



At the Intersection of Technology and Artistry

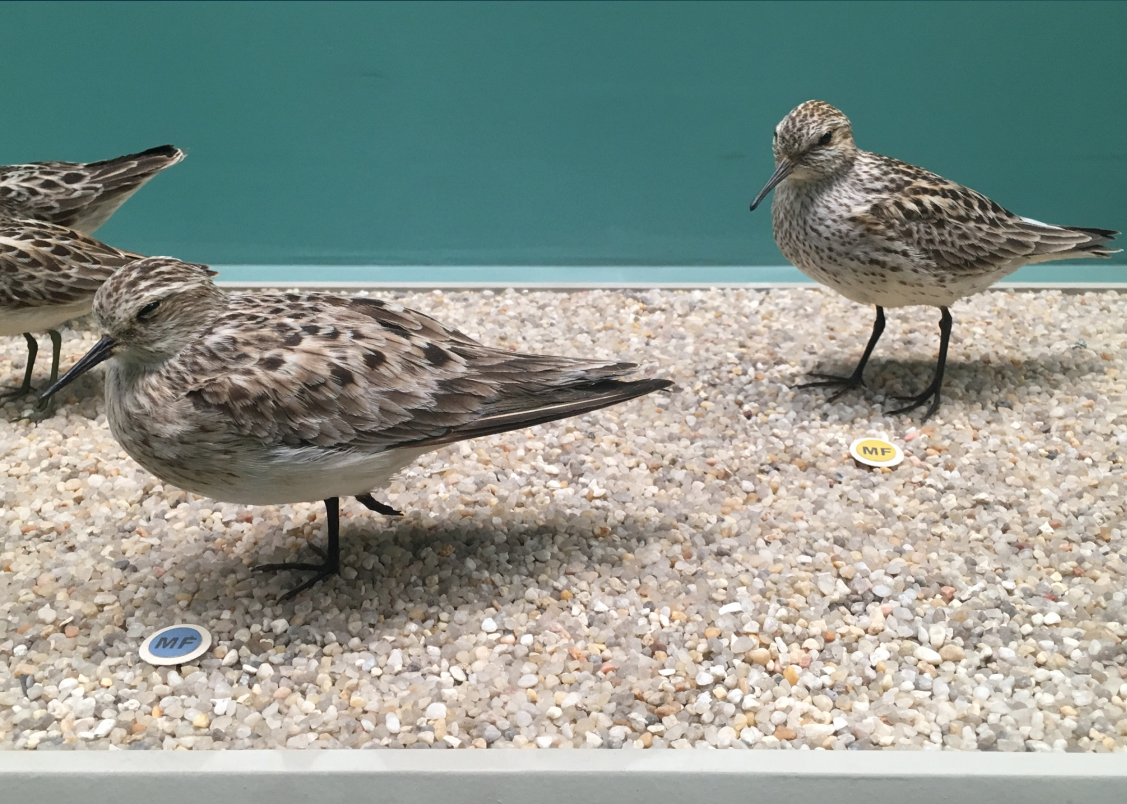
IDIGBIO'S 3RD
ANNUAL DIGITAL DATA IN BIODIVERSITY
RESEARCH CONFERENCE

Collin J. Morét and Chelsea A. Graham

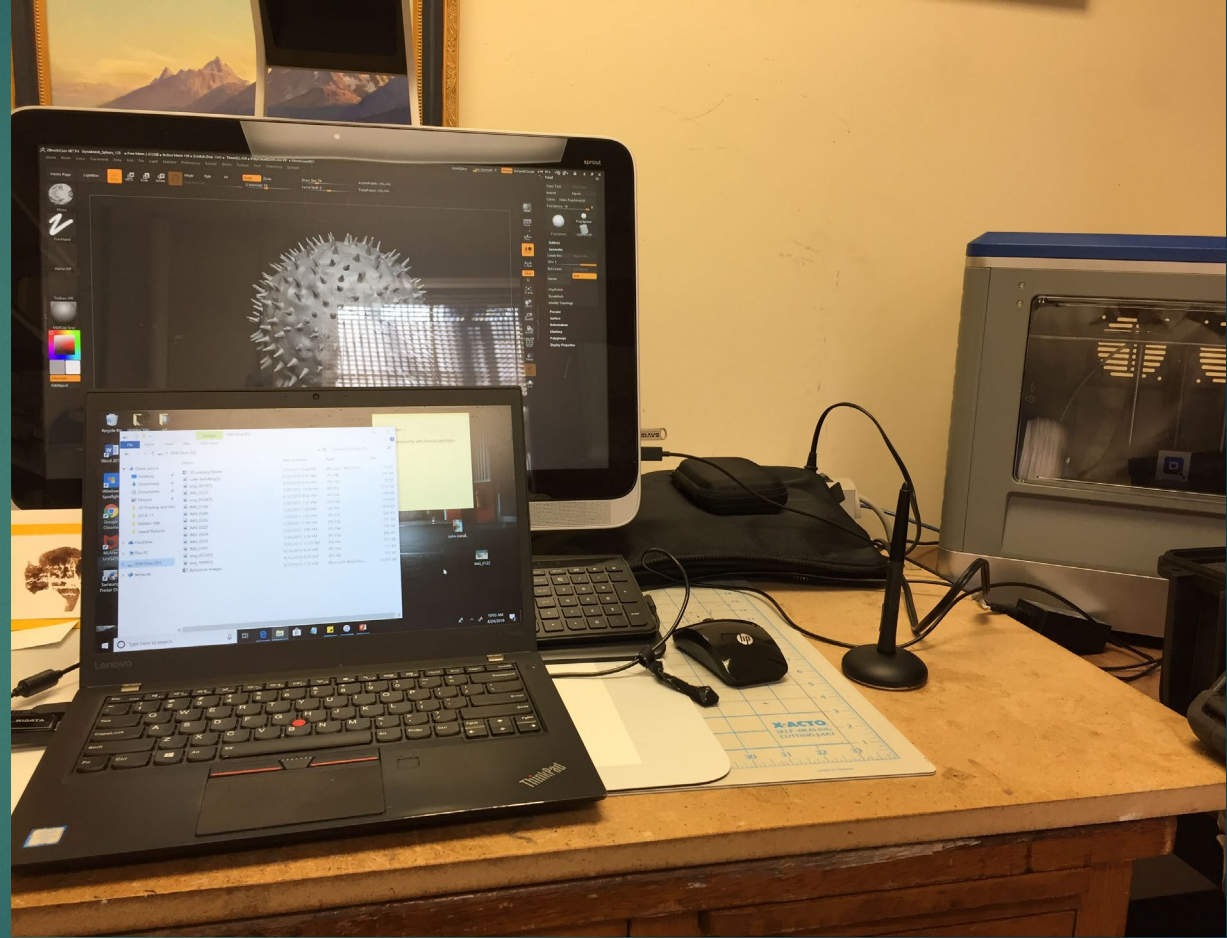
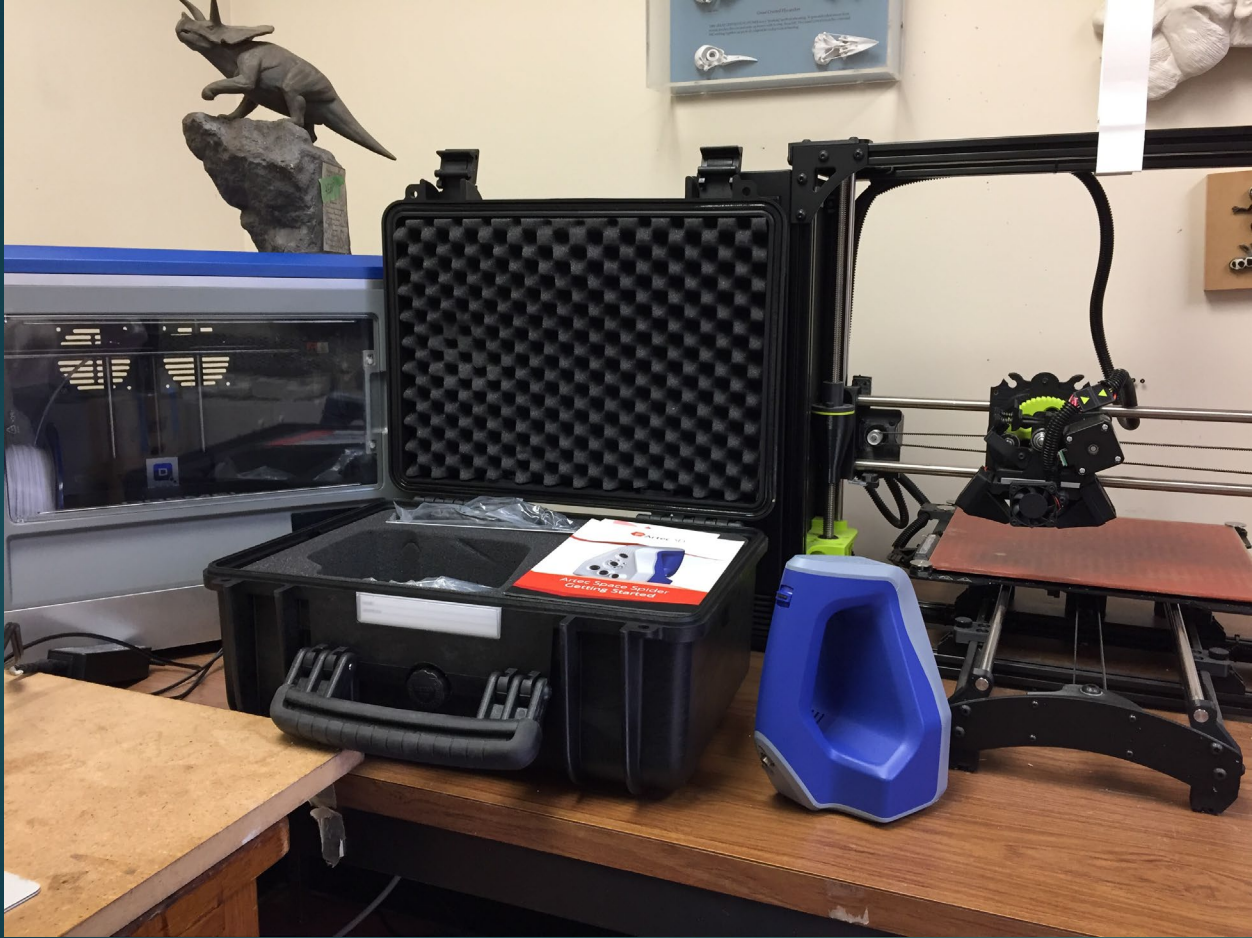








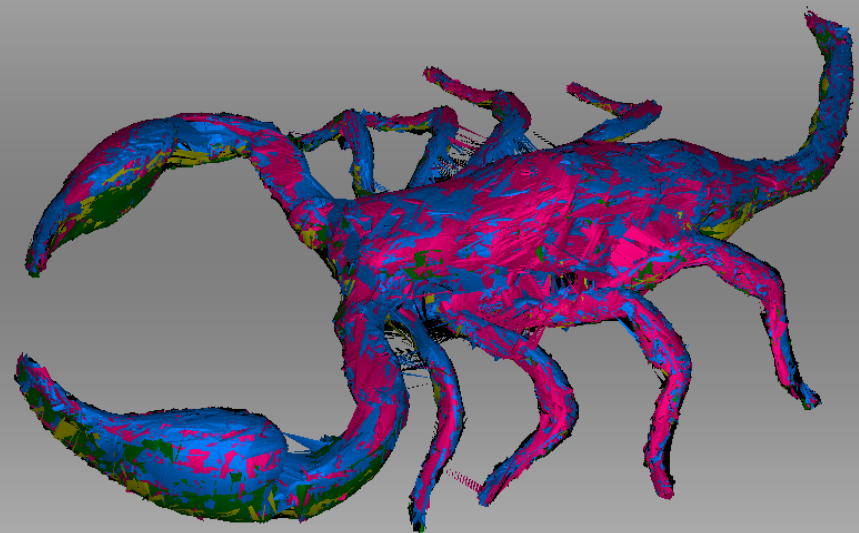








- Scan
- Autopilot
- Editor
- Tools
- Align
- Fix holes
- Measures
- Multi
- Texture
- Publish



COLOR MODE

- Texture
- Scan color
- Surface color
- Max error
- X-Ray

RENDER MODE

- Solid
- Wireframe
- Points
- Wire over solid
- Points and solid

BACKFACE

- Show
- Cull
- Black

Lighting L

Grid G

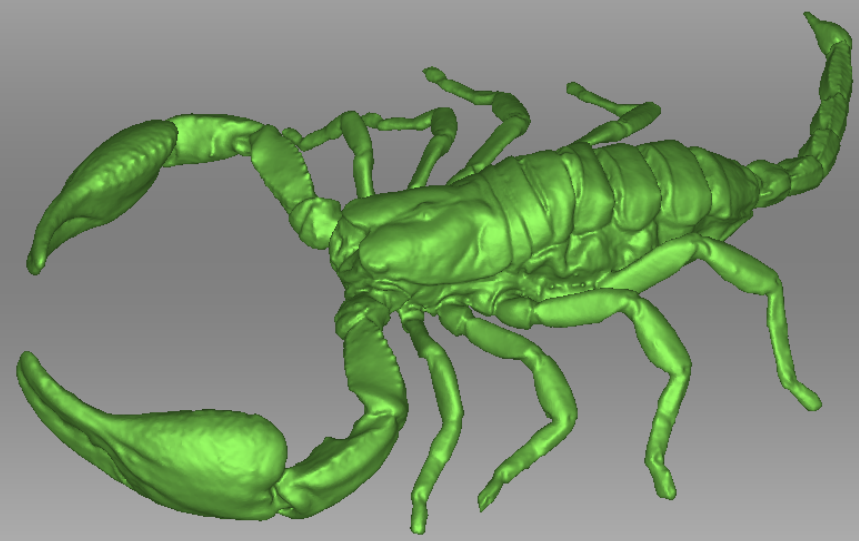
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2	Spider Scan 5	600	600 / 404 MB	0.2
3	Spider Scan 6	527	527 / 358 MB	0.2
4	Spider Scan 8	309	309 / 250 MB	0.2
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6	Sharp fusion_pt 1		1 / 14 MB	
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Log window

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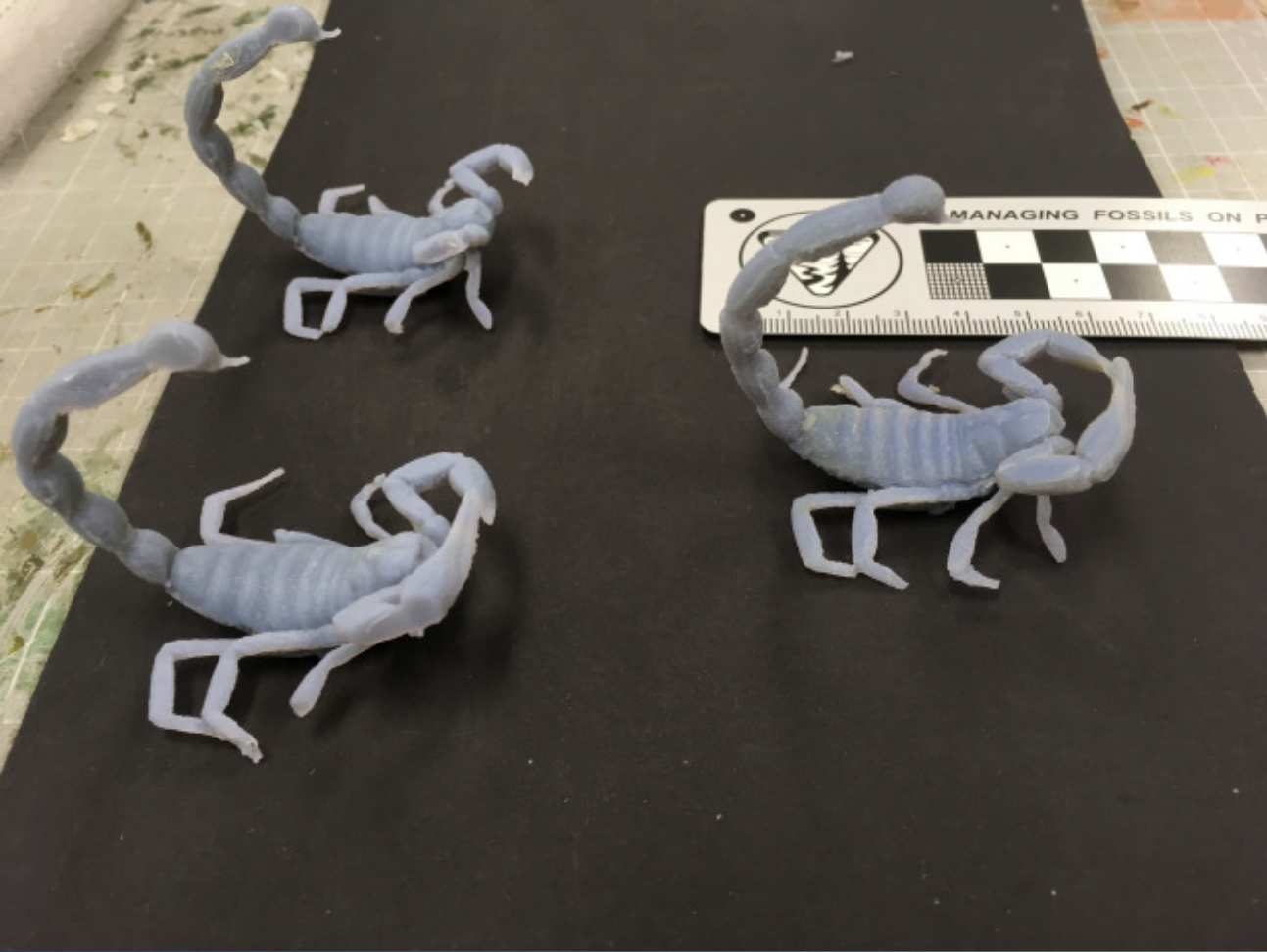














FROM MERCURY TO EARTH?

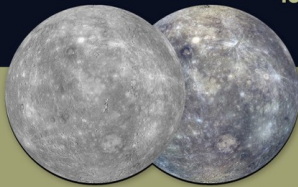
A METEORITE LIKE NO OTHER

IN FEBRUARY 2012 A SCATTERING OF 35 GREEN STONES was discovered in the Sahara Desert of Morocco. Their texture and shape indicated that they belonged to a meteorite, but their olive-green color was unique. Where did this meteorite—known as **NWA 7325**—come from?

Most meteorites originate in the asteroid belt between Mars and Jupiter. However, based on chemistry and mineral composition, some are known to have come from Mars or Earth's moon.

With its high magnesium and chromium content—and low amount of iron—the chemistry of **NWA 7325 is unique among meteorites**. And its low magnetism perfectly matches the known magnetism of Mercury. Together these traits suggest a Mercurian origin for NWA 7325.

NWA 7325 is the only potential fragment of the planet Mercury on Earth. Presented here—for the first time—is the largest fragment recovered.



Anatomy of a planet

The innermost planet of our solar system, Mercury, is the **SMALLEST** of the eight planets. On Mercury...

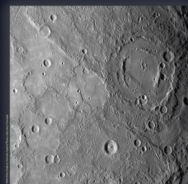
...one year—the time taken to orbit around the sun—equals **88 Earth days**. ...one day equals **4,222 hours** (176 Earth days)

...there is no atmosphere to retain heat. The temperature at the equator reaches **800 °F** (427 °C) during the day, but plummets to **-280 °F** (-173 °C) at night.

...the planet's diameter is **3,032 miles** (4,880 kilometers)—roughly the distance between the East and West coasts of the United States.

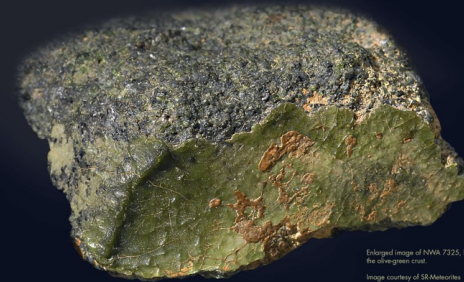
...the average distance to the Sun is **36 million miles** (almost 58 million kilometers). Earth's distance from the Sun is 93 million miles (150 million kilometers).

...the surface gravity is **38%** that of Earth's. A human weighing **150 pounds** (68 kilograms) on Earth would weigh **only 57 pounds** (26 kilograms) on Mercury.



The surface of Mercury is **heavily cratered** from asteroid bombardments in the planet's past. In 2012, NASA confirmed that the MESSENGER spacecraft detected **ice within craters** of the planet's north pole.

METEORITES KNOWN FROM THE FOUR ROCKY PLANETS



Enlarged image of NWA 7325, highlighting the olive-green crust.
Image courtesy of SR Meteorites



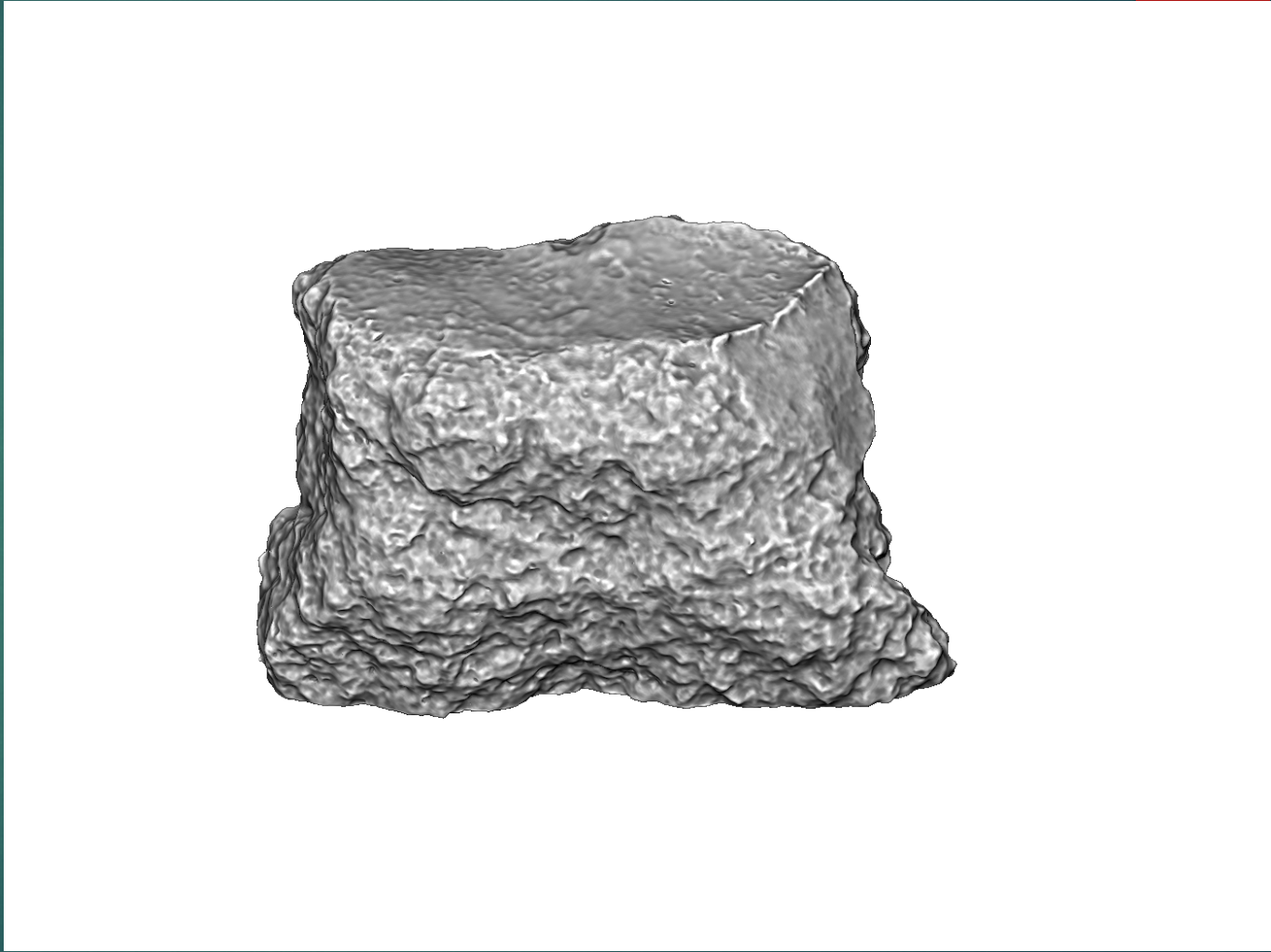
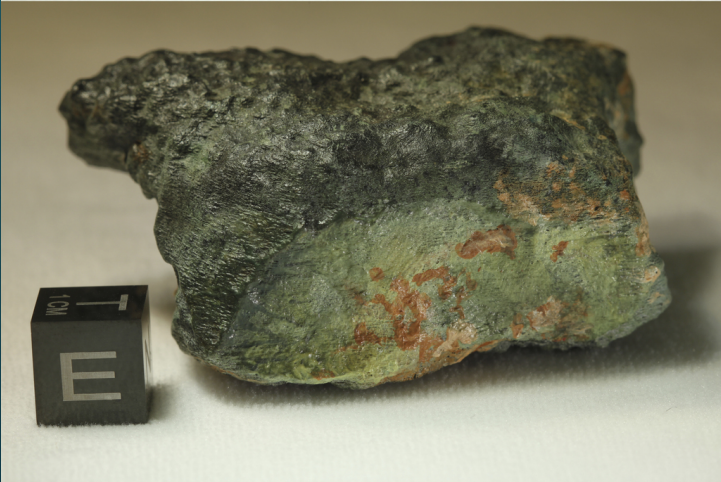
Mercury meteorite
4.56 billion years old
Found in the Sahara Desert, Morocco
NWA (Northwest Africa) 7325
On loan courtesy of SR Meteorites

Combined, the fragments of NWA 7325 total 245 grams (less than one pound). Its 79 fragments—of these sizes—**make it the largest fragment of NWA 7325** in any planet's history to date, formed by surface melting when it passed through Earth's atmosphere. Generally, larger rocks are known from several lunar meteorites, but none are as brightly colored as that of NWA 7325.

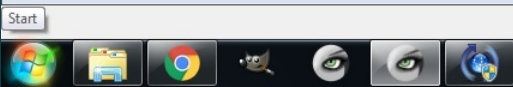
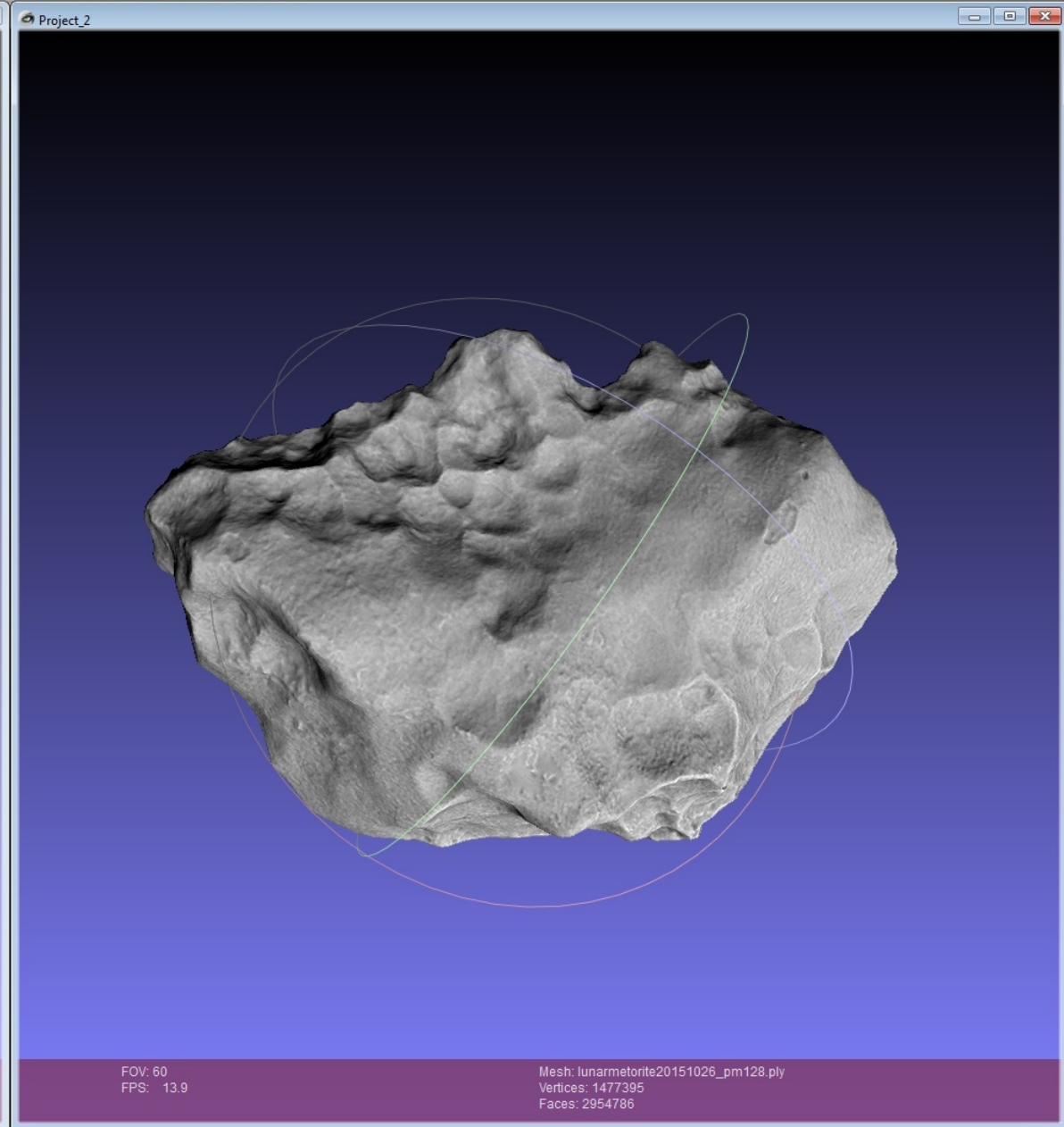
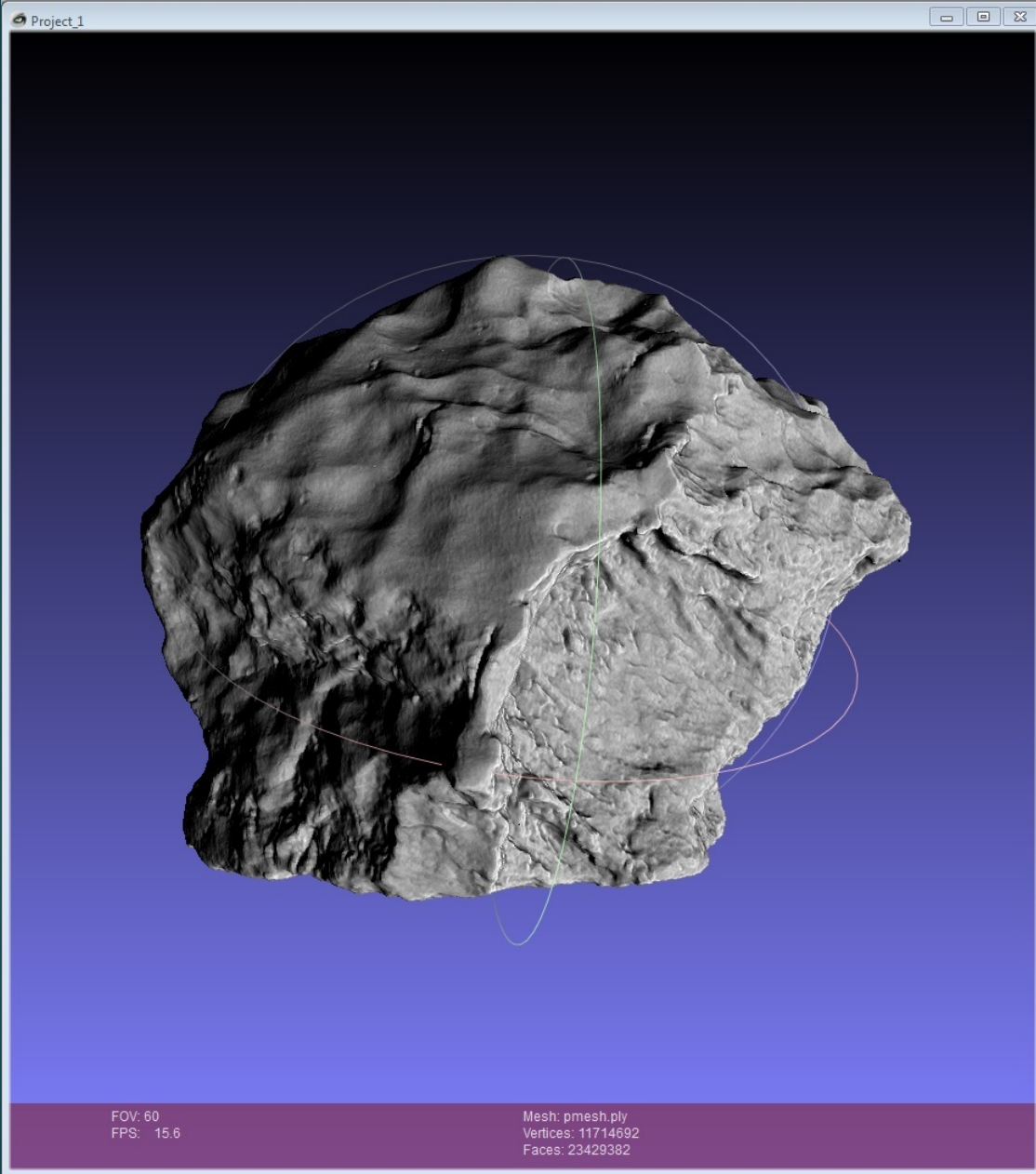
THE STORY CONTINUES...

While the magnetism, low iron content, and high levels of magnesium all suggest a Mercurian origin for NWA 7325, not all scientists currently agree. Some argue that the meteorite's age—4.56 billion years—makes it too old to be from an inner rocky planet. But Martian meteorites are known to be as old or older. Also, the levels of some chemical elements within NWA 7325 do not perfectly match those of Mercury's surface. But perhaps NWA 7325 originated well below the surface, excavated and blasted into space by a large, deep impact.

As with all stories of science, **more time and study are needed** to fully understand the true origin—and potentially incredible significance—of this curious little green rock.







unknown type of meteorite
 Displayed here is Northwest Africa (NWA) 5000, one of the largest lunar meteorites ever discovered.



A Coveted Stone

Of the approximately 40,000 meteorites recovered on Earth so far, only about 125 are from the Moon. One of the most coveted of them all, Northwest Africa (NWA) 5000 was found in southern Morocco in July 2007, half buried in the desert terrain of the Sahara.

The stone weighed a whopping 25.41 pounds (11.53 kg)—almost as heavy as the largest samples returned by the Apollo missions. The exact replica (right) shows the original appearance of NWA 5000.

FROM THE MOON TO THE EARTH

Northwest Africa (NWA) 5000

As the closest and largest object in the sky, Earth's Moon has fascinated mankind since the dawn of time. Its scientific investigation began on July 26, 1609, when Thomas Harriot first observed the Moon by telescope.

Three hundred and sixty years later—on July 24, 1969—the first Moon rocks were returned to Earth as part of NASA's Apollo lunar program. With these specimens, a new chapter in the study of meteorites began. The Apollo samples allowed for the recognition of a new, previously unknown type of meteorite: those originating from the Moon.

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The stone weighed a whopping 25.41 pounds (11.53 kg)—almost as heavy as the largest samples returned by the Apollo missions. The exact replica displayed here (right) shows the original size and appearance of NWA 5000.

Since 2007 slices of the original meteorite have been distributed worldwide to meteoritists and collectors. This 3.88-pound (1.76-kg) end piece (left) features both remnants of the fusion crust formed during atmospheric entry and the surface that was exposed to Saharan winds after landing (the darker, speckled area). The flat, cut surface offers a glimpse into the lunar rock's true color and composition.

Left: Northwest Africa (NWA) 5000, before cutting. Right: Exact replica of Northwest Africa (NWA) 5000, after cutting.



EMPIRES AND WINGS

The History of NWA 5000

Through radiometric dating, scientists have determined that NWA 5000 was knocked off the lunar highlands by an impacting asteroid around the time of Alexander the Great's death (323 BCE) and the founding of the Seleucid Empire (312 BCE).

After remaining in space for some 1,300 years, it was pulled to Earth (right) at the time of the Viking and the Viking orbiters landed in the area around 600-7000.

This Seleucid clay tablet dates to the Seleucid period (312-63 BCE). Discovered in Syria by Francesco J.P. Nolet, it records the velocity of the Moon's movement across the night sky for 248 days.

It is very possible that NWA 5000 was still part of the Moon when the clay tablet was written. By the time the tablet was discovered in southern Iraq, NWA 5000 had already fallen to Earth and had been lying in the Sahara for almost 1,000 years.



Background image showing NWA 5000.

Apollo missions. The exact
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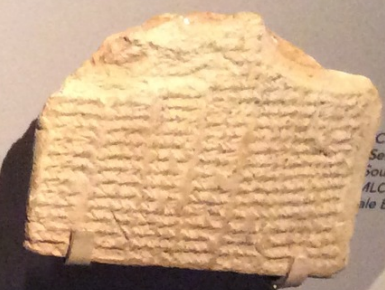
ica (NWA) 5000
ahara, Morocco
esy of Greg Hupe/The Hupe Collection



After roaming in space for
Earth roughly at the time Le
in the New World (AD 1000)

This cuneiform clay tablet date
BCE). Donated to Yale by financ
velocity of the Moon's movemen
days.

It is very possible that NWA 5000 w
the clay tablet calculations were mac
discovered in southern Iraq, NWA 500
and had been resting in the Sahara for



Cuneif
Seleuci
Southern
ILC 188
ale Baby

Background image courtesy NASA

Special Thanks

Yale Peabody Museum of Natural History

Peabody.yale.edu

Yale Peabody Museum Preparator

Michael Anderson

<https://museummodelmaking.wordpress.com/>

Yale Engineering CEID

<http://ceid.yale.edu/>

Institute for the Preservation of Cultural Heritage

<https://ipch.yale.edu/>