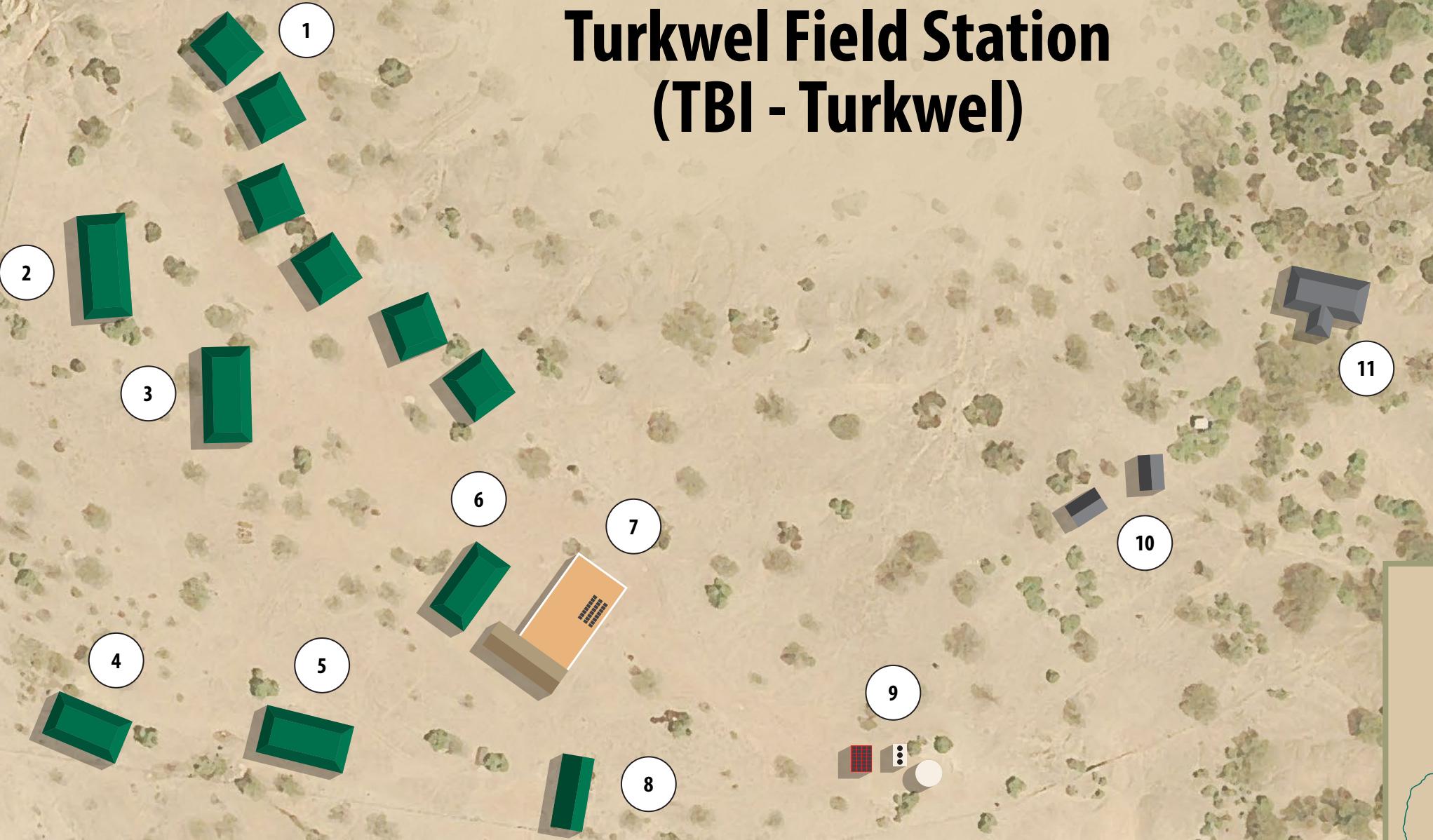
T U R K W E L
R I V E R

Site Map for

Turkwel Field Station (TBI - Turkwel)

- 1. Six Cottages (each containing two suites for senior scientists)
- 2. Dining facility, kitchen, meeting spaces
- 3. Student dormitory
- 4. Staff dining
- 5. Staff dormitory
- 6. Classrooms & lab for field school
- 7. Research & curatorial laboratory building
- 8. Vehicle maintenance, wood working, metal working, tent making
- 9. Energy Center
- 10. Senior staff housing
- 11. VIP housing & dining

100 Meters



Research

While the primary focus of research projects facilitated by TBI is human prehistory, research in the Turkana Basin has expanded to include areas of sustainability, climate change, and modern human culture and diversity. Further, new advances in technology such as DNA testing, remote sensing, GIS applications, and high-resolution aerial photography have opened new doorways in the sciences of archaeology, paleontology, and biological evolution, leading to an unprecedented wealth of new data.

Currently, research projects in the Basin are investigating an enormous range of questions about the ancient inhabitants in and around Lake Turkana, including Cretaceous period vertebrates such as dinosaurs and crocodilians; the origins of modern African megafauna; the evolution of Miocene apes; ancestry of the hominid lineage in Africa; the origins of our own genus *Homo*; the diversification and spread of modern humans in the last 250,000 years; and the transition to pastoralism, fishing, and agriculture.

Long considered the likely place of humankind's biological origins, recent discovery of the world's oldest stone tools on the west side of the lake suggests the region may be a good candidate for human cultural and technological origins

as well. Researchers are examining the emergence of material culture here, and its indications for the cognitive evolution of Early Stone Age hominins are intriguing. Other scientists are exploring the origin of economic strategies, such as fishing, hunting and gathering, in modern humans over the last few thousand years, and how the development of these strategies may have contributed significantly to human survival at the onset of huge climatic changes at the beginning of the Holocene period.

Indeed, the Turkana Basin has proved an ideal laboratory to study climate change over time. Ongoing projects examine the paleoenvironmental context for human evolution and cultural development, reconstructing ancient rivers and lakes, dating geological formations, and attempting to understand the role that climate change had in producing new species and stone-tool cultures. Entomology projects are looking at bee diversity, an issue critical to world food supply; others study insect vectors of diseases, with implications for worldwide health. Data currently being collected about the impact on Lake Turkana's food web and fisheries from hydroelectric and agriculture projects may prove vital to a growing global population whose fresh water sources have become increasingly taxed.

MAJOR GRANTS

*awarded to researchers
affiliated with TBI:*

39

Total funding:

\$15,927,239



Kenyan entomologist Dino Martins, a former TBI Postdoctoral Fellow, is considered one of the world's leading authorities on pollinator insects. TBI's various programs are vital in training the next generation of scientists to work in the Turkana Basin.

Sharing a Wealth of Knowledge

A key tenet of TBI's mission is to share the vast accumulation of knowledge gleaned from decades of research with colleagues and students from across the globe and with the public at large.

To this end, TBI and Stony Brook have initiated the **Human Evolution Workshop** (HEW) Series, bringing together top scientists and researchers from around the world for lectures and panel discussions on current issues in the field of human prehistory. The first set of these took place at Stony Brook University; with the establishment of TBI facilities in Kenya the annual workshops have been held at either TBI-Illeret or TBI-Turkwel since 2008.



The twelfth annual Stony Brook Human Evolution Workshop,
50 Years of *Homo habilis*.

Topics to date:

- **The African Origins of Modern Humans**
- **Out of Africa 1: Who, Where, and When?**
- **The First Humans**
- **Diversity in *Australopithecus*: Tracking the Earliest Bipeds**
- **Prehistory of the Turkana Basin: Opportunities and Priorities for Future Field Research**
- **From Fishers to Herders**
- ***Homo floresiensis* and Human Evolution**
- **50 years of *Zinjanthropus***
- **Our Ancestors' Ancestors: The Miocene Roots of the Hominin Tree**
- **Geological History of the Turkana Basin**
- **GIS and its Application in the Turkana Basin**
- **50 years of *Homo habilis***

Origins Field School

TOTAL NUMBER OF STUDENTS TO DATE:
122

NUMBER OF COUNTRIES REPRESENTED:
7

NUMBER OF INSTITUTIONS REPRESENTED:
35

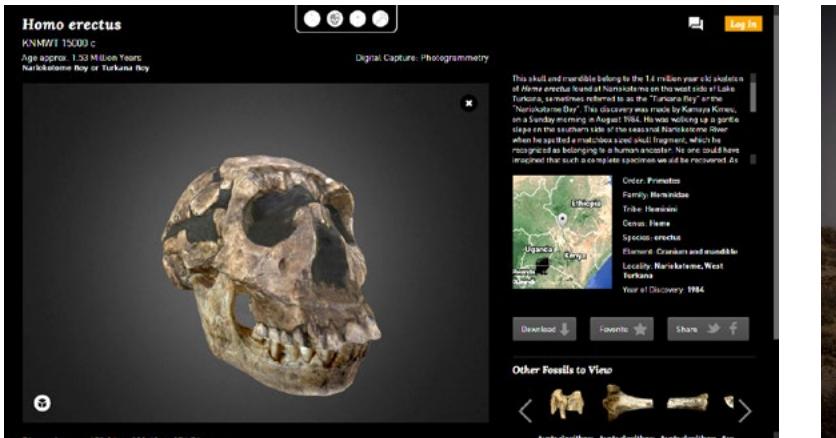
"You gain a deeper respect for other ways of life, learn to make connections between people, cultures, the past, present and future. You learn to think critically, reject ignorance and see through the semantics and nuances in global political pontificating. And then there's how you benefit socially."

—Former Origins Field School student



In 2012 Louise Leakey launched **AfricanFossils.org**, a web portal that makes the paleontological and archaeological heritage of Kenya available to the world. A collaboration with TBI and the National Museums of Kenya, Louise and her team have digitized a comprehensive selection of fossils and artifacts from the museum's collections, including scores of important hominid finds. Specimens in the collection can be rotated and compared to each other in virtual space, and new digital models are uploaded to the site each week. The project has been generously supported by 3D software company Autodesk, and offers tremendous potential to make the fossil evidence for human evolution available to anyone with internet access.

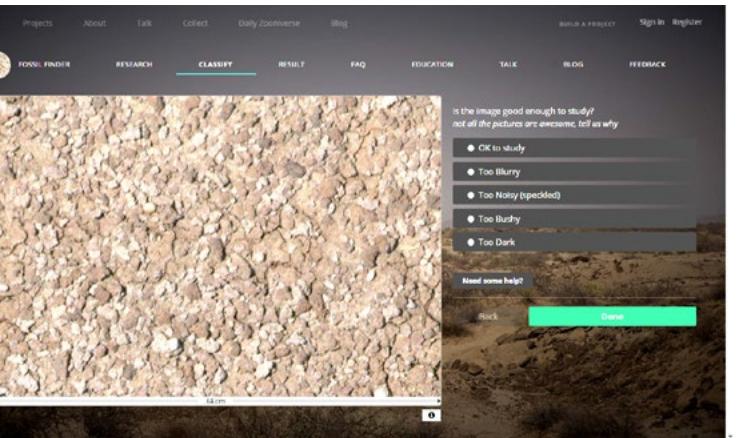
In addition to the 3D models, the website also features an interactive timeline and maps, a virtual lab and virtual excavation sites through which visitors can experience the complete process by which a fossil is discovered, recovered, and curated.



Examining a virtual fossil at AfricanFossils.org

In September of 2015, Louise announced a new site, **FossilFinder.org**, enabling citizen scientists to help discover fossils and other ancient artifacts. In this system, high resolution imagery of fossil exposures is captured using a range of aerial platforms, which is then uploaded onto an interactive website allowing online fossil hunters to examine the ground in minute detail. They can then tag notable features on the images including rock types, fossil fragments or stone tools. These findings are then submitted for use in the paleoenvironmental reconstruction of these landscapes.

"In this exciting new approach, we are asking for help to document the fossil bearing landscapes, which will assist us in the reconstruction of past environments," says Louise. "This partnership between the public and the scientific team will be transformative to our research. More eyes, more information, more discoveries."



Web interface of FossilFinder.org

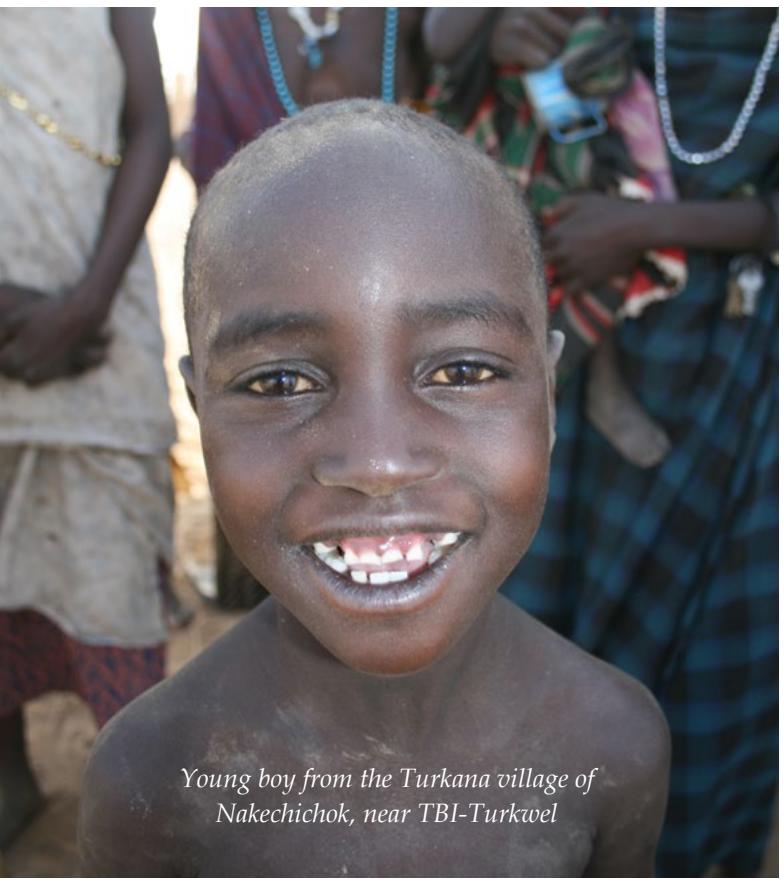
Partnership with the People of Kenya

In addition to its key role as repository for the fossils and artifacts uncovered in Turkana and Marsabit counties, TBI works closely with these local governments to make positive and sustainable changes in the lives of the people that surround Lake Turkana in areas of education, health, natural heritage awareness and environmental preservation. Our organization has been enthusiastically received by these communities, as we have been able to bring jobs, training, and educational support to this very remote region. We have seen a renewed interest by locals in the prehistory heritage of their land: in 2015, when a monument was established by Turkana County at the discovery site of Turkana Boy, the people of nearby Nariokotome Village embraced the young hominin as one of their own, even giving the fossil a name in their Turkana language.

The **TBI Community Outreach Project** runs a mobile clinic that regularly visits numerous homesteads around the village of Ileret. Staffed with a nurse and three trained community health workers, the mobile clinic has led the way in the district for immunizations of children, prenatal and antenatal care, deliveries, emergency response, nutrition support and curative services.

TBI continues to work with two local committees at TBI-Ileret and TBI-Turkwel to provide the best students from surrounding areas with bursaries enabling further primary and secondary schooling. A number of teachers are supported through this program as well, furnishing the local schools with essential

teaching staff. The community of Ileret initiated a high school program in 2013, and the TBI bursary fund is currently paying the salaries of the four teachers at the institution. Until now, the nearest high school was approximately 200 kilometers away. TBI's support means hundreds of young people now have opportunity for educational advancement previously unknown in the area.



Young boy from the Turkana village of Nakechichok, near TBI-Turkwel

Long-term financing

Now that TBI has been established, it is anticipated that funding for its long-term financial needs will derive from three main sources:

The TBI Field School will provide a revenue stream covering many of the operating costs of the facilities at Ileret and at Turkwel through reasonable charges for use of TBI infrastructure. By maximizing facility use during the academic year, it is our intent to offset annual operating costs to the maximum extent possible. To this end we plan to run field schools each semester. We estimate that the field schools' use of the facility for 20 weeks per year will provide almost 40% of the recurrent operational costs for the Ileret and Turkwel facilities.

A second revenue stream will be generated by the use of our facilities by scientific researchers. By charging reasonable rates for facility use (i.e., much lower than the cost to scientists of mounting and equipping individual, free-standing projects themselves) TBI generates resources to cover a substantial portion of ongoing recurrent operational costs. It is anticipated that operations of the TBI Caravan, by Air Turkana, will contribute additional revenue once the plane has been fully paid for.

Finally, the **endowment of a scientific research program** will buffer TBI from an entirely revenue-based financial plan, thus ensuring quality research.

Development

The Turkana Basin Institute has come an incredibly long way in a relatively short period of time.

Phase I of our development required raising funds to build and equip a temporary facility at Ileret that would support year-round field research and community projects, to locate a suitable site for a facility on the west side of the lake, and to begin to support postdoctoral scientists and postgraduate fellows. Our initial cost estimate for these goals was USD 2.4 million. However, Phase I was completed by the end of 2007 for about USD 2.2 million, thanks in part to Stony Brook, which funded



TBI's administrative costs in the USA. This ensured that almost all of the funds raised were dedicated to construction, equipping the facility and supporting young scientists. Stony Brook raised USD 500,000 for Phase I via the Stars of Stony Brook Gala that honored Richard Leakey in 2007.

Fundraising for **Phase II** of the TBI project began in 2008 and was completed in the spring of 2014. The goal was to raise USD 10 million over three to five years to enable construction of a permanent facility at Turkwel, to replace the temporary structures at Ileret with a permanent facility, and to invest in the physical capital required to support research. Jim and Marilyn Simons, who had already generously supported Phase I of the project, made a dramatic difference by committing a USD 5 million challenge grant from the Simons Foundation. This challenge offered a dollar-for-dollar match for all other funds donated to support Phase II. The pace of fund-raising increased dramatically when the challenge grant was announced early in 2008, and allowed us to complete Phase II.

While much has been accomplished, our work is not yet done. In order to fully realize Richard Leakey's decades-long vision of a multidisciplinary research station in one of the most remote and scientifically valuable places on the planet, we have set our sights high with our **Phase III plans**. The hallmark of this final phase will be the expansion and enhancement of field research support. Now that we've built the facilities, we want them to be in constant use to accelerate the pace of scientific discovery and the dissemination of new knowledge.

See Table 1, Summary budget for Phase III in Appendix



When musician Paul Simon visited TBI with his wife and children in August 2008, he offered to perform on our behalf, culminating in a hugely successful fundraising effort led by Ian Telfer and Nancy Burke and Jussi and Sally Westergren. Ian and Jussi organized an event in Vancouver in September 2009 at which Paul Simon and Jim Cuddy played and sang. This raised USD 1 million and drew down a further million dollars from the Simons' challenge grant. Following this successful model, Rich and Peggy Gelfond, along with Dietlinde Maazel, Dorothy Lichtenstein, Marilyn and Jim Simons, Sonia and Paul T. Jones, Nancy and Ian Telfer, and Helen and Brice Marden, organized a similar event in New York City on May 2, 2012, with Paul Simon once again contributing his voice and music to the cause. This exciting evening raised USD 2.1 million total.

III. OUR FUTURE

This is an exciting time for TBI. We look forward with great anticipation to building on five decades of unprecedented human prehistory research. The answers to fundamental questions are now within our reach:

What are the origins of *Homo sapiens*? Compelling DNA evidence suggests the rise of ancient human lineages in East Africa, and a number of Late Pleistocene sites throughout the Turkana Basin hold promise to illuminate the crucial time period around 60K years ago, when modern humans left Africa to populate the rest of the planet.

What are the origins of modern ethnic groups living in the Turkana Basin today? Numerous Holocene-age sites hold a potential wealth of information about the historical archaeology of the region's indigenous populations.

What are the origins of African megafauna? We are planning long-term excavations at the early Miocene site at Buluk through which critical missing pieces of the biogeography of the African continent will be filled in, delineating the rise of modern elephants, giraffes, pigs, rhinoceroses, equids, antelopes, and carnivores.

While Lake Turkana is arguably the most important repository of fossil evidence for human evolution in the world, TBI also provides the ideal location to study topics as varied as botany, limnology, entomology, alternative energy, linguistics, development studies and health care. As such, we will continue to welcome scientists and researchers from all disciplines to our facilities, and hope to increase their numbers in the coming years.

We have but scratched the surface of what remains to be discovered.

Honor Roll

Abercrombie & Kent	Roz Ho & Jack Daulton	Dietlinde Maazel	Paul Simon
Abercrombie & Kent Philanthropy	The Fernwood Foundation	Helen and Brice Marden	Jim & Marilyn Simons (Simons Foundation)
Enrique & Valeria Aboitiz	The Fuel Freedom Foundation	MATCO Ltd.	Lucille & Carlton Sedgeley
David Acker	Peggy & Rich Gelfond	Microsoft Corporation	Naomi Seligman & Ernest von Simson
The Ark Foundation	Ann & Gordon Getty	Maureen Mitchell	Sirai Management, Ltd.
Scott Asen (The Asen Foundation)	Frank Giustra (Radcliffe Foundation)	Wangechi Mutu	Carlos Slim (Fundacion Telmex)
Autodesk, Inc.	Gail & Ernst Habicht	National Geographic Expeditions	The Sprott Foundation
Edward Barlow	Diane & Keith Hill	Edward Norton (Norton Family Foundation)	Mark Stewart
The Geri Bauer Foundation Inc.	Robin & Jim Herrnstein	Susan E. O'Conner	Ian Telfer and Nancy Burke
Hernan Buchi	Isibindi Charitable Trust	Gerry Ohrstrom (Donors Trust, Inc.)	University of Helsinki
Maureen & Dan Cahill	Sonia & Paul T. Jones	Robert H. Olander II & Jean E. Olander	Michel David Weill
Simon Cairns	Geoffrey Kent	Jonathan and Jennifer Oppenheimer Foundation	Jussi and Sally Westergren
The Ceres Charitable Foundation	David H. Koch	Kresimir Penavic	Edith & Michael Wigler
Joyce & Bruce Chelberg	Richard Leakey	Wendy P. Phillips	The Wolfensohn Family Foundation
Chief Executives Organization	Dorothy Lichtenstein	Christine and Mark Read	Frank & Kay Harrigan Woods
Kathy & Bill Cleary (The Cleary Trust)	Hans Jakob Limbach	Janice & James Rohlf	
Jim Cuddy	The Lundin Foundation	Allan P. Rothstein	
Jeanne & Don Dana	The Lundin for Africa Foundation	Royal African Safaris	

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11	Nature Publishing Group, all magazine covers; Mike Hettwer, background image
15	Mike Hettwer
18	Mike Hettwer, hominin skulls; Bob Campbell, all archival photography
20	Mike Hettwer, hominin skulls; Bob Campbell, all archival photography
22	Mike Hettwer, hominin skulls; Harvard University, field school class photo; Allan Morton, field school excavation; Bob Campbell, all remaining archival photography
24	Mauricio Antón, <i>Nysyrticus</i> reconstruction; Bob Campbell, <i>A. anamensis</i> jaw; Fred Spoor, <i>Kenyanthropus</i> skull; Bob Campbell, all remaining archival photography

Appendix

Table 1: Summary budget for Phase III

July 1, 2014 to December 31, 2020

Operations support	\$6,000,000
Enhanced research support	\$5,000,000
Science education	\$1,000,000
Construction and equipping	\$2,000,000
Vehicle fleet	\$1,000,000
Total	\$15,000,000
Detail on items for Phase III	
Current operations (budget \$12,000,000, \$6,000,000 covered from revenues generated by TBI field schools and researcher utilization payments)	\$6,000,000
Enhanced research support for preparation of fossils by Kenyan technicians to ready them for study and publication	
Enhanced research support for competitively funded scientific expeditions with highly trained Kenyan technicians	
Collections curation, storage and management at TBI-Illeret and TBI-Turkwel	\$5,000,000
Development of a global, web-based, educational program on human evolution and related sciences (AfricanFossils.org) and including planning for a comprehensive educational package of MOOC's for use by universities around the world based on the format of Richard Leakey's BBC television series <i>The Making of Mankind</i>	\$1,000,000
Construction of TBI administrative headquarters outside Nairobi on land donated to TBI Ltd. by Richard and Meave Leakey	
Enhancement of construction at TBI-Turkwel for long term scientific and technical accommodation	
Enhancement of construction at TBI-Illeret for long term scientific and technical accommodation, aircraft hanger	
Construction of aircraft hanger at Orly Airport (Nairobi) on plot of land purchased previously by TBI Ltd.	\$2,000,000
Completion of vehicle fleet for research and field school activities	\$1,000,000
Total	\$15,000,000

Every human being alive today shares DNA inherited from a common African ancestral population. Fossil layers covering 7,000 square miles of exposed surface around Lake Turkana capture all the major events in the human story from 7 million years ago to the present, granting us a unique opportunity to unlock the secrets of our past. Clearly, the potential for new, important scientific discoveries in the Turkana Basin is as vast as the region itself.

