

ASTEROID RICHES

“NASA’s robotic mission to a metal world is scheduled for liftoff on October 5, 2023. That mission, the spacecraft traveling there, and the world it will explore all have the same name—Psyche.”

Jim Bell¹

“16 Psyche is the only known object of its kind in the solar system.”

Lindy Elkins-Tanton²

What an amazing week it has been!

The Russian invasion of Ukraine is now over 450 days old, a Russian spacecraft sent to explore the moon crashed on the lunar surface, mercenary Wagner Group leader Yevgeny Prigozhin—who led an abortive coup against Putin in June—reportedly died in a fiery crash of his Embraer Legacy 600 private business jet near Moscow, Chinese President Xi Jinping inexplicably was a “no show” for a major address at the BRICS Summit 2023, former President Donald Trump’s unprecedented mug shot was released by the Fulton County Sherriff’s Office in Atlanta, Georgia (his fourth indictment, this one for a conspiracy to unlawfully undo his election loss in Georgia in 2020), and a week in which the Biden administration continues to evade and slow-roll providing evidence in a number of corruption related inquiries.

“Sigh.”

On the personal front, Ima and I drove to Oklahoma City (OKC) from Branson, Missouri on Sunday night and checked into the Skirvin Hilton Hotel (one of our favorite places). On Tuesday morning, we were privileged to attend a breakfast session at the hotel featuring a welcome

¹ Jim Bell and the IFLScience staff, “NASA’s Psyche Mission To A Metal World May Reveal The Mysteries Of Earth’s Interior,” *IFLSCIENCE*, Aug. 22, 2023. Bell has been part of NASA’s *Psyche* team for the last six years.

² Quote is from “NASA mission to a \$10,000-quadrillion asteroid is two months from launch,” +*Freethink*, Aug. 12, 2023. Elkins-Tanton was the principal investigator of the *Psyche* mission when NASA authorized the project in 2017.

by Oklahoma Governor Kevin Stitt, (yes, I have a photo), followed by a presentation by *Westwin Elements* Board member and former Boeing CEO Dennis Muilenburg. (As usual, Muilenburg's presentation was smooth as silk and hit all the right themes). In attendance were several foreign dignitaries—including the UN Ambassador from the Democratic Republic of the Congo (DRC) and a Turkish representative—as well as investors, potential investors, and media representatives.

Following the breakfast meeting, we loaded on buses for the almost 90-mile drive to Lawton, Oklahoma, and a groundbreaking ceremony for *Westwin's* pilot plant. There was a tent at the site to provide some relief from the heat for those in attendance. I'm not sure how much it helped. Standing out there in my jacket, wearing a white plastic construction helmet and clutching a shovel—along with about fifteen other *Westwin* officials, technicians, investors, and Board members—I felt riverlets of sweat rolling down my back. I was wilting like a character without protective gear in the fiery desert sands of Frank Herbert's *Dune* novel.

Did I tell you it was hot?

I mean like well over 100 degrees hot!

We quickly loaded up on the air-conditioned buses and headed off for a lunch session on the Cameron University campus, where we heard an address by former *Rio Tinto* CEO Tom Albanese followed by a congratulatory greeting from the mayor of Lawton/Fort Sill. The mayor easily had the best line of the day: “please don't be discouraged by today's heat, the average temperature for Lawton is 75 degrees.”

The day concluded with a formal dinner back at the Skirvin. In the “it's-a-small-world” department, Ima and I sat at a table with a businessman from Fort Worth, Texas, who turned out to be the son of Nevin Neal—a professor in the History Department at TCU. As we discovered, the businessman and I were on the TCU campus at the same time. It was a trip down memory lane. We exchanged stories about Angelo's BBQ down by the river with its Texas-style chopped beef brisket sandwiches; those were the days when there was sawdust piled on the floor, a large stuffed bear greeted patrons at the entrance with a paw partially missing—among other animals in the restaurant's

taxidermy collection—and memories of the large, frosted mugs of Lone Star beer. There were stories about the rickety Old South Pancake House that formerly stood near the railroad tracks. The names from those years came flooding back—Dr. Spencer Tucker, Dr. Boyd, Dr. Frank Reuter, Dr. Bohon, Dr. Procter, Dr. Donald Worcester, and Mr. Cherryholmes. I hadn't thought about them for years.

On Wednesday, the day after these momentous events, (in the temporary offices of *Westwin* in OKC), I huddled together with a handful of others to discuss future feedstocks and general geostrategic matters. In attendance was *Westwin's* CEO (and former student) KaLeigh Long, the company's security specialist, two investors, and one of our project managers. The wide-ranging discussion concerned potential nickel and cobalt resources in several countries around the world.

The last items of conversation concerned a car ride the investors had with Tom Albanese, who is, as it turns out, a bit of a techno-futurist in his own right, talking about harvesting resource-rich nodules from the ocean floor and the prospects of asteroid mining. At that point I mentioned NASA's upcoming *Psyche* mission and the promise of fantastic riches for the country, or well-heeled entrepreneur, able to first exploit the precious metals available on the faraway asteroid.

What is the *Psyche* mission?

What is asteroid mining?

Is this some far-fetched, science fiction fantasy?

Hardly.

A very real, present day, space mission is about to liftoff to explore one of the most curious objects in the universe: the largest-known of the M-type metallic asteroids, *16 Psyche*. The asteroid itself was discovered by the Italian astronomer de Gasparis in mid-March 1852, has the width of Massachusetts, and orbits between Mars and Jupiter in the main asteroid belt.³ The asteroid was named after the Greek goddess Psyche, the goddess of the soul, who was born as a mortal woman and eventually granted immortality because of her beauty. Psyche is represented as a

³ Bell, *et.al.*, "NASA's Psyche Mission."

beautiful woman with butterfly wings. The “16” prefix signifies it was the sixteenth minor planet in order of discovery. *Psyche*’s distance from Earth varies between 186 million miles and 372 million miles, depending on its location in its orbit relative to ours. The asteroid is irregular in shape but measures roughly 173 miles long and 144 miles across.⁴

Most asteroids consist primarily of barren rock or ice. But not *Psyche*. It is thought to be the core of a planetesimal (an early planetary building block) whose outer layers have been stripped away over eons of time. Some scientists estimate—based on radar observations—that the asteroid may be between 30 and 60 percent metal. They assert the metallic asteroid consists of iron, nickel, and a number of other rare metals, including gold, platinum and copper.⁵ If so, some estimates place the value of the asteroid’s iron deposits, alone, at around \$10,000 quadrillion, or around 100,000 times the value of today’s total world GDP economy (\$100 trillion).⁶ Others suggest the value of the asteroid’s metals—if they can be mined and returned to Earth or lunar refineries—will be enough to destroy commodity markets and perhaps cause the collapse of the world’s economy.⁷

As such, the potential financial windfall for the country, or individuals, able to successfully exploit and mine the asteroid is off the charts. In my mind, there is one historical comparison. Sort of. When we visited Amsterdam a few years ago, I was amazed at the ornate houses that lined the city’s canals (all narrow in design to avoid city taxes based on the amount of property frontage). This enormous wealth traces back to the Age of Exploration—as I called it in my *Western Civilization*

⁴ Jess Thomson, “NASA’s impending mission to \$10,000 quadrillion asteroid explained,” *Newsweek*, Aug. 17, 2023. This missive relies on non-scientific articles to frame a picture of *16 Psyche*. For a deeper technical discussion of the asteroid—including controversies over its origin—see, among others: Dmitriy F. Lupishko, “on the bulk density and porosity of M-type asteroid 16 Psyche,” *Solar System Research*, 40 (3): 214-218 (2006); Elkins-Tanton, *et al.*, “Journey to a metal world: Concept for a Discovery Mission to Psyche,” *LPI Contribution No. 1777* (45th Lunar and Planetary Conference), p. 1253, March 2014; and Elkins-Tanton, *et al.*, “Observations, meteorites, and models: A preflight assessment of the composition and formation of (16) Psyche,” *Journal of Geophysical Research*, 125 (3): 23 (2020). *Wikipedia* has an excellent article on 16 Psyche.

⁵ Sam Tonkin, “NASA prepares to launch Psyche probe to \$10,000 Quadrillion asteroid,” Jul. 20, 2023.

⁶ Thomson, “Nasa’s impending mission.”

⁷ Tonkin, “NASA prepares to launch.”

classes—and perhaps the most successful trading company in history, the *Vereenigde Oostindische Compagnie* (VOC), better known to us on this side of the pond as the Dutch East India Company, was established in 1602, and headquartered in the *Oost-indisch Huis* (East India House), still located in downtown Amsterdam. The Company sent over one million voyagers across Asia at a time when a seafaring trip from Amsterdam to Batavia (today’s Jakarta) would last from eight to 10 months (at least a year and a half round trip). It could be a perilous undertaking: many ships and many individuals would never return. But with the right knowledge, the right ship and crew—and a healthy dose of good *joss* (luck)—a risky investment could make one extremely wealthy. Some online sources note, for example, that the Company’s stock amounted to a massive 78 million Dutch *guilders*, which translates to a whopping \$7.9 trillion USD in today’s money. Or worth the equivalent of *Apple, Microsoft, Amazon, ExxonMobil, Berkshire Hathaway, Tencent, and Wells Fargo* put together.⁸

My point? A future wealthy entrepreneur—with or without official government backing—can make a fortune in asteroid mining. With just one trip. Only instead of one and a half years, it may take as much as twelve years to cash in on the investment.

But back to the *Psyche* mission itself. A SpaceX Falcon Heavy Rocket will provide the liftoff from Earth—with a launch window from Thursday, October 5 to Wednesday, October 25 this year—blasting off from the Kennedy Space Launch Complex 39A at 10:38 a.m. EDT. The *Psyche* science mission will be the first time NASA uses Elon Musk’s SpaceX rocket and marks the Falcon Heavy’s first interplanetary launch.⁹ The rest of the way, *Psyche* will rely on *ion propulsion* (the pressure of ionized Xenon gas jetting out of a nozzle will provide a continuous, reliable, and a relatively low-cost way to propel the

⁸ Bobby Salomons, “The Dutch East India Company was richer than Apple, Google, and Facebook combined,” *DUTCHREVIEW*, Mar. 30, 2023. For the view that such valuation estimates, as much as \$8.28 trillion in some accounts, are gross overestimates see Lodewijk Petram, “Was the VOC the most valuable company ever? (Answer: NO!),” *worldsfirststockexchange.com*,

⁹ Jamie Carter, “NASA’s ‘Psyche’ Mission To Quadrillion-Dollar Asteroid Is Go,” *Forbes*, Jul. 19, 2023; Jeff Foust, “Falcon Heavy to launch NASA Psyche asteroid mission,” *Space News*, Feb. 28, 2020.

spacecraft).¹⁰ The journey will consist of a slow spiral of some 2.5 billion miles, including a gravity-assist flyby past Mars. The probe itself—the same size as a large SUV with solar panels a bit wider than a tennis court—will arrive at the asteroid in August 2029, (a trip of nearly six years) where it will spend 26 months mapping the asteroid’s geology, topography, and gravity.¹¹

In addition to its unique propulsion system, the *Psyche* mission will employ a new deep space communications system to communicate with the spacecraft one or two times a week.¹²

As I hinted before, a growing number of space entrepreneurs—for whom the concept of asteroid mining is anything but the stuff of science fiction fantasy—will be closely watching the results of the *Psyche* probe. At the same time, several scientists hope the probe’s results will provide insights to help them better understand the Earth’s core and the early formation of our planet.

Why am I so interested in the upcoming *Psyche* mission?

I remain convinced that asteroid mining will be an important part of the global economic structure in my grandchildren’s world. That future world is what I really enjoy writing—and thinking—about. Right now, for example, I am working on two or three scenes for a novel to follow-up on my futuristic techno-Christian trilogy (the first book of which will be available by the end of next month). My novels are typically set 20-30 years in the future. One of those scenes involves an extremely wealthy future Sino-Singaporean businessman—a combination of Elon Musk and Jeff Bezos on steroids—who has wrangled a mining and refinery concession on the moon’s South Pole (a base occupied by the Chinese before the Great Conflict). From his company’s future lunar base, he will construct the world’s largest space tanker to exploit the resources on asteroids such as *16 Psyche*.

The *Psyche* mission, in my opinion, offers a glimpse into this future.

¹⁰ In mid-August all 2,392 pounds (1,085 kilograms) of xenon propellant was fed into the spacecraft. See *Ibid*.

¹¹ Bell, *et.al.*, “NASA’s Psyche Mission.”

¹² “NASA Mission,” (*Freethink* article).