



**PSYCHE  
INSPIRED  
IRON CLASS**

Psyche Inspired  
Iron Class

A Collection of Artworks

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These allow you to experience more Psyche content online. To start, open the camera app on your iPhone/iPad or download and open a free app such as “QR Code Scanner” from the Google Play store for Android. Hold your smartphone or tablet over these barcodes. Once scanned, follow the generated link on your device to experience our interactive content online and enjoy.



# What is Psyche Inspired?

Psyche Inspired is a program that brings undergraduate students from any discipline or major together to share the excitement, innovation, and scientific and engineering content of NASA's Psyche mission with the public in new ways through artistic and creative works.



# Foreword from Lindy

June 20, 2019  
Pasadena, California

With great pleasure we present the art from the second year of the Psyche Inspired program. In our first year we piloted the program at Arizona State University, and this year we took the program nationwide. The program has student artists from all over the country, and not just from on-campus programs – we have artists who are distance learners as well. We are thrilled with the art!

Every endeavor is a human endeavor. The ways we emotionally connect with our work and our world can be expressed most completely, sometimes, through art. The art of these interns has reached everyone on the Psyche project, and far beyond, further encouraging people from around the world to create their own art inspired by the mission and the asteroid. This joy and connectivity is palpable.

We want to remind the world that it takes all of society to explore space. Not just engineers, and not just scientists, but space is for everyone in every discipline. It's for graphic designers, and artists, and people who do theater. It's for people who keep the accounts and do schedules. It's for every person who is interested in being a part of it. And so with Psyche Inspired we are bringing onto the mission team undergraduate creative artists from all genres and also from all majors.

In this second year we welcomed 15 undergraduate artists, each with a different creative genre (though there was great breadth of talent and few stuck to just one medium), from 9 colleges and universities. About half our Psyche Inspired students are STEM majors, and the other half largely arts majors. We love this diversity. And we love the art that has resulted!

This program has already touched the public and the mission in so many ways, more than we anticipated. It's bringing us all together and sharing the inspiration of our challenge and our plan, even more than we thought it could. And so I write this with the greatest gratitude for everyone in our Psyche Inspired program: with deepest thanks, I salute the accomplishments of your year!

I hope these works of art give you the joy that they give the Psyche team.



**Linda T. Elkins-Tanton**

Principal Investigator, NASA Psyche Mission



# A Note from Brooke

June 12, 2019  
Scottsdale, Arizona

All space exploration requires pushing boundaries. The Psyche Inspired program aims to do the same, engaging undergraduate interns from a wide range of majors in using their creativity to communicate the mission with the public. Over the year they create at least four original works, encouraging people to find elements of themselves within the mission and enhancing public engagement in space exploration.

Although the 2018-2019 Psyche Inspired interns, known as the “Iron Class,” were the second class to participate in the program, they were the first to be selected nationally. The Iron Class application was open to any full-time undergraduate student in the U.S. and its territories, enabling interns from across the nation to connect and collaborate artistically. Using technologies such as video conferencing and messaging platforms, Psyche Inspired interns were able to share ideas, obtain feedback, provide updates, and collaborate with peers with a range of backgrounds, creative styles, and majors. They created a virtual community across distance and time.

In Psyche Inspired, participants are encouraged to collaborate with each other and to experiment with different media and genres. The interns are provided with artistic freedom as long as the works are accurate and do not introduce or promote scientific misconceptions. Psyche mission staff, scientists, and engineers provide feedback along the way, and the Psyche team’s enthusiasm for and involvement in Psyche Inspired enhanced the students’ feelings of belonging to the team and excitement for the mission.

Over the course of the year, the fifteen Psyche Inspired Iron Class interns created 65 artworks communicating different facets of the Psyche mission. Here we present these works with the goal of inviting the reader along on Psyche’s journey—from the formation of the asteroid to the anticipated arrival of the spacecraft at Psyche in 2026.

The Psyche mission endeavors to reach as many people as possible. Psyche Inspired interns are a key conduit, creating rich, meaningful pieces with which people inside and beyond the mission can identify.

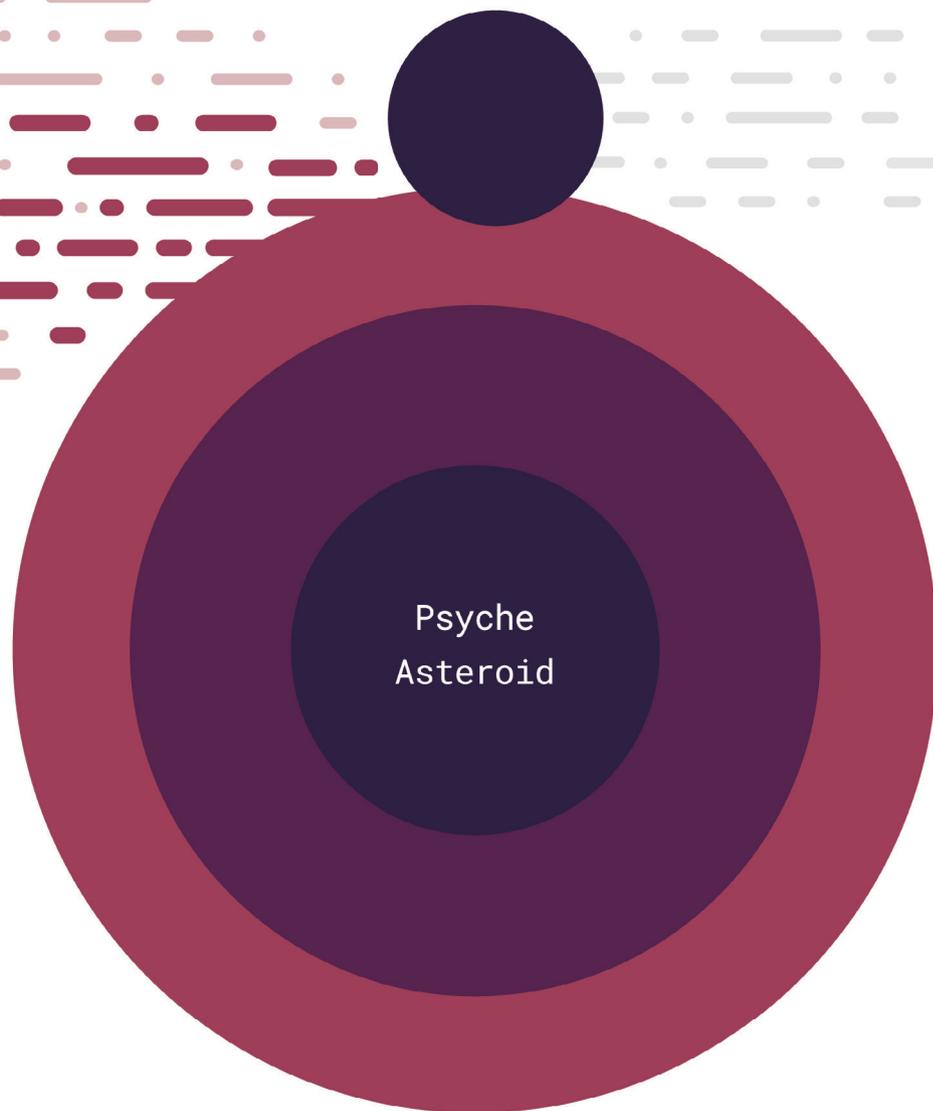
## **Brooke Owen**

Student Manager, Psyche Inspired and Psyche Student Collaborations

# Formation

Scientists think Psyche is the exposed metal core of an early planet, one of the building blocks of the terrestrial (rocky) planets in our solar system: Mercury, Venus, Earth and Mars.

Psyche is most likely a survivor of multiple violent hit-and-run collisions, common when the solar system was forming. The asteroid Psyche may be able to show us how Earth's core and the cores of the other terrestrial planets came to be.





## Psyche Origins

Sophie Hullinger

*video*



This piece depicts the hypothesis that (16) Psyche is the metallic core of a protoplanet, and by learning about Psyche we can learn more about Earth's core. It is thought that the protoplanet collided with other material in the early solar system over a long period of time, removing all the rocky layers and exposing the core underneath. For my project, a metallic sheet was cut and bent in the shape of Psyche and suspended from the ceiling. Projected onto the metal Psyche shape is a golden representation of the theoretical protoplanet Psyche and an animation of the process for how they think it became the way it is today. The light projected onto Psyche spins around the room, acting as a beacon to tempt us to explore the asteroid.



## **Journey to the Beginning of Psyche**

Anna Vanderberg

*stop-motion animation*

For this animation, I experimented with painting by hand. This means that each frame is an individual painting, each painted one over the next on a single sheet of glass and photographed. Since this piece was more experimental for me, I decided to also make my sound effects more experimental. Rather than timing my animation to music or logical sound effects, I created a soundscape made entirely of the sounds of paintbrushes swishing, mimicking the actions I performed when painting. We begin zoomed outside of our galaxy, and rush through the solar system, past Mars, and into the asteroid belt just in time to see an object strike Psyche, stripping it of its rocky mantle. Psyche is alone and unobserved for a time, until the Psyche spacecraft enters the scene.





## **Sun Pendant**

Stacy Woodruff

*dendritic opal, brass wire*

I chose to start with the sun because it is at the center of what we are doing on the Psyche mission. We orbit the sun; Psyche orbits the sun; and the sun will power the spacecraft. Without it, we wouldn't be doing any of this. I created this pendant out of orange dendritic opal and brass wire.



## Psyche Smash

Ben Conway

*sculpture made of metal, polymer clay, and a wooden shadow box*



For this project, I created a model of the Psyche asteroid by wrapping a steel ball in polymer clay. Then I simulated the impact that removed the asteroid's outer layers by dropping a rock on it. Finally, I arranged the impact fragments and another model in a box to show what it looked like before and after the impact.



## **Elemental**

Olivia Ferrel  
*embroidery*

Elemental depicts an open skull exposing the chemical symbol for iron (Fe) above it. The skull represents the core of who we are as scientists and artists. Meanwhile, the use of iron serves as a reminder of what makes Psyche so special, seeing as it is thought to be a metal world rather than one made of rock.



## String Theory

Angela Wroblewski  
*string art*

This piece is the Psyche asteroid pictured in string. It is another way for one to depict Psyche. After finishing the piece, I noticed that my piece, a jumbled mess of string, is similar to the jumbled mess of metal that makes up the Psyche asteroid.

# Existence

Asteroids themselves are thought to be leftover material from the formation of the universe. Therefore, they offer unique opportunities to study our universe's formation.

(16) Psyche is unique because scientists believe that this asteroid may be the core of a protoplanet that was bombarded, stripping the mantle away leaving an exposed planetary core. As such, Psyche is believed to be made almost entirely out of nickel and iron. However, its surface appears to have some small areas that are rocky.

Psyche lies in the main asteroid belt between Mars and Jupiter, orbiting the Sun at an average distance of 3 astronomical units (AU) (about 280 million miles or 450 million kilometers).



## **Levitating Psyche**

Brenton Chase

*sculpture*

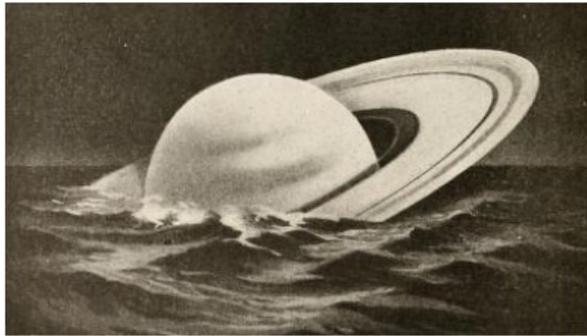
I used to have a levitating globe, and I remembered how much fun I had playing with it, so I decided to make the same thing featuring (16) Psyche.

# Finding Psyche

By Addison Rizer

Vulnerability has always been something I avoid. As a result, I write narratives about loneliness and disenchantment and isolation. The things I'm feeling but don't know how to express. I don't know, looking back, that any character I've ever written hasn't had some moment of removal from the world around them. I love isolation to engagement stories. I think they speak to how I experience my own humanness. How I want the world to work. How we cycle through these states of being: isolation to engagement to isolation all over again.

Because of this, I often find myself writing about things that are not human. I use them to process my own emotions. I am particularly drawn to astronomical things. Planets and supernovas and moons. It feels, to me, that anything I've ever felt I can find in the stars.



After my grandfather died, my teacher told me that Saturn would float if there was a body of water large enough to hold it. Part of a lesson we were learning, probably. But, I remember how that idea was so baffling to me. It seemed so heavy, solid. But, still, it would float.

## Blog Post

Addison Rizer

*creative nonfiction*



In learning about Psyche, I've learned about vulnerability. I found inspiration not only in Psyche's story of collision and loss, but also in the community of hope we've built around seeing Psyche for the first time. This creative writing piece explores that vulnerability and how we can find ourselves in things that live in our sky.



## Asteroid Tunes

Ryan Powell

graphics by Jessika Raisor

music, programming, and Xcode



I created this app with the intention of it being educational, musical, and fun. I took the Solar System and scaled it down 31,536,000 times, turning the years of the orbital periods into seconds. Then I correlated the distance from the Sun to pitches on an 88-key keyboard. I chose these five asteroids because they each had very defining characteristics—each the largest of their kind. Essentially, the pitches are determined by the asteroids' distances from the Sun, and the orbital periods become the rhythms that the pitches are played. It was a lot of fun to make, and I brought back some of my experience in Xcode, writing in Swift! Credit to fellow intern Jessika Raisor for the adorable asteroid artwork!



## **Psyche's Silhouette**

Olivia Ferrel  
*embroidery*

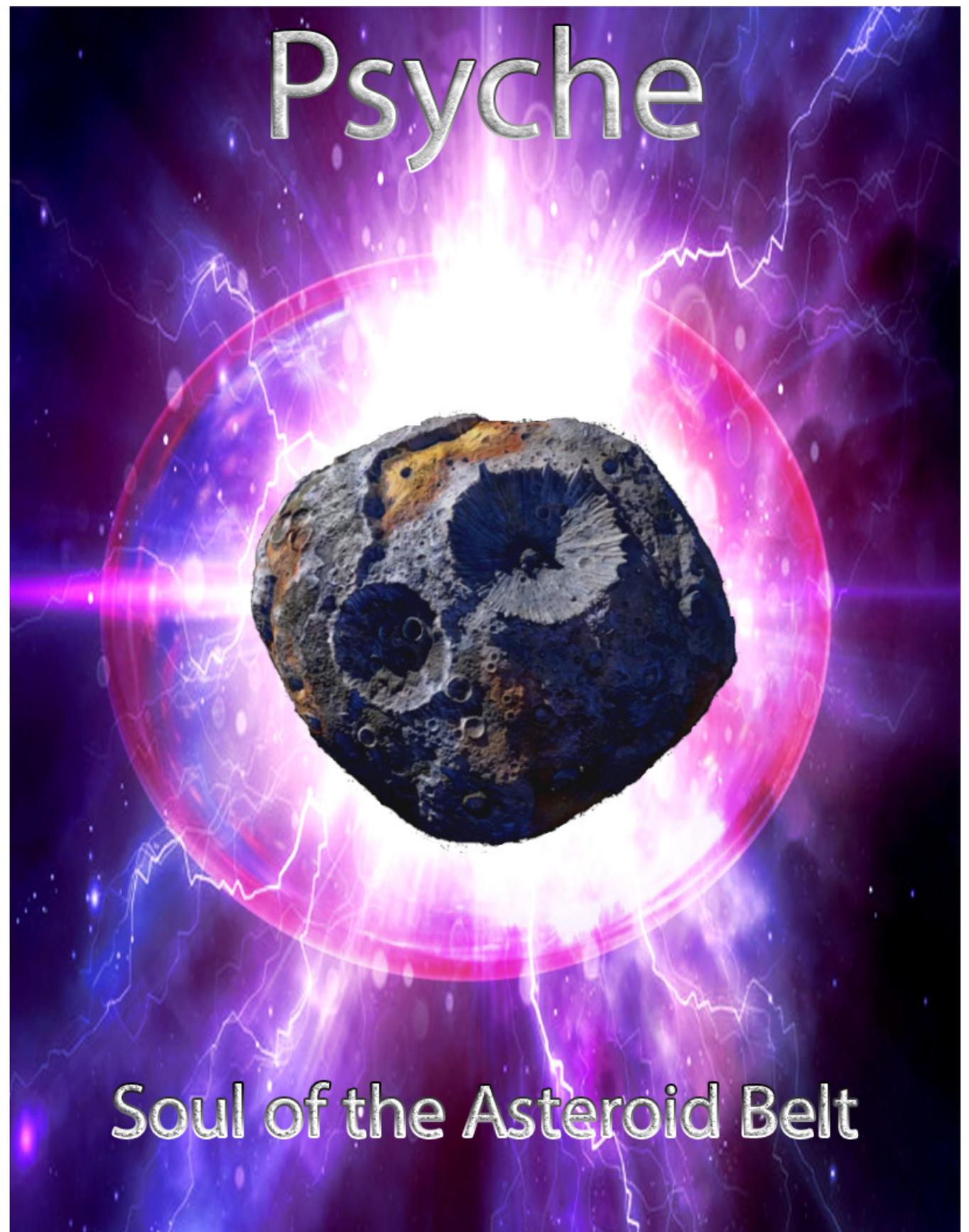
At the center of multicolored rays is a silhouette of the Psyche asteroid, which is outlined in black beading. This represents the unknowns of Psyche and its potential, the wonder and hope surrounding the mission, and all the questions we hope to have answered by further research and exploration.

## **The Soul of the Asteroid Belt**

Brenton Chase

*digital art*

Displayed here is the Psyche asteroid exuding a blue and purple electric aura, alluding to the possibility of it being the core of a planet. When I think of the core of our planet, I think of the magnetic field it generates, and when I picture magnetic attraction in my mind, it is represented by electricity. The title, "Soul of the Asteroid Belt", alludes to the fact it was named after the Greek goddess of the soul, which is written in metallic letters to represent the metallic make-up of the asteroid.





## VR Psyche

Jessika Raisor

*VR animation*



I created this VR animation, commonly referred to as a “quillustration”, in Quill. This is one of the newest artistic mediums out in the world and I have started to experiment with it more and more. Because this medium allows people to visit new worlds, what better way to show off the metal world of Psyche? It seemed to be the perfect way to introduce (16) Psyche to the public, and because of the freedom and possibilities of VR, I was able to create the possible interior of Psyche as well through my own artistic interpretation.

Dear Psyche,

I've had dreams so often of being lost I wake up and believe it. In them, I can't find anything familiar. My dresser drawers rearrange themselves. My favorite jeans are missing, somehow, despite my certainty at putting them exactly in their always place. My face is not my own. My hands are stranger's hands.

I wake up believing it. My hands are not my hands all day. They are someone else's, pretending to be me. They touch and feel and none of it registers. Once, I tapped my fingertips to a pan sizzling on the stove when my mother wasn't looking. I winced in practice. It never hurt. The dreams bleed through.

## Dear Psyche

Addison Rizer

*writing*

I think we function in orbits. We circle things all our lives. That's what these letters to Psyche are about: the way we circle, cycle, to and from the same things. Lily, for example, goes through three phases of an orbit with each set of three letters. The first is isolation. The second is hesitation. The third is association. Engagement. Burrowing into the world instead of, as in the first sections, away from it. Each set of three letters has a repeated line. In the first, it appears early on. In the second, about halfway through. The third features it at the end. These lines change as Lily does. She is dreaming of being lost, then found, and then not dreaming anything at all. A sign of healing, perhaps. It can be easier to talk to things like Psyche instead of other people. Times of struggling. But, as Lily demonstrates, it can't last forever. Find comfort in things like Psyche, sure. How they parallel your hurt. Your life. Your isolation. But, also, let people in, too. Psyche might have been through a lot, but it can't talk back. Isolation to hesitation to engagement. You need all three to complete the circle.



# Discovery

Psyche was found roughly 51 years after the discovery of the first asteroid. On March 17th, 1852, Italian astronomer Annibale de Gasparis discovered Psyche, making it the sixteenth asteroid to be discovered.

Recently, scientists have combined radar and optical observations to generate a 3D model of Psyche that shows evidence for two crater-like depressions. However, no one has seen the Psyche asteroid yet, so we will not know what it actually looks like until the spacecraft arrives.



(1) Ceres sunrise cornstalks swell in dampened soil	(5) Astraea a stream of stars through the meadow— reflection	(9) Metis pebbles on the shore form a single narrow path beneath seaward soles	(13) Egeria there is a clear spring where she lives in the city comfortably alone
(2) Pallas lovers of the night do not mourn the loss morning birds unheard	(6) Hebe he is still out there that blonde boy with muddy cheeks digging up earthworms	(10) Hygeia ice cubes in a glass amber bourbon by the sea old friends together	(14) Irene babbling brook clashing and clamoring against rocks flows peacefully still
(3) Juno holding up the sky as long as they can recall the oldest tree in town	(7) Iris green leaves turn yellow and orange then red as they fall	(11) Parthenope cold wind gives her a voice not heard but felt	(15) Eunomia shadows of the cypress drift across the sidewalk telling stories of the sky
(4) Vesta trees from the hillside crackling by firelight rest upon the hearth	(8) Flora cloudy vase on the windowsill holding flowers to the sun	(12) Victoria an open courtyard where children laugh together grandmother's empire	(16) Psyche silent droplets on the glass bokeh of distant lights a kiss

## Haiku for 16 Asteroids

Dagan Sassarini

*poetry*



The present moment is so powerful that it lends us an opportunity to redefine both our future and our past. Short moments of mindfulness allow us to make the greatest connections, to see things for what they are, and to be innovative in our solutions to problems faced both as individuals in our daily lives and together as humanity. Writing haiku is a practice that enables me to remain mindful during stressful times. Using three levels of functionality outlined by Professor Gail Sher, I have attempted to write sixteen haiku, one for each of the first sixteen asteroids discovered, with Psyche being the last. Each haiku draws upon the history of each asteroid and emphasizes the inherent connection of scientific discoveries with our natural environment.



## **Psyche: Discovery to Expedition**

Sophie Hullinger  
*video*

This stop-motion animation is an artistic representation of how Italian astronomer Annibale de Gasparis discovered (16) Psyche in 1852, and it draws a comparison to the launch of the Psyche spacecraft in 2022, led by Lindy Elkins-Tanton. This piece shows how big of a deal it is that this mission is happening and how far space discovery has come in such a relatively short amount of time.





## **At Home or Far Away**

Dagan Sassarini  
*photography*

These photographs represent the importance of discovery, even in our own backyards. I hope that they are satisfying to look at. More importantly, I hope they spark some curiosity within you. In the most ideal situation, the viewer will find motivation to go on walks in their own neighborhood, to see new patterns in our environment, and to explore the universe close to home as intently as humanity continues to explore our final frontier.

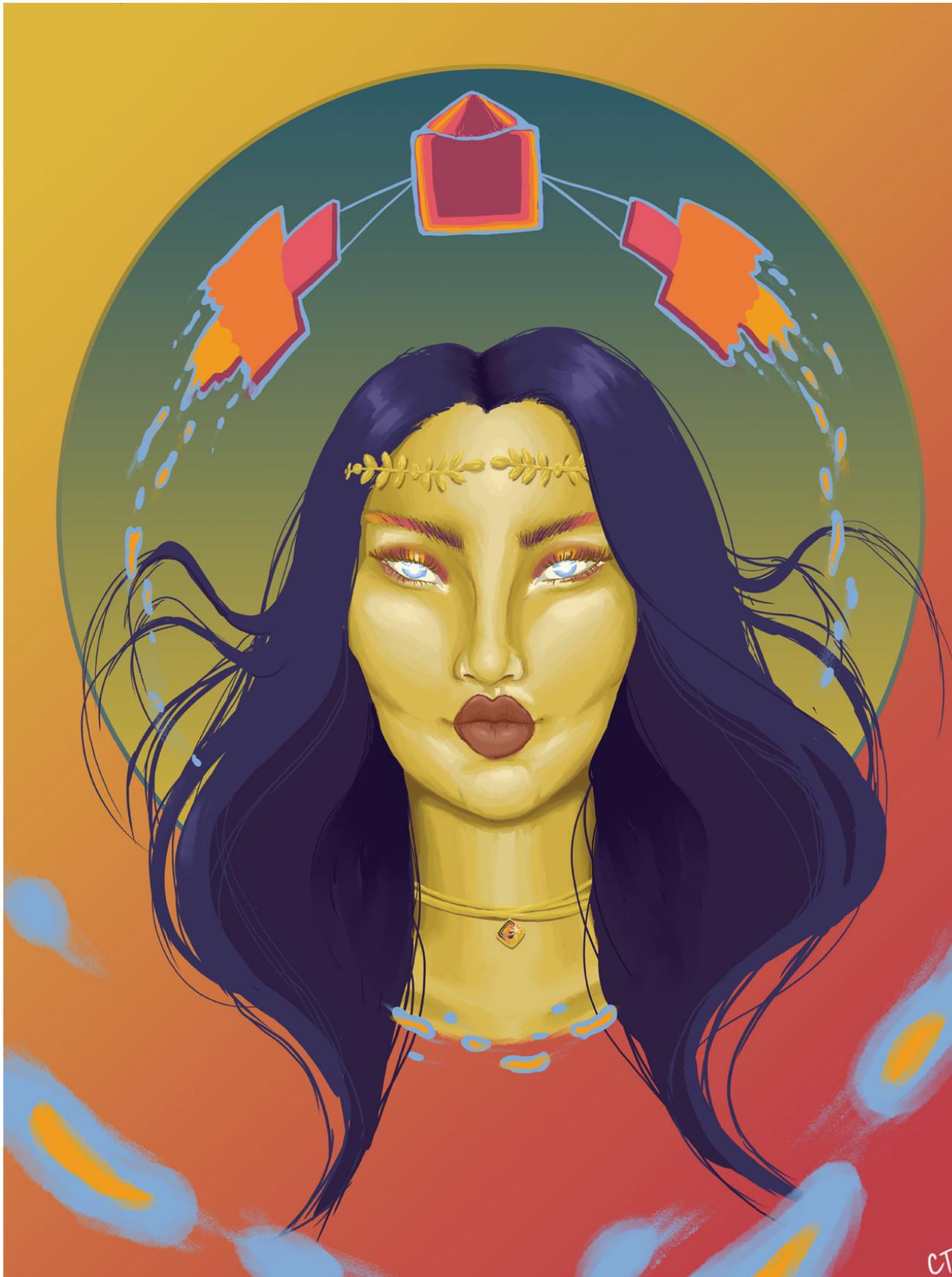


# Nomenclature

The early asteroids discovered, including Psyche, were named after gods and goddesses from ancient Greek mythology. Italian astronomer Annibale de Gasparis named Psyche after the goddess of the soul. The goddess is often symbolized by a butterfly.

Because Psyche was the 16th asteroid to be discovered, it is sometimes referred to as (16) Psyche.





## **Goddess Psyche**

Carissa Tinoco

*digital art*

This piece is my artistic rendering of the Greek goddess of the soul, Psyche, after whom the asteroid being investigated was named. Alluding to the Greek mythology aspect of the mission, I included a gold leaf headband and a gold choker necklace as symbolism for the jewelry that the ancient Greeks sometimes wore. Flying above the woman's head is the Psyche spacecraft that will be launched in 2022. It is surrounded by a blue glow that matches the color of the woman's pupil-less eyes (pupil-less since the eyes are the window to the soul!). The spacecraft appears to be melting and is bent in a way to suggest dynamism—this movement, in addition to the woman's suspended hair, represents the progress we are making toward the mission, as well as the actual action of being launched. Most of the colors I used were from the Psyche mission's official color palette.



## **Psykhe: The Goddess and Asteroid**

Rachel McNeil

*painting/acrylic and marker*

This painting depicts the goddess, Psykhe, for whom the asteroid was named. In this piece, there are hidden images and text that relate to the discovery story of the asteroid. If you look closely at tendrils of hair, accessories, and wings, you'll find clues that relate to numerous aspects of the Psyche asteroid, such as the scientist who discovered it, what it is believed to be made out of, etc.

# Cupid and Psyche: A Very Short Story

by Dagan Sassarini

This is a time and place yet untouched. The storm fills the morning sky and drop by drop beats down upon the city. She finds the upward queues of lights obtrusive as they cut through a sky on the constant edge of daylight. Weightless shadows no longer tell the truth of time, no longer drift across the sidewalks, no longer hide the city's secrets from a familiar sun.

Numberless passengers board and depart the carriage at regular intervals, all but a few on schedules predictable as the metro system and weekly weather report.

*"This is the divine illusion,"* she surmises in a soft breath. *"The passage of time appears as a mass breaking in the wind and sinking beneath the waves. We watch it fall in a single direction as our movements and their residue form a single, narrow path beneath our soles."*

This is her treatise; she documents as the metropolis around her inhales and exhales. Passengers onboard carry oxygen throughout the circulatory system of a respiring city. Water streams down the window against a turbulent red sky.

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The carriage hums gently as it glides above the tracks toward an approaching interchange. He stands quietly behind a sliding yellow gate, craning his head from left to right. He is collecting images, processing light.

He imagines, *"These are memories without a history, those not yet lost."*

Then time moves forward as a river of immigrants coalesce up a stairwell to the station platform. Screens on support columns flash green with an announcement. Light floods between the electric blue tracks then disappears with a reverberating hum. He steps over a reflection of platform lights and into the carriage.

Fully present in their seats, they spot glimpses of time passing before their eyes. Images shift as buildings rise up and stain the landscape with an indelible veneer. The two of them are reminded that – throughout time – the world presses on without them. Imbibing changes of the landscape, they nod at beauty after beauty willingly forsaken in pursuit of another. A maelstrom of red clouds engulfs the carriage like a violent reconciliation. They listen to the silence, a beating silence; hear the constant hum of empty space.

In the fullness of time, they break their silence with a kiss.

## Cupid and Psyche: A Very Short Story

Dagan Sassarini  
*writing*



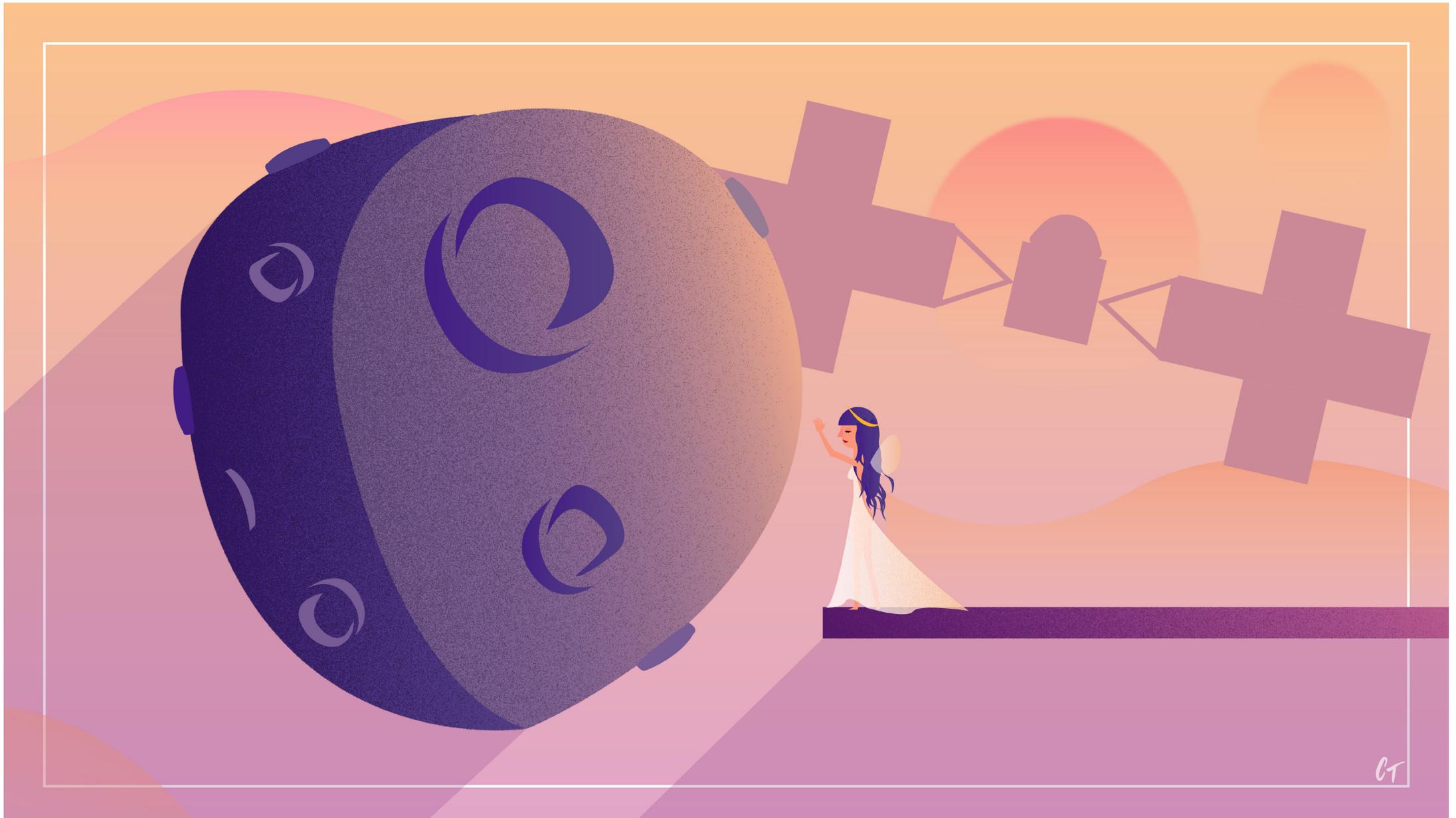
This is a story set in a time and place yet untouched – but still glimpsed by us all, whether in our future or past.



## **Spirit**

Brenton Chase  
*digital art*

This piece depicts the Greek goddess Psyche, after whom (16) Psyche was named, holding the asteroid.



## Human Psyche

Carissa Tinoco

*digital art*

This ethereal piece illustrates a woman coming into contact with the Psyche asteroid. The woman represents the goddess of the soul, after whom the asteroid was named. She also represents the people that have come together to take part in the Psyche mission. While she is symbolically reaching out to touch the asteroid, we are reaching out into space to investigate this asteroid. This was a fun piece to make as I got to play around with color theory.

# Possibilities

Deep within rocky, terrestrial planets, scientists infer the presence of metallic cores, but these lie unreachable below planets' rocky mantles and crusts. Because scientists cannot see or measure Earth's core directly, Psyche offers a unique window into the violent history of collisions and accretion that created terrestrial planets.

Unlike most other asteroids that are rocky or icy bodies, scientists think the M-type (metallic) asteroid (16) Psyche is comprised mostly of metallic iron and nickel similar to Earth's core. Scientists wonder whether Psyche could be an exposed core of an early planet, maybe as large as Mars, that lost its rocky outer layers due to a number of violent collisions billions of years ago.

Credit: <https://solarsystem.nasa.gov/asteroids-comets-and-meteors/asteroids/16-psyche/in-depth/>



## What Could have Been

Angela Wroblewski

*acrylic on canvas*

I wanted to highlight the idea that Psyche could have been a core of a planet. This is imagining what could have been and all the life that could have occurred. I think this is a major part of astronomy, imagining all the possibilities in the universe. On one side I made a colorful, crowded planet slice to convey a feeling of liveliness. There are trees, mountains, and other vegetation painted in ways they may not be seen on Earth. For example, there is a red mountain range with a dark whirlpool on one side of the planet. There are also forests that range from the normal green and orange we see on Earth to alien purple and blue trees. This slice fades into space. On the other is Psyche as it is now, empty and without life. There is emptiness save for a few stars off in the distance.

**THE ONE IN WHICH THE EARTH AND PSYCHE  
PLAY GO-FISH**

[There is a table. A stack of cards in the center. EARTH sits at one side. PSYCHE sits at the other. They each have a hand of cards in front of them.]

EARTH

Do you have any iron?

(PSYCHE hands a card over.)

PSYCHE

Do you have any nickel?

(EARTH hands a card over.)

EARTH

Do you have any nickel?

(PSYCHE hands a card over.)

PSYCHE

Do you have any iron?

(EARTH hands a card over.)

EARTH (sighing)

This is useless. We have the same cards.

PSYCHE

Same core.

EARTH

Maybe. You look different than me, though.

PSYCHE

There was an accident. I am a survivor.

EARTH

Ah! You're hope.

## Pages from Psyche: Conversations

Addison Rizer

*play*



“Psyche: Conversations” is a set of one-act plays in which we explore Psyche’s capacity to inspire.



# *An Asteroid Named Psyche*

Written by Ryan G. Powell



One day so long ago, was a planet that began to grow,  
More and more, day by day,  
Between Jupiter and Mars, she would lie out there among the stars,  
Knowing she would make it far, she sang,

Someday I'm going to be, a planet that's my destiny,  
I can't wait, wait to see, who I'll be,

Following her orbit still, she would dance around, as she grew,  
Filled with joy, through and through,  
Then one awful tragic day, some space debris flew in her way,  
Struck her down, to just her metal core...

What was I going to be, what was my destiny,  
Now I won't, ever see, what could be,

She would mope all day and night, wishing that she'd found a way,  
To steer free, of the debris,  
Then year 2026, a satellite from Earth appeared,  
That traveled far, to tell her this,

You're special, unique as can be, without you we will never see,  
What we are, we've come this far, so what will it be,

That's when she had realized, she was needed now for Earth to thrive,  
So she thought, long and hard,  
Turning back to her new friend, said she'd gladly help and lend a hand,  
For she had found her purpose once again, she sang,

I know what I need to be, it's clear now, my destiny,  
For my remains, Earth's are the same, and soon they'll see,

Ahh—,

Ahh—,

Where they'll go, what they'll see,

I'll go down, in history,

What I am, and what I'll be,

Is Psyche

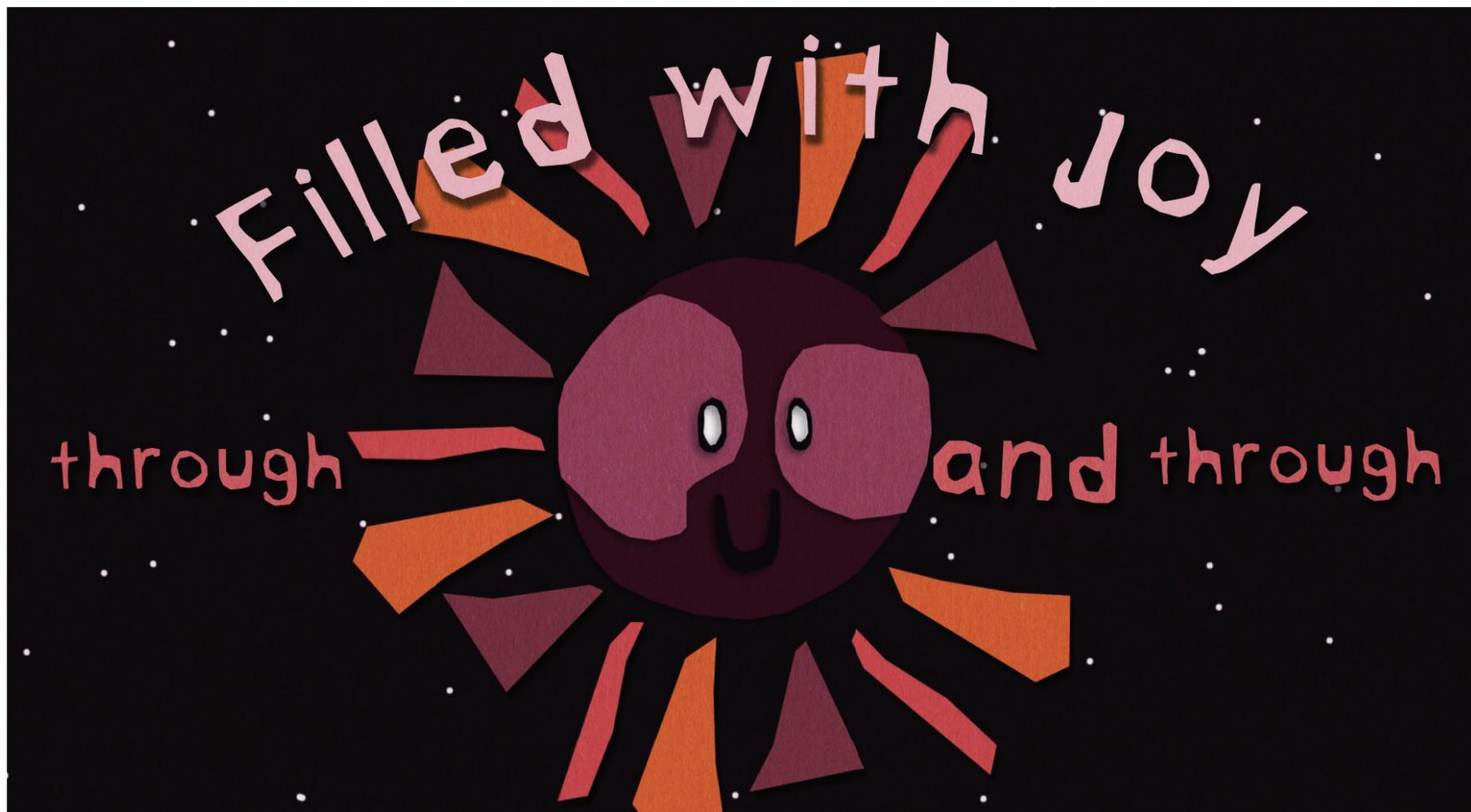
## **An Asteroid Named Psyche**

Ryan Powell

*music and lyrics*



“An Asteroid Named Psyche” is a children’s song that I wrote, which follows the asteroid’s story. I wanted the song to be both educational and exciting for kids, so I brought the Psyche asteroid to life and created a story that could have a nice little moral while also staying on target scientifically. I aimed for the melody to be catchy, a characteristic that was aided by repetition and structure. The vocals and guitar were recorded by my friend Amelia Murray, a New York City based singer-songwriter, who did an amazing job of giving the tune a character. Along with the recording, I created a lead sheet and a lyric sheet, both of which will be shared with various schools for any choirs that would be interested in learning the song and learning about the mission.



## **An Asteroid Named Psyche: Video**

Jessika Raisor (animation)

Ryan Powell (music and lyrics)

*animated music video*



I created this animated video after hearing the children's song composed by fellow intern Ryan Powell. The song personifies Psyche, and for me that was a lot of fun to play with in terms of animation. I created the work to look like paper cutout stop motion because it is simple and easy to follow, especially with the text on screen making the video more of a sing-a-long. And because the song tells an imagined story, a simplified and cartoony style ensured that there wasn't any confusion about whether this was an accurate appearance (since we don't know what Psyche looks like yet!). (Vocals and guitar by Amelia Murray)



## Psyche Stacking Dolls

Jessika Raisor  
*clay and acrylic*

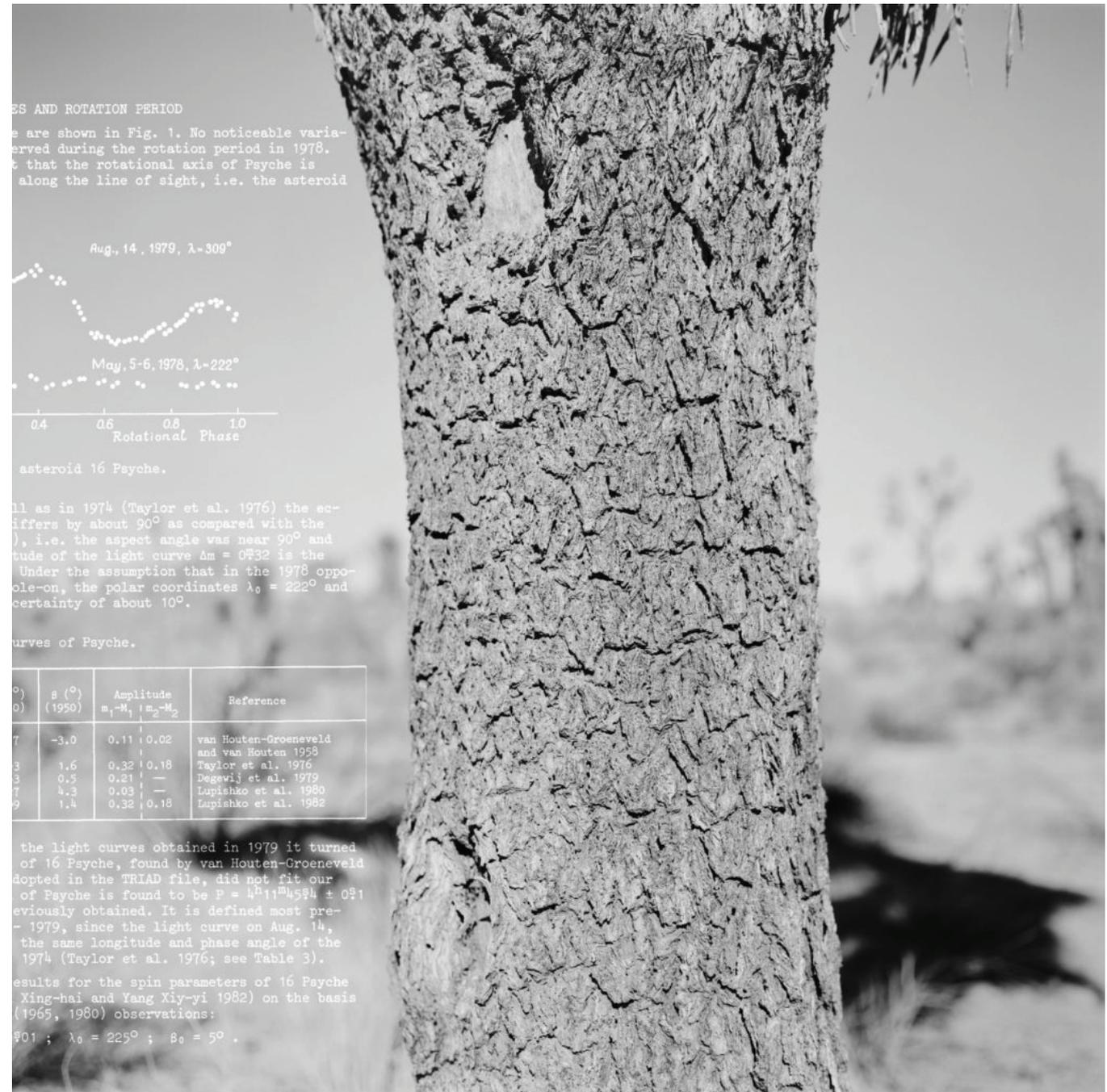
The concept of this project seems so obvious to me now that I can't believe I hadn't thought of it sooner. (16) Psyche is thought to be the core of a planet, and we are visiting it to learn more about it, so what better way to show that than through stacking dolls! The first layer is my imagining of what the planet exterior could have been, the second layer is the asteroid as it is today, and the third layer, a bit more abstract, is a butterfly or the "soul" of Psyche. This symbolism comes from the goddess Psyche herself. Since we don't know for sure what we will find when we get to Psyche, this seemed like the perfect fit. I hope the project can be a fun and approachable outreach tool so people can literally uncover and learn more about Psyche!

# Photosynthesis

Dagan Sassarini  
*photography*



Psyche Inspired serves as a reminder that the arts and sciences are not at odds with one another. It reminds us that the incremental acquisition of understanding through observation can be shared and expressed creatively. These are the fundamental concepts that shaped this project, which began with research about the asteroid's scientific history and about a dozen scientific articles from the second half of the 20th century describing Psyche in terms of photometric analyses. Thus, "Photosynthesis" is collection of photographs and scientific articles combined in an attempt to explore similarities between photography and an earlier period of Psyche research. The Psyche mission and the photographs in this project both serve a purpose of acquiring information that may lead to a better understanding and appreciation of our own planet. Trees, which also contain important information in their cores, are the subject of these photographs. Much like the Psyche mission, light brings them to life.



ES AND ROTATION PERIOD

e are shown in Fig. 1. No noticeable varia-  
erved during the rotation period in 1978.  
t that the rotational axis of Psyche is  
along the line of sight, i.e. the asteroid

Aug. 14, 1979,  $\lambda = 309^\circ$

May, 5-6, 1978,  $\lambda = 222^\circ$

0.4 0.6 0.8 1.0  
Rotational Phase

asteroid 16 Psyche.

11 as in 1974 (Taylor et al. 1976) the ec-  
differs by about  $90^\circ$  as compared with the  
, i.e. the aspect angle was near  $90^\circ$  and  
tude of the light curve  $\Delta m = 0.732$  is the  
Under the assumption that in the 1978 oppo-  
ole-on, the polar coordinates  $\lambda_0 = 222^\circ$  and  
certainty of about  $10^\circ$ .

curves of Psyche.

$\delta$ (1950)	$\delta$ ( $^\circ$ )	Amplitude $m_1 - M_1, m_2 - M_2$	Reference
7	-3.0	0.11   0.02	van Houten-Groeneveld and van Houten 1958
3	1.6	0.32   0.18	Taylor et al. 1976
3	0.5	0.21   —	Degevič et al. 1979
7	4.3	0.03   —	Lupishko et al. 1980
9	1.4	0.32   0.18	Lupishko et al. 1982

the light curves obtained in 1979 it turned  
of 16 Psyche, found by van Houten-Groeneveld  
adopted in the TRIAD file, did not fit our  
of Psyche is found to be  $P = 4^h 11^m 45.94^s \pm 0.91$   
viously obtained. It is defined most pre-  
- 1979, since the light curve on Aug. 14,  
the same longitude and phase angle of the  
1974 (Taylor et al. 1976; see Table 3).

results for the spin parameters of 16 Psyche  
Xing-hai and Yang Xiy-yi 1982) on the basis  
(1965, 1980) observations:  
 $P = 4^h 11^m 45.94^s \pm 0.91$  ;  $\lambda_0 = 225^\circ$  ;  $B_0 = 5^\circ$  .



## Plant Your Seed

Rachel McNeil

*acrylic paint on pre-made pottery*

This piece is interactive and meant to engage with audiences in a way that prompts them to consider the infinite possibilities space exploration holds and how they can participate. This piece combines science, art, nature, and artificiality in a way that pushes the viewer to reconsider the definition of science and the role art plays in discovery. For the interactive component of the piece, I ask viewers to write an idea or hope they have for future space exploration on tiny cards shaped like seeds. Viewers are encouraged to not only write but also read the ideas of others in hopes of spurring inspiration and allowing viewers to interact with each other indirectly. This project not only functions as a piece of art but also a real-time artifact that holds the thoughts of many people with differing backgrounds, levels of education, and perspectives on space.

# Construction

The Psyche spacecraft and solar panels, which will be built by Maxar (formerly SSL), are about the size of a singles tennis court. The body of the spacecraft will be slightly bigger than a Smart Car and about as tall as a regulation basketball hoop.

The spacecraft will include a Gamma Ray and Neutron Spectrometer, a Multispectral Imager, a Magnetometer and an x-band radio telecommunications system. The Psyche mission will also be testing a sophisticated new laser communication technology, called Deep Space Optical Communication. It will encode data in photons to communicate between a probe in deep space and Earth.

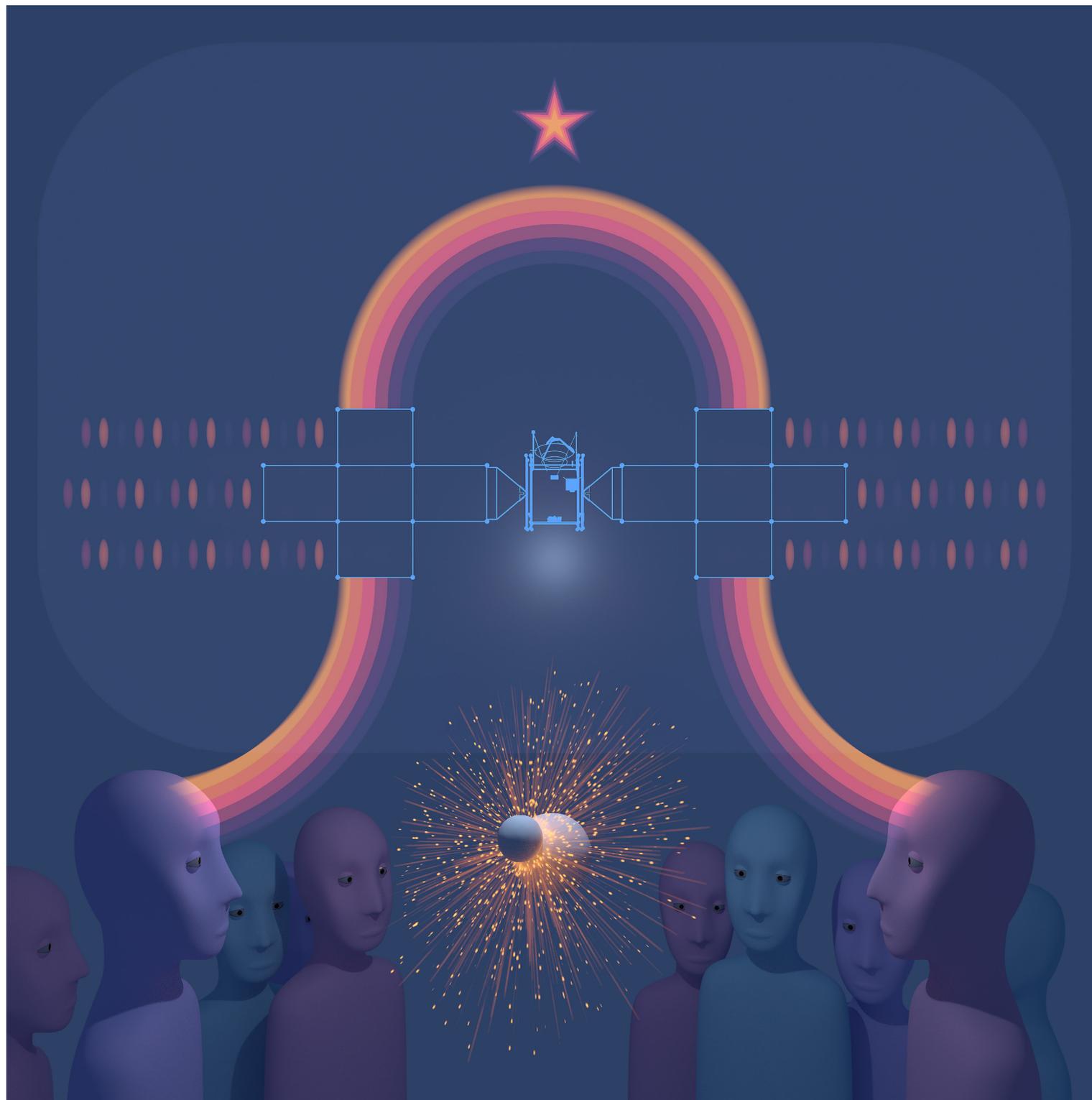


## Late Night

Miguel Montañez  
*animation*



This animated loop shows an engineer staying late to work on the Psyche orbiter. She types on a computer, testing the orbiter and turns to see it respond to her.



## Humanity's Psyche

Ben Conway  
*3D rendering*

The general idea of this piece is to show how all of humanity can create great things together. The rainbows of thoughts flow from people's minds and join together at the Psyche spacecraft. The arc above the spacecraft forms the symbol of the Psyche asteroid. The impact shown between the figures was inspired by the Psyche blog post about mythology—it represents how our experiences affect the things we create. It also represents how we can move beyond destructiveness and instead work together to make new things.

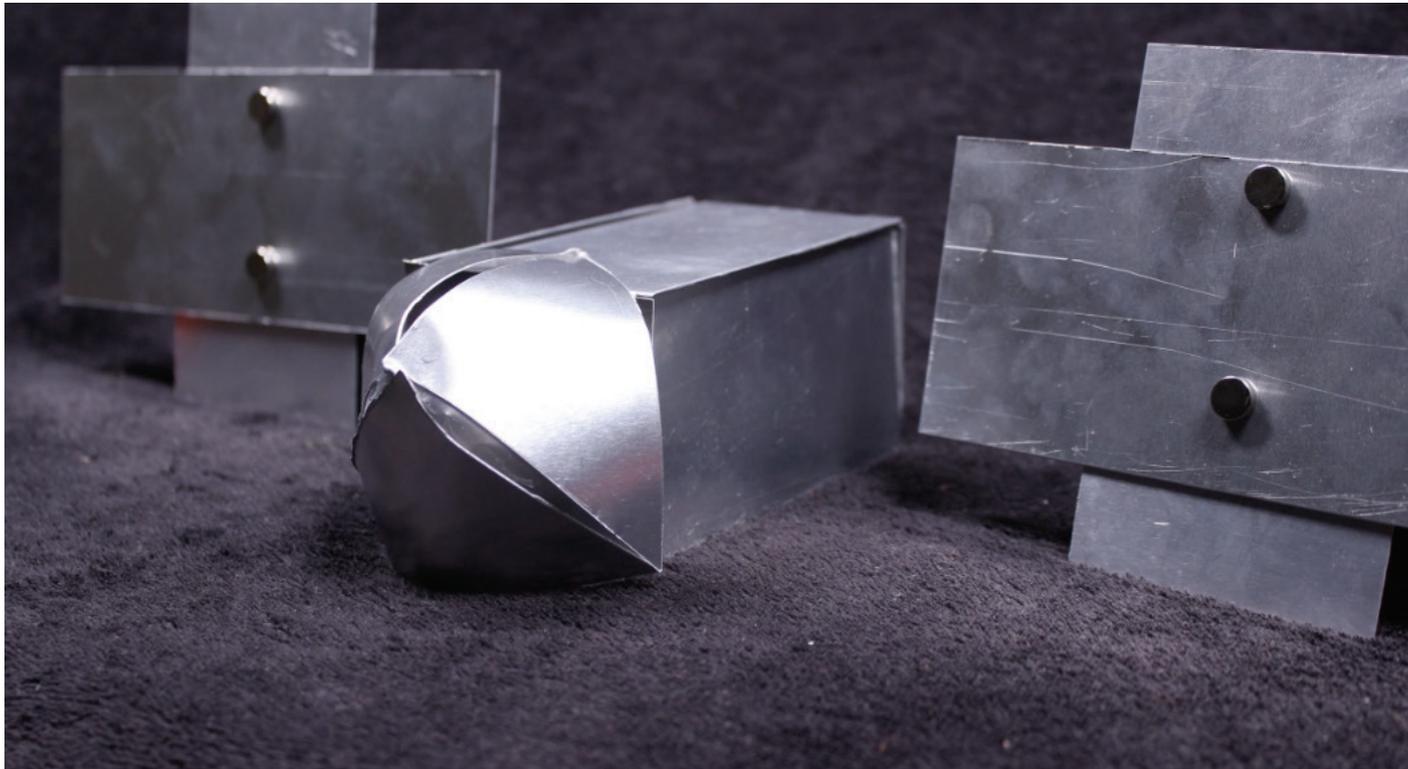


## **Abstract Orbiter Origins**

Sophie Hullinger

*video*

This piece is a stop-motion animation using pieces of aluminum. The pieces reveal, unfold, and combine themselves into the bare bones of the Psyche spacecraft's components. I wanted to make the spacecraft seem so full of life that it creates itself just for the mission.



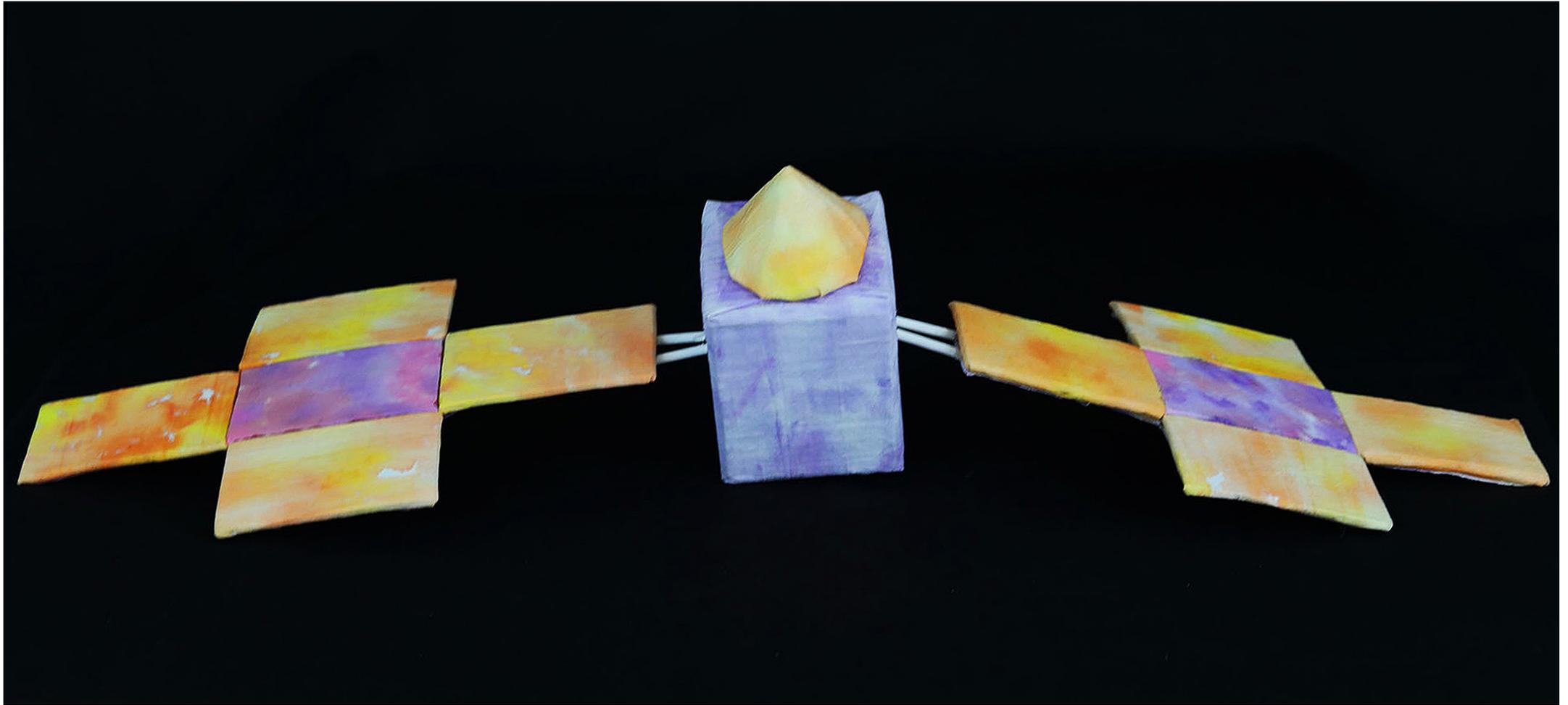


## The Scientists' (Art) Work

Rachel McNeil

*mixed media*

This piece aims to redefine what we traditionally think of as “science” by showcasing the creative and inspirational process scientists go through when conducting research. This work serves as an example of how STEAM (Science, Technology, Engineering, Arts, and Mathematics) is interconnected and can be utilized to convey scientific data in a more engaging and accessible way.

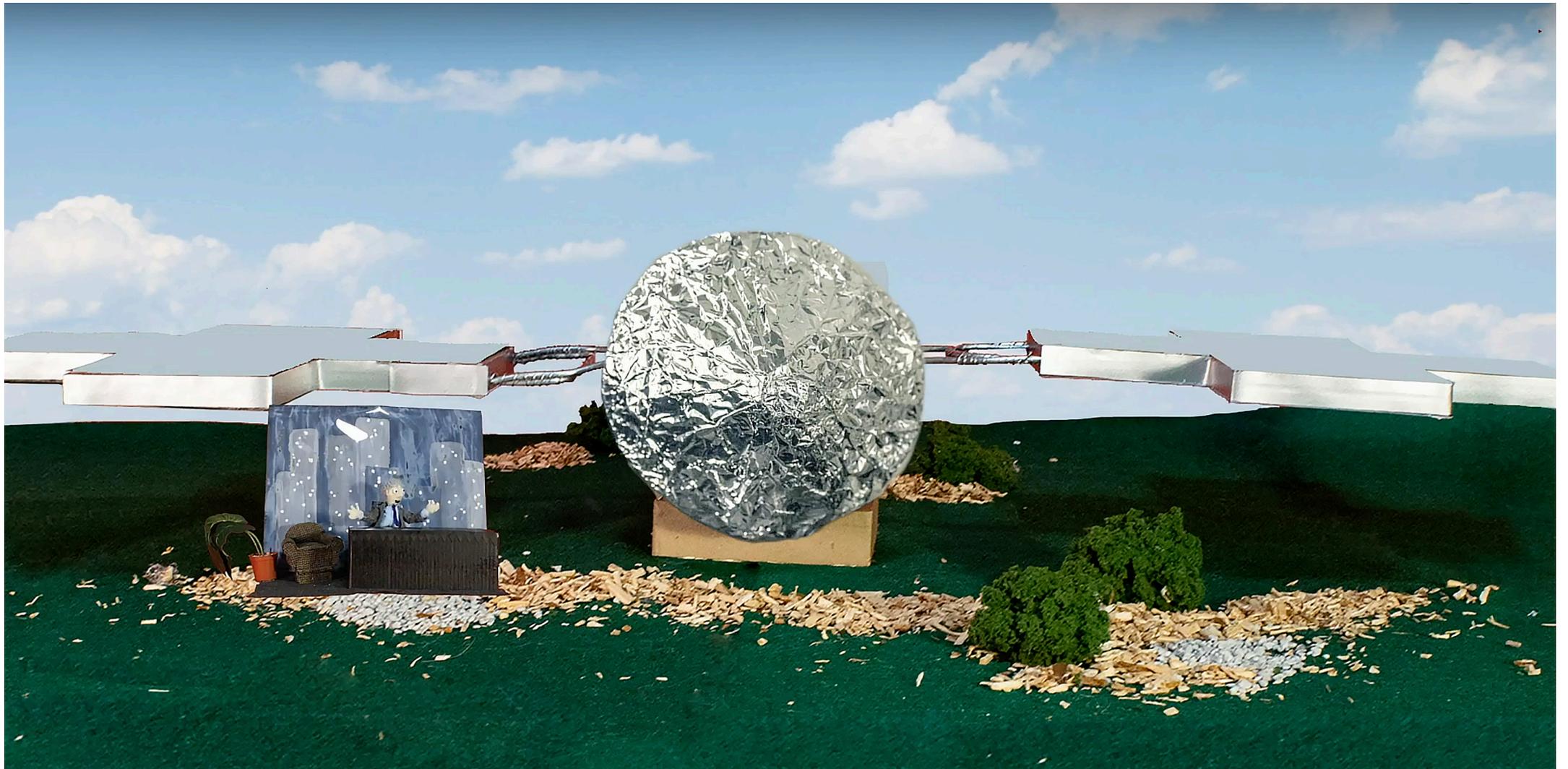


## The Spacecraft

Olivia Ferrel

*cardboard, papier-mâché, flour sack towels, and watercolor*

This small scale Psyche spacecraft features colors from the Psyche badge and embroidery with relevant information about the mission, including Principal Investigator Dr. Lindy Elkins-Tanton's name and the time frame of the mission. I made this piece after remembering the rockets I played with as a kid, and I wanted to create something you could hold in your hand and connect with.



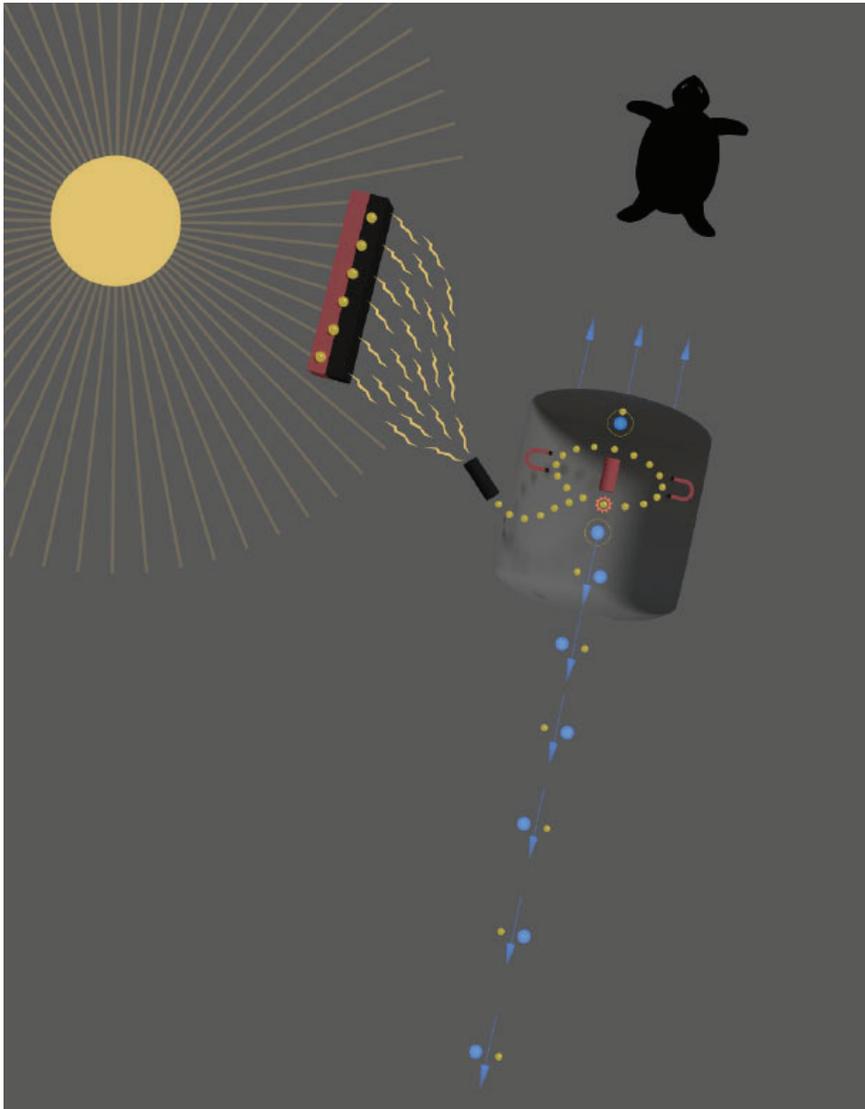
## Interview with Psyche Part 1

Anna Vanderberg

*stop-motion animation*



For this stop-motion animation, my goal was to create a comical-yet-educational situation in which viewers would get to see a character interact with the Psyche spacecraft. I was inspired to use the talk show format because of all the shows I've seen where a bubbly host invites a celebrity guest ostensibly to talk about the guest, but truly to promote their latest work. This format allowed me to get a little silly with inserting a large spacecraft into a role humans typically fill while still sharing real facts about the Psyche spacecraft. It's my hope that this animation will be accessible to children and adults alike, and that anyone who watches this can have a laugh while learning.



## Psyche Tortoise and Hare

Ben Conway

*3D rendering*



This image depicts two different types of spacecraft propulsion through the metaphorical lens of the fable Tortoise and the Hare. In that story, the Hare challenges the Tortoise to a race. Although the Hare's victory seems certain, the Hare becomes tired and stops to rest. Meanwhile, the Tortoise continues at a low speed. This is one way to think of the different types of propulsion systems that a spacecraft can use. Chemical rockets resemble the Hare: while they can produce massive amounts of thrust, they are limited in how much fuel they can carry and run out of fuel more quickly. Meanwhile, a solar-electric propulsion system—a Tortoise—doesn't accelerate quickly, but it can maintain its tiny acceleration for years without running out of fuel.

# Mission

The Psyche mission was chosen by NASA on January 4, 2017 as one of two missions for the agency's Discovery

Program, a series of relatively low-cost missions to solar system targets. The Psyche spacecraft is targeted to launch in mid-2022 and travel to the asteroid using solar-electric (low-thrust) propulsion, arriving in early 2026.





## Psyche Delic

Carissa Tinoco

*digital art*

This poster series takes a modern twist on a groovy style and is a play on words from the Psyche mission. Psyche-delic is both a pun and an adjective to describe the style of art and initial idea I had for this project. Both images consist of concentric shapes radiating from the subject (which is either the Psyche spacecraft or asteroid) and use the colors found in the Psyche mission's color scheme. As a poster that is meant to be seen, I wanted the images to be as eye-catching and scientifically accurate as possible, so I made sure the colors took up a big part of the posters, the text had a stylistic and striking diagonal to them, and that all the details of both the asteroid and the spacecraft were captured through finely painted strokes.



## **Lindy in the Sky with Diamonds**

Chloe Carriere

*acrylic and gouache paint on canvas*

Dr. Lindy Elkins-Tanton is a planetary scientist and professor with expertise in planet formation and evolution. She is the face of the NASA Psyche mission, not only because she is the Principal Investigator, but also because her leadership and perseverance are what will propel this mission to success. The mission is looking to provide a deeper look into space and ultimately give us a better understanding of the Universe. I wanted to give the illusion that Lindy is another constellation in the galaxy. I have also included Lindy's astrological sign of Virgo as a tongue-in-cheek nod to another belief system (astrology), which has been rejected by the scientific community as having no explanatory power for describing the Universe.

# My Journey to Psyche

I was born with muscular dystrophy, a disease that gradually deteriorates my muscle in stages throughout my life. I thought that it would one day limit what I am able to do. This spurred an interest in academic fields, namely science. I decided that if I couldn't rely on my body, I would rely on my mind—just as my grandfather had done while living with the same disability that I have.

My grandfather was both my inspiration and a reminder of what I feared. He was an engineer at Boeing for 45 years, despite not having any use of his hands or legs. Even though he couldn't use tools himself, he was a valuable member of any team he was on. He knew his weaknesses and pushed past them using other strengths to do what he loved, never allowing himself to be limited by his disability.



(My grandfather, Harold Chase, at the launch of Delta 2)

It was incredible to me, his passion for what he did and his ability to do it undaunted by his muscular dystrophy. I wanted to be just like him. He showed me that even with my disability, I could do what I love if I work towards it. At the same time, his success also made me afraid that I wouldn't be able to accomplish what he had, that I wouldn't be able to push past my limitations as he had. I feared that I wouldn't be able to overcome my physical limitations for a career that I loved, so I limited my options to careers that wouldn't be physically strenuous.

## My Journey to Psyche

Brenton Chase

*blog post*

This blog post is an introspective view of my life leading to joining the Psyche Inspired team and what it means to me.





## **Dr. Lindy Elkins-Tanton**

Olivia Ferrel

*embroidery and watercolor*

This hoop depicts the mission's Principal Investigator, Dr. Lindy Elkins-Tanton, on a watercolor interpretation of the Psyche asteroid. I wanted to make this piece as a tribute to Dr. Lindy as thanks for bringing humanity to the mission. Her image is centered on the black and purple background to represent both the heart of the Psyche mission and the potential we have as creators and scientists.

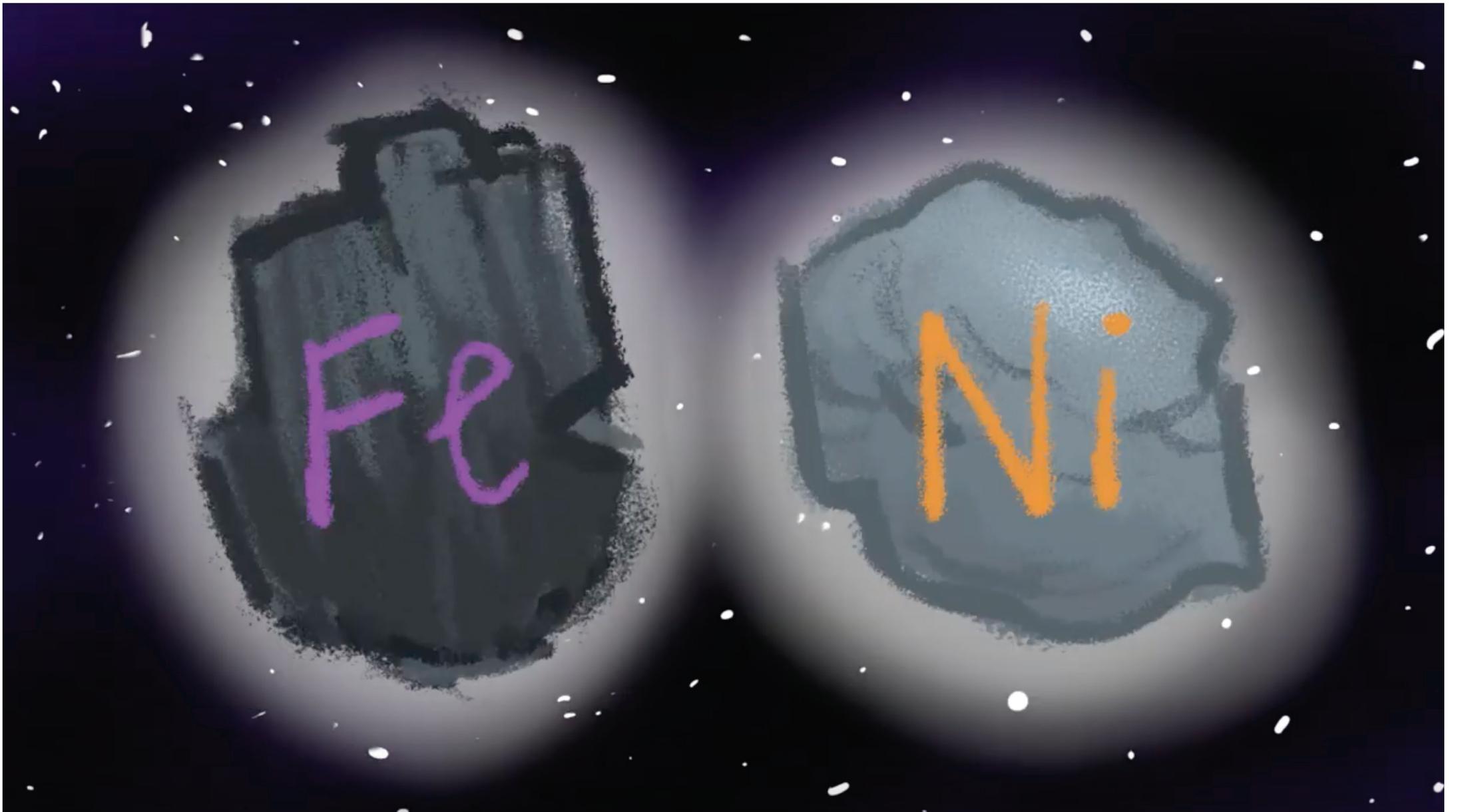


## **The Psyche Shoe**

Angela Wroblewski

*acrylic paint, white canvas shoe*

This is a pair of Psyche-themed shoes. Using acrylic, I painted the asteroid and the Psyche mission badge on one shoe and the spacecraft on the other. I tried to keep the shoe vibrant while using only greys, pink, orange, and purple, as these are the Psyche mission colors. I was heavily inspired by artwork from previous interns.



## Interview with Psyche Part 2

Anna Vanderberg  
*stop-motion animation*



This animation, which is a follow-up to Part 1, features the Psyche spacecraft once more answering questions. I wanted to make sure that these pieces can stand alone without outside explanation, so I made this animation cover more general aspects of the mission than my last one did. I like the idea of being able to approach a spacecraft and level with it about what it's doing, so for this one I skipped the middleman and had imaginary TV viewers ask Psyche their questions. I had a lot of fun with it, and I hope my viewers do, too!

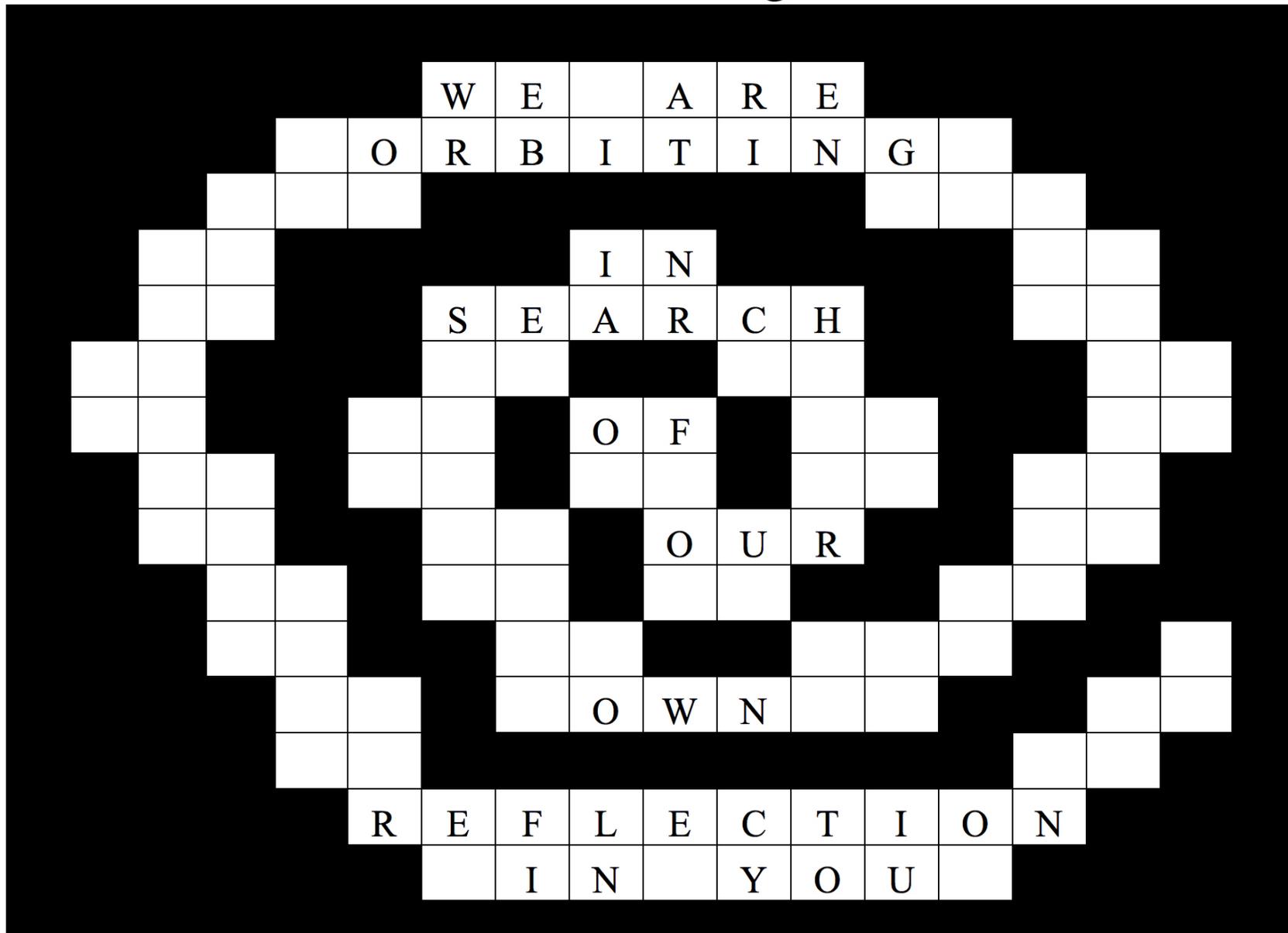


## **Psyche Patch**

Miguel Montañez  
*embroidery*

This hand-embroidered patch for the Psyche mission imitates the style of older NASA mission patches.

# The Orbiting



## Psyche Crosswords

Addison Rizer

*crosswords*

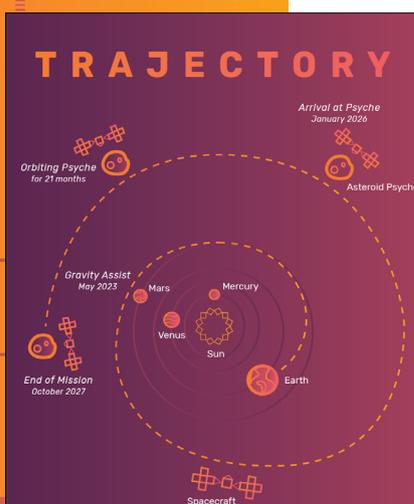


I have always loved the way crossword puzzles interact with language — how they serve as a way to learn new words to use to describe the world around us. I think they're tools that make us think about what words mean and how we use them. In making these crosswords for Psyche, I tried to get in touch with what Psyche might be thinking, yearning for, wanting. In this series, there are poems that I used to try to get in touch with Psyche's language, and also two crosswords that will help others get to know Psyche better. All of the answers can be found on [psyche.asu.edu](http://psyche.asu.edu). Be sure to print them out and try your hand at them if you'd like to get to know Psyche better!

# WHAT IS PSYCHE?

**Psyche is...**

- a NASA space mission led by Arizona State University to visit an asteroid that has never been explored before
- the **16th asteroid ever discovered**, discovered in 1852 by Italian astronomer Annibale de Gasparis
- named after the **Greek goddess of the soul**
- one of **10 largest asteroids** in the asteroid belt orbiting the Sun
- hypothesized to have been a **protoplanet** that had separated internally into a rocky mantle and iron core, but **suffered violent impacts** that stripped away its mantle, leaving only the **metal core**

**START 2015**

## PHASE A

Sep 2015 - Dec 2016  
**Concept Study**

- Mission was selected by NASA
- Large team, led by Principal Investigator Dr. Lindy Elkins-Tanton, then worked on detailed concept study in order for it to be further considered for NASA's Discovery Program (a series of smaller lower-cost space missions that explore the Solar System)

## PHASE B

Jan 2017 - May 2019  
**Preliminary Design of all Instruments & Spacecraft**

- Design spacecraft & instruments that will be used to analyze asteroid
- Undergo project and flight system through Preliminary Design Review

## PHASE C

May 2019 - Jan 2021  
**Final Design and Subsystem Fabrication, Assembly, & Test**

- Build instruments: magnetometer, multispectral imager, gamma ray and neutron spectrometer
- Incorporate radio science with X-Band Radio Telecommunications System and new laser communication technology with Deep Space Optical Communication

## PHASE D

Jan 2021 - Sep 2022  
**Instrument & Spacecraft Assembly & Test**

- Integrate all spacecraft subsystems onto spacecraft bus
- Spacecraft undergoes testing in: vibration, environmental thermal-vacuum, electromagnetic interference and compatibility
- Ensure all aspects of mission are ready and fully operational through Operations Readiness Review
- Ship spacecraft to launch site since it is now fully assembled with solar panels

## Mission Launch

- Re-check spacecraft before integrating it into launch vehicle
- Spacecraft will travel with low-thrust solar-electric propulsion
- Conduct Post-Launch Assessment

## PHASE E

Oct 2022 - Oct 2027

### Mars Gravity Assist

- Spacecraft will enter and leave Mars's gravitational field to increase speed, to set its trajectory to intersect with Psyche's orbit around the Sun, and to save propellant, time, and expense

### Arrival at Psyche

- Before arriving at Psyche, spacecraft will spend 100 days in approach phase and measure asteroid's spin axis and rotation

### Orbiting Psyche

- Orbit asteroid for 21 months
- Perform science operations from 4 different orbits (Orbits A-D), each successively closer to the asteroid
- Instruments send data back to Earth for analysis, during each orbit

## TRAJECTORY

Arrival at Psyche January 2026

Orbiting Psyche for 21 months

Gravity Assist May 2023

End of Mission October 2027

Spacecraft

Asteroid Psyche

Mars, Mercury, Venus, Sun, Earth

## INSTRUMENTS USED

### SPACECRAFT

uses solar-electric, low-thrust propulsion powered through cross-shaped solar panels

### MULTISPECTRAL IMAGER

provides high-resolution images of geologic, compositional, and topographic data using filters to discriminate between Psyche's metallic and silicate constituents

### GAMMA RAY AND NEUTRON SPECTROMETER

detects, measures, and maps Psyche's elemental composition

### MAGNETOMETER

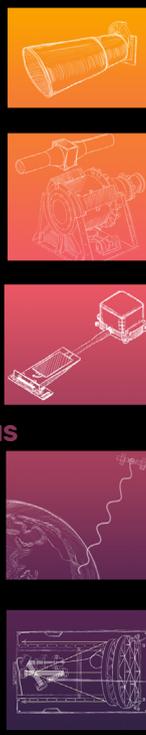
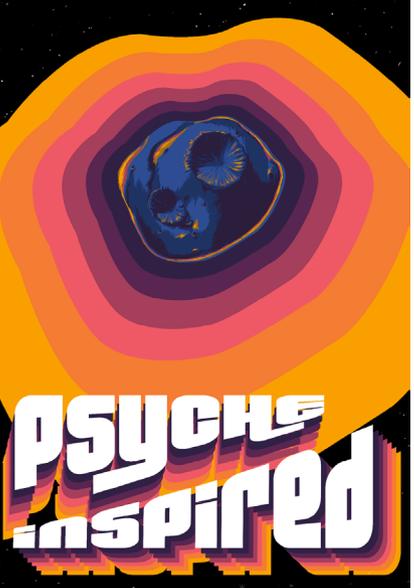
detects and measures the remanent magnetic field of the asteroid using high-sensitivity magnetic field sensors

### X-BAND RADIO TELECOMMUNICATIONS SYSTEM

measures Psyche's gravity field to high precision, and provides information on Psyche's interior structure when paired with topography from onboard imagery

### DEEP SPACE OPTICAL COMMUNICATION

encodes data in photons, since using light instead of radio allows the spacecraft to communicate more data in a given amount of time

**PSYCHE INSPIRED**

psyche.asu.edu

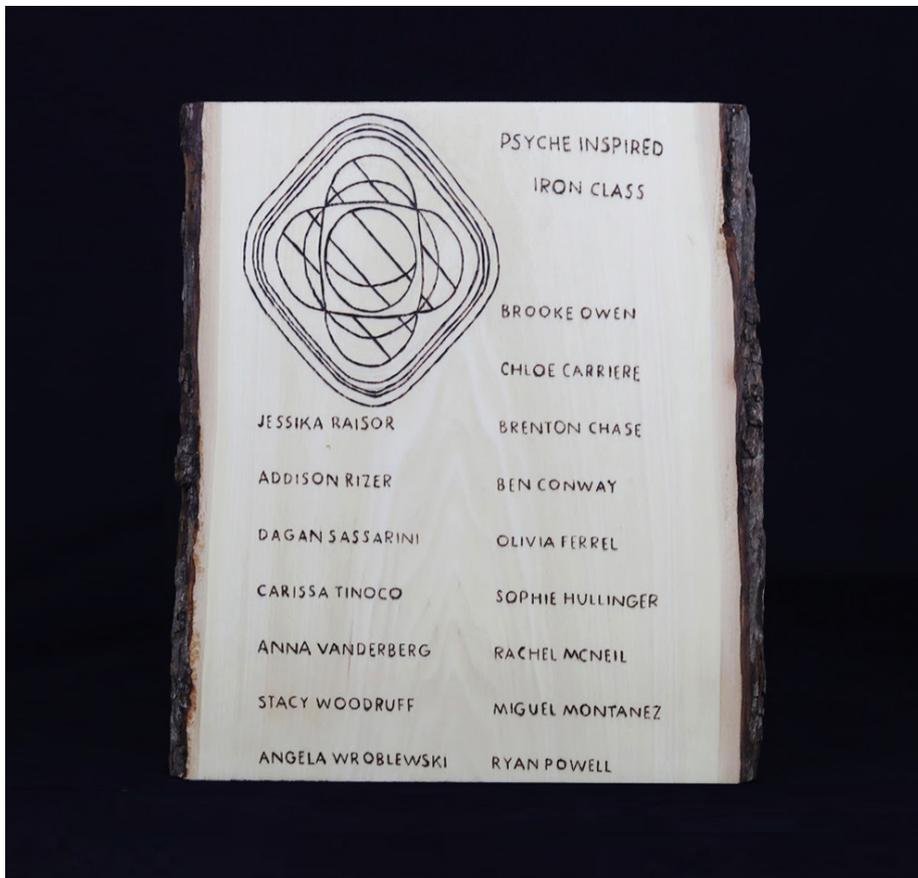
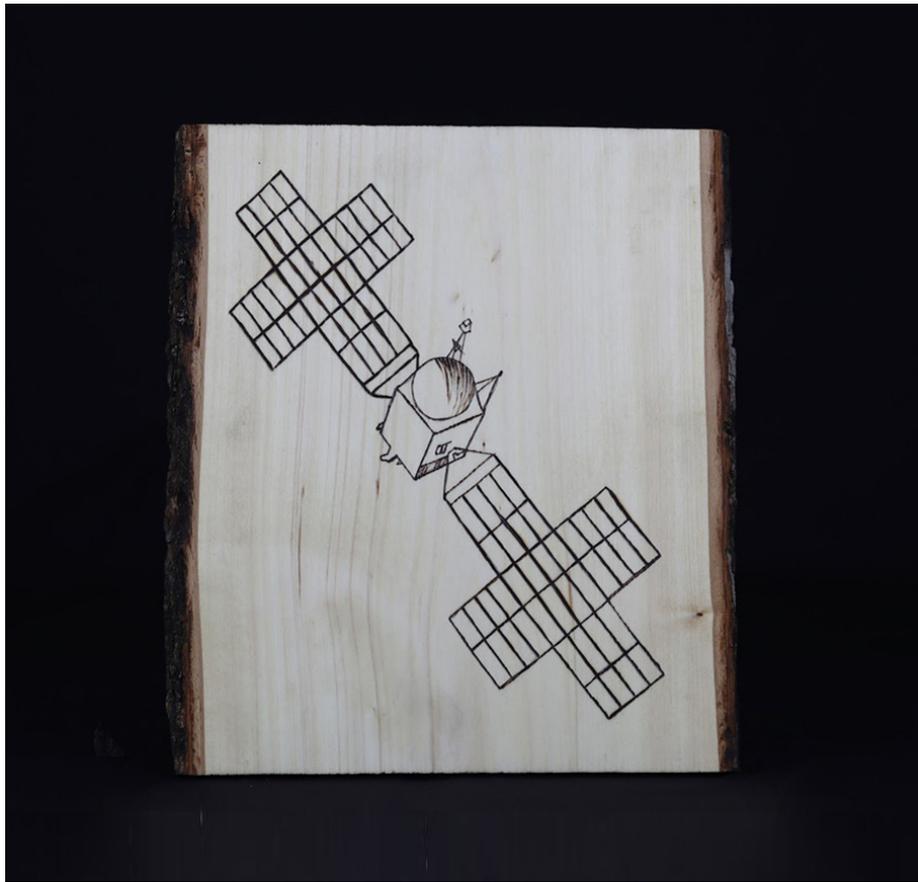
Designed by: Carissa Tinoco



## Psyche Mission Brochure

Carissa Tinoco  
*digital art*

I created a trifold brochure meant to be printed and physically handed out to people at outreach events (such as the Psyche Inspired showcase exhibit) who would like to learn more about the Psyche mission. As a tool for outreach, it is a summarized, compact, colorful, and accessible version of the information that is on the Psyche mission's website.



## Parts and Pieces

Olivia Ferrel

*wood and woodburning*

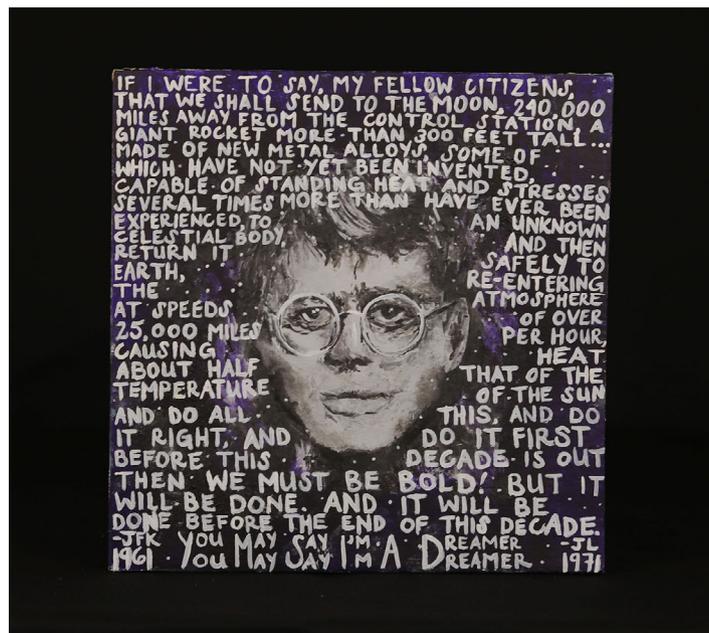
These three woodburnings depict the asteroid, the spacecraft, and the names of the Psyche Inspired Iron Class interns. The woodburning was inspired by fellow intern Dagan Sassarini's "Photosynthesis" project. This is a new medium for me, but I felt that it would push me artistically and help me to explore the relationship between nature and technology.

# Milestones in Space and Music Exploration

Chloe Carriere

*acrylic on vinyl records and record cases*

This piece represents major milestones in both space and music exploration, focusing on the 1960's to the present. A few things that I value most in life are music, space, and art, so I created this project to combine the three. In 1961, President John F. Kennedy declared that America would ascend to the moon by the end of the decade, initiating space as a national priority.



My first painting in this series shows JFK among the stars with a portion of his famous 1962 speech “We Choose to Go to the Moon” layered on top. The President is shown here with John Lennon’s signature glasses and the lyrics “You may say I’m a dreamer” from the song “Imagine” underneath Kennedy’s speech. Lennon’s “Imagine” was released in 1971, one decade after Kennedy’s speech was given. I joined these two because both John Lennon and President John F. Kennedy were dreamers. The Beatles is the highest-certified music group in America and regarded as the foremost and most influential band in history.



The second painting is a play on the Beatles’ “Sgt. Peppers” album cover highlighting our very own 16-Psyche Mission and our mighty leader, Lindy Elkins-Tanton. Sgt. Peppers was an album full of extremely influential and experimental music released in 1967 and is highlighted as a major milestone in music history.

# Milestones in Space and Music Exploration



Between 1967 and 1972, NASA began reaching for the moon through the Apollo Missions. The aim of the program was to land people on the moon and bring them safely back to Earth. Six of these missions, Apollo 11, 12, 14, 15, 16, and 17, achieved this incredible goal, and broke through previously set limitations of space exploration.



## Milestones in Space and Music Exploration



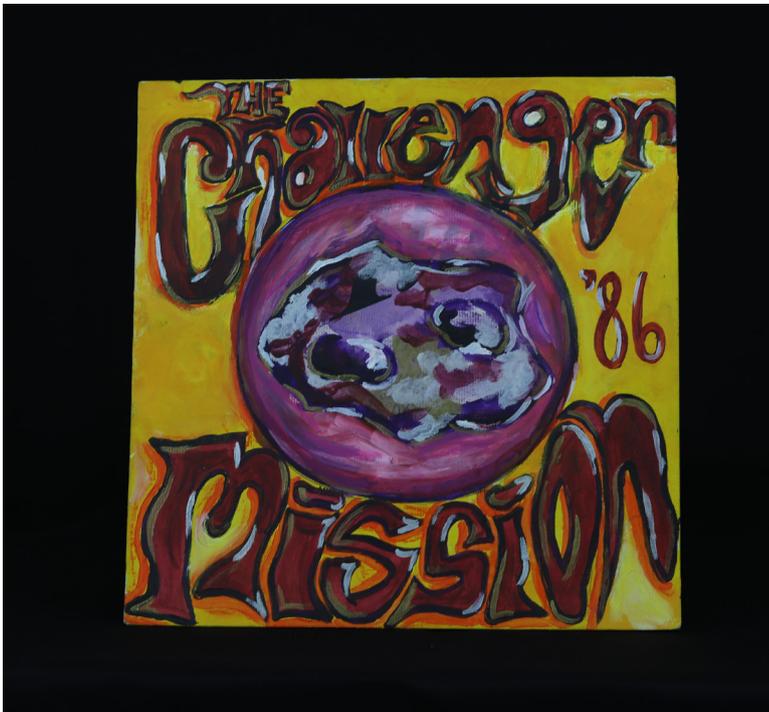
The moon landing in 1969 by Apollo 11 is displayed on the next vinyl. This unbelievable milestone brought inspiration to the hearts of the public, leading to more excitement and interest in NASA's space exploration objectives.

Pink Floyd is the ninth highest certified music artist in the United States and is considered one of the most successful and influential rock groups in history. Their album "The Dark Side of the Moon" was released in 1973 and is displayed with the Psyche asteroid over the recognizable depiction of white light passing through a prism to form the color spectrum.



In 1977, the Golden Record was carried through space by Voyager 1 and 2 spacecrafts. This vinyl contains sounds and images portraying the diversity of life and culture on Planet Earth. This incredibly unique time capsule is captured in this painting in metallic gold and silver.

## Milestones in Space and Music Exploration

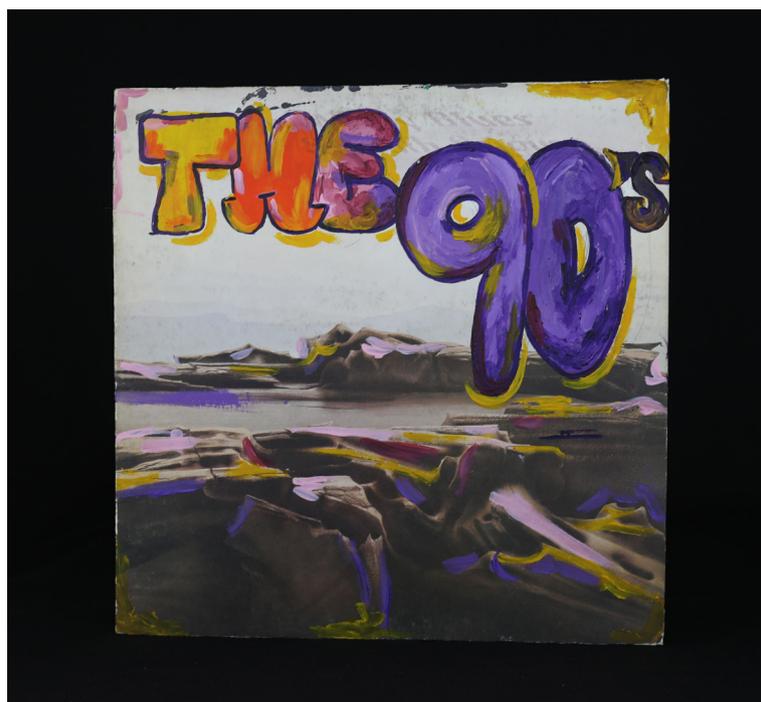


Jimi Hendrix is widely regarded as one of the most influential electric guitarists and celebrated musicians in the 20th century, who died at the young age of 27. His album “The Jimi Hendrix Experience: Are You Experienced” was released in 1967 and this painting is inspired by the album cover. In 1986, NASA launched one of its space shuttles, Challenger, which is presented in the Jimi Hendrix-style album design. Challenger’s final mission took place on January 28, 1986. The orbiter broke apart 73 seconds into its flight, killing all seven crew members. This milestone in space exploration led to a major increase in safety precautions, and the memory of the astronauts’ contributions continues to influence generations of future explorers.



The 90’s were full of incredible milestones in space exploration including NASA’s Hubble Space Telescope which launched April 24th, 1990. Hubble shed light on the darkest area in the sky and produced the most amazing images of galaxies the world had ever seen.

## Milestones in Space and Music Exploration



On December 4th, 1996 NASA sent its Mars Pathfinder to Mars carrying a rover called “Sojourner.” Interestingly enough, the vinyl case used for this next painting is called “Seventh Sojourn” with songs titled “Lost in a Lost World” and “New Horizons.” The mission lasted until September 27th, 1997, which is one day before I was born (September 28th, 1997). During the summer before I was born, my mom purchased a 1997 Nissan Pathfinder; the car shares a name with NASA’s Mars mission. The car ended up in Chicago with my uncle who barely drove it, so 16 years later my parents gifted me with the Nissan Pathfinder. My love for NASA and their missions to Mars gave the car more meaning to me.



## Milestones in Space and Music Exploration

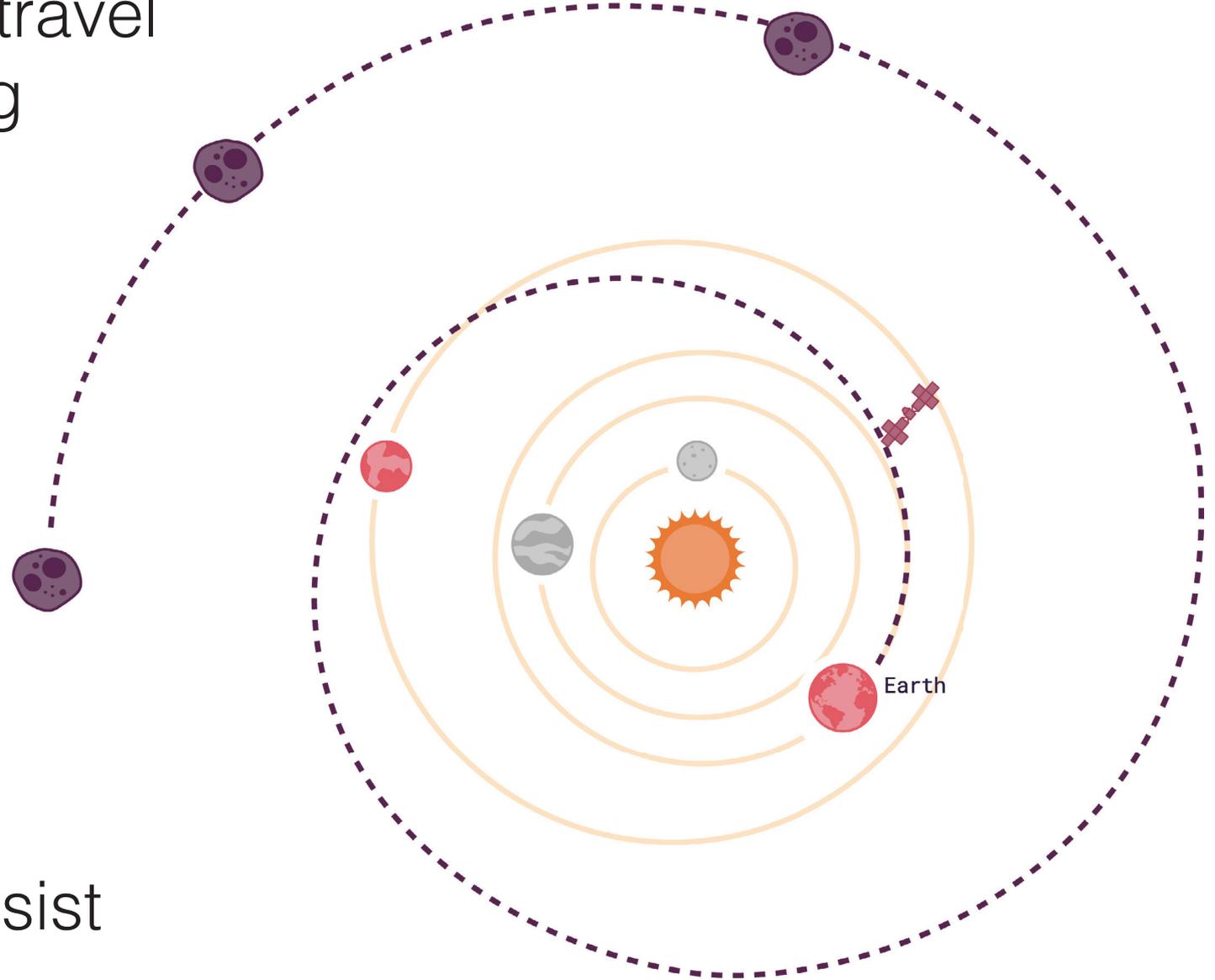


Now, in the years 2021 and 2022, two sister missions, Lucy and Psyche, will be launched. Lucy will be the first space mission to study six of Jupiter's Trojan asteroids. Psyche, our very own, will be on a journey to analyze a unique metal asteroid in the Asteroid Belt. These missions show that space exploration will not cease to exist, and we as a society will continue to move forward with the common curiosity and spirit of adventure in both music, space, and art exploration objectives.

# Journey

The Psyche spacecraft is targeted to launch in summer 2022. The spacecraft will travel to the asteroid using solar-electric (low-thrust) propulsion.

The spacecraft is projected to arrive at the asteroid in 2026, following a Mars flyby and gravity-assist in 2023.





## Take Off

Stacy Woodruff

*malachite and azurite, stainless steel wire*

In this piece, the central stone represents Earth, and the wire wrapping is similar to the Psyche spacecraft's flight path. The glass beads are reminiscent of Earth's atmosphere. I chose to use stainless steel for the flight path that will connect Earth and Psyche because we believe that Earth's core and Psyche are both made primarily of iron and nickel, like stainless steel.

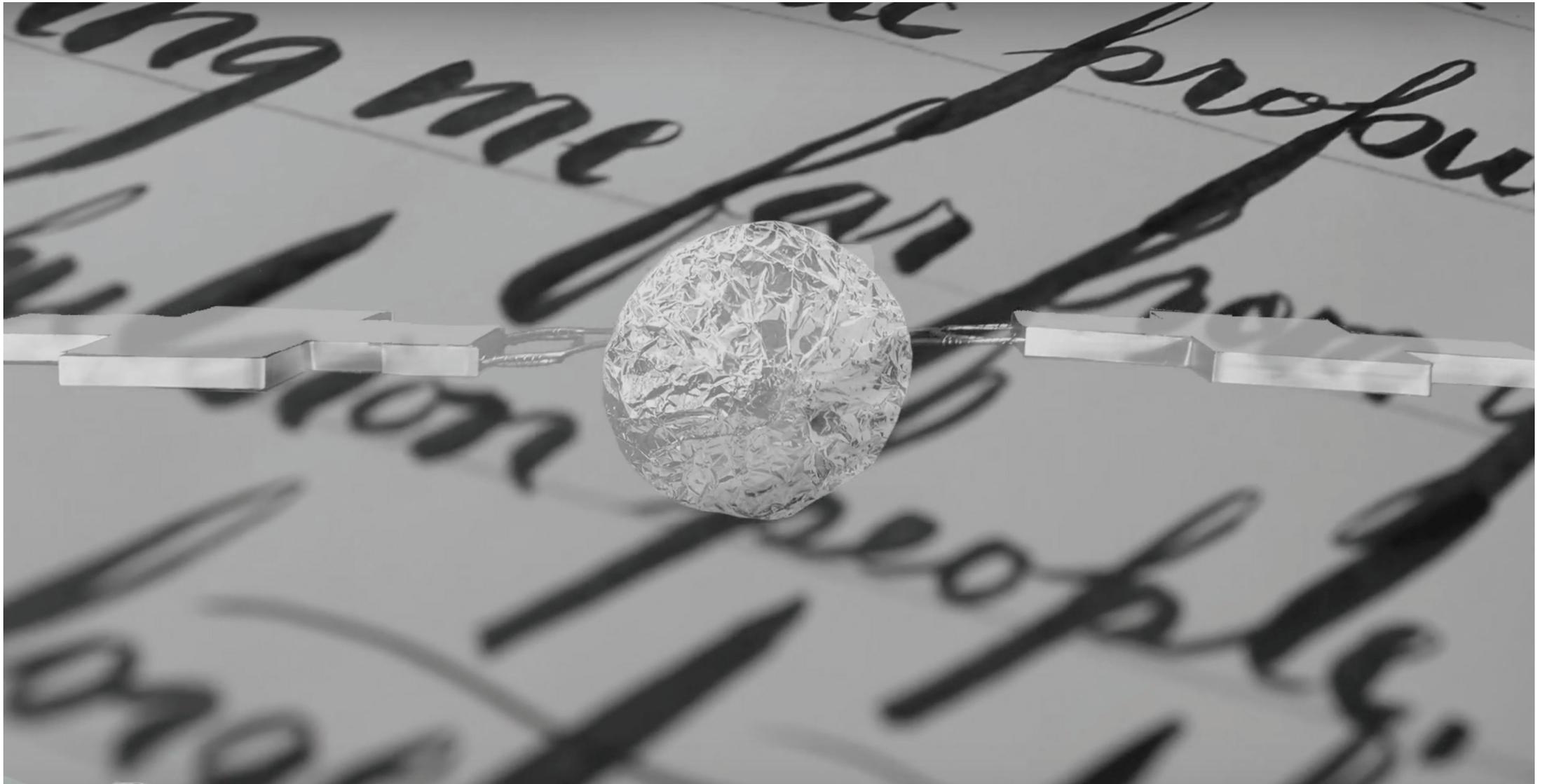


## Psyched to Go Home

Chloe Carriere

*gouache and canvas*

This piece depicts the Psyche orbiter making its way through the asteroid belt towards its new home, Psyche the asteroid. I started the painting with a watercolor outline of the asteroids and the orbiter. Once the outline was complete, I worked on the background by using different “space” colored gouache and acrylic paints in different areas to suggest that the orbiter is traveling through space. I will usually start with one color, adding it to different areas of the painting before moving on to a new color. This allows for the painting to be balanced with color, forcing your eyes to travel through the painting. Once the background was finished, I worked on laying down color for Psyche and adding details along the way. Painting the orbiter on top of the space background gives a 3D effect, while the eyes on the solar panels and the hopeful message in the stars suggest a more human persona for the spacecraft.



### **Interview with Psyche Part 3**

Anna Vanderberg  
*stop-motion animation*



This is the third and final part of my miniseries in which Chad the host interviews the Psyche spacecraft. My first two pieces were more informational, so for this one I decided to do a more fun take on the situation as my characters bid each other goodbye and Psyche gets to tell the public how much their engagement means to it.



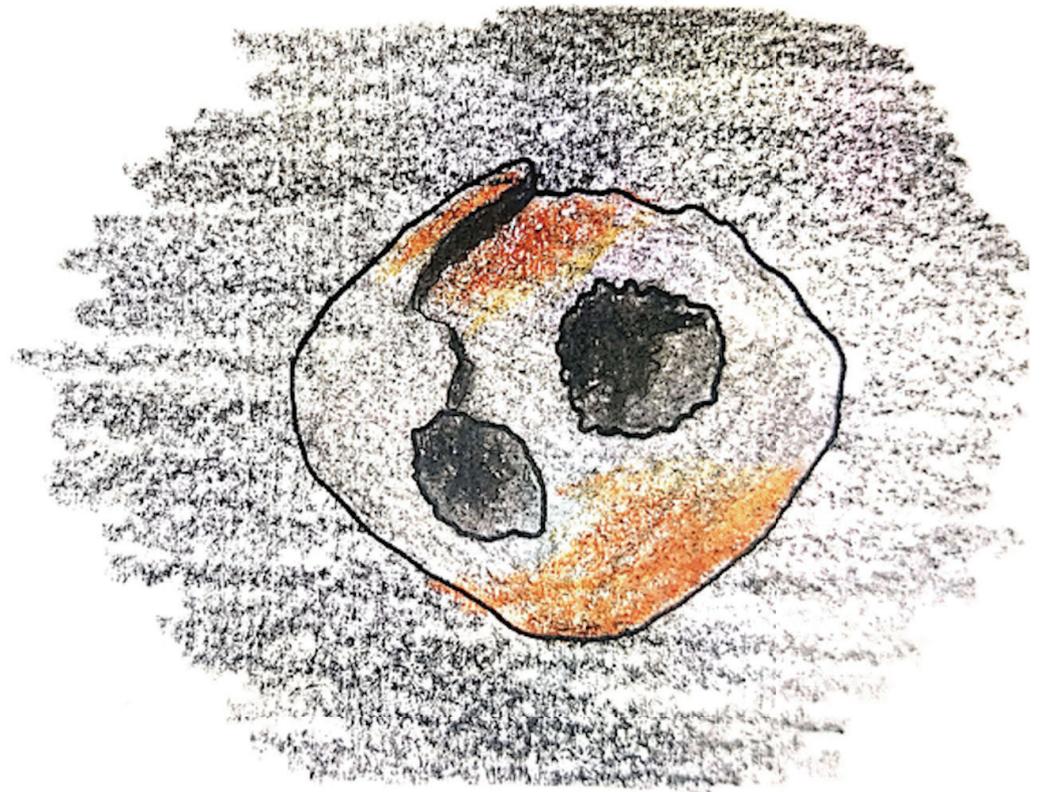
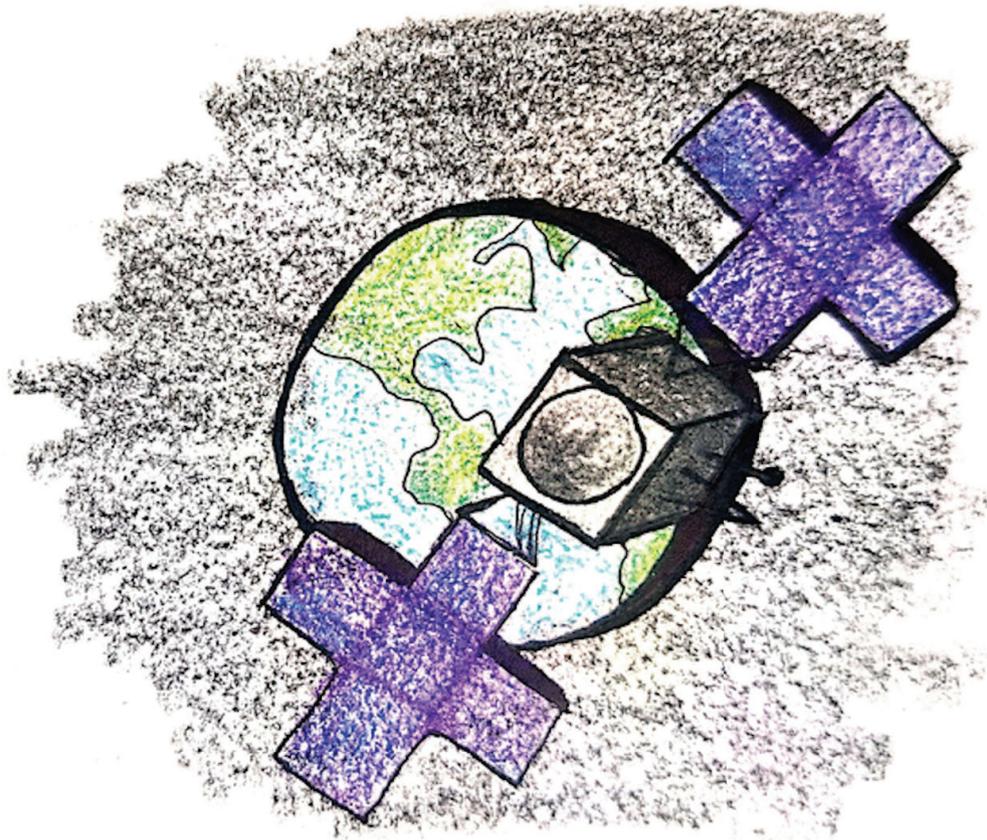
## **Journey to Psyche - A 3D Experience**

Ryan Powell

*music and sound*

For this piece, I did some experimenting with 3D sound, or binaural sound. This is something that I've been interested in for a long time and was able to implement in this piece. I wanted to combine music and the 3D sound aspect to tell a sort of story on the way to the asteroid that uses sound bites from previous NASA missions, showing how far we've come leading up to the Psyche mission. In essence, it's like a film score with 3D sound elements. I had a blast doing it, and I got some help from an actress friend of mine, Katrina Dykstra, who played the little fairy you'll hear about halfway through. All that said, grab a pair of over-ear headphones, find a quiet room, sit back, close your eyes, and be taken on the journey!





## Flipping Through Psyche

Angela Wroblewski

*colored pencil*



This cute, cartoon-like flip book depicts the spacecraft's journey to Psyche. There are three main scenes that appear very quickly: The first shows the spacecraft leaving Earth. The second shows the path the spacecraft takes to get to Psyche, which includes a gravity assist from Mars that aids the spacecraft on its journey to Psyche. The third scene zooms in on Psyche. This one is meant to mimic the spacecraft's perspective.



## **The Psyche Shirt**

Miguel Montañez  
*digital art, shirts, ink*

I wanted to design and make a stylish Psyche shirt.



## **Journey to Psyche**

Stacy Woodruff

*sodalite, brass wire*

This piece combines brass wire-wrapped embellishments with a more traditional bezel-set sodalite stone. It is inspired by the journey from Earth to Psyche. The shape and trailing tendrils show the motion of the journey, and the pattern in the sodalite is reminiscent of deep-space images of nebulas.



# Psyche: Mission Control

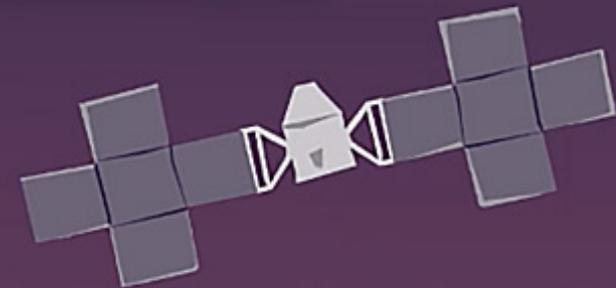


An Interactive Timeline Adventure

Created by Jessika Raisor for  
the Psyche Inspired Program,  
Find out more by going to

<https://psyche.asu.edu/get-involved/psyche-inspired/>

Start



## Psyche: Mission Control

Jessika Raisor  
*HTML5 Digital*



Even though the Psyche site is wonderfully designed and engaging already, I wanted to create a more game-like atmosphere to engage kids directly. Not every kid wants to scroll on a webpage and read (I personally did as a kid, but I know I'm not the typical user!). This was my first time doing a project like this, and it made me really think about interactive design. I designed the Interactive Timeline as if the player was put in charge of the mission; this hopefully gives the player a sense of responsibility even though it is just pretend. With this new "role," the user is able to focus on learning about the mission.



## Breaking Barriers

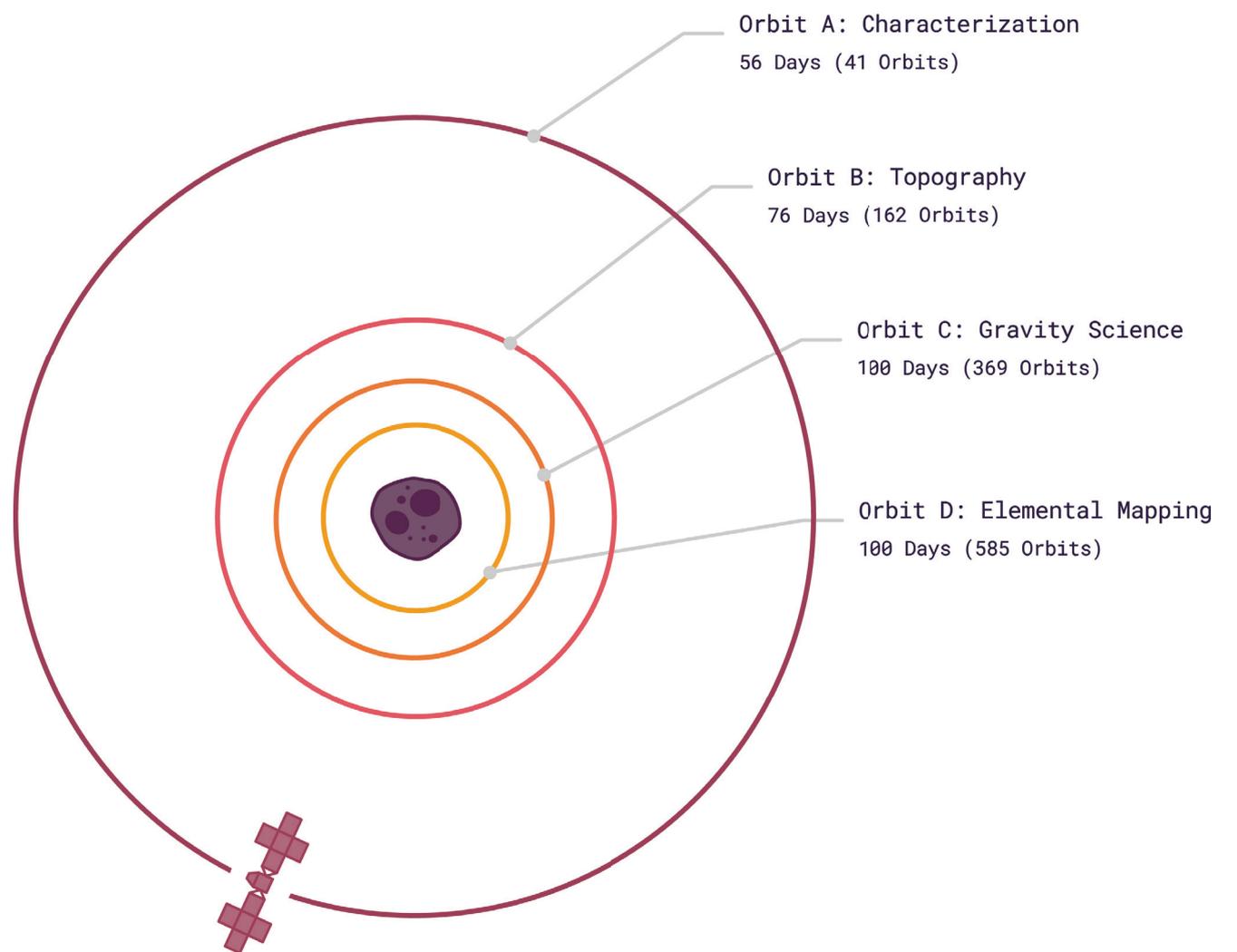
Chloe Carriere

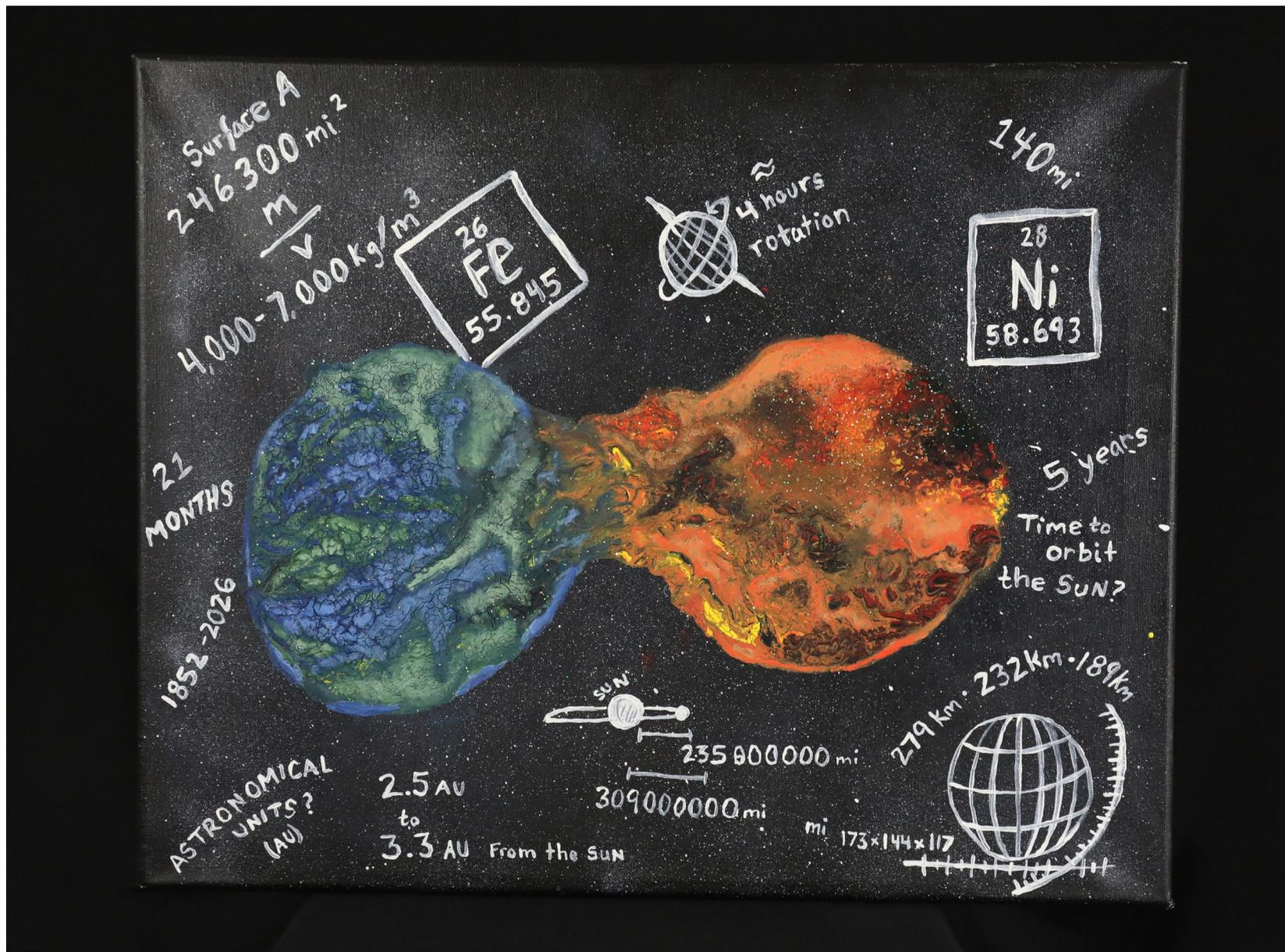
*paint on canvas*

This immense 5x9-ft. piece depicts the Psyche spacecraft breaking down the wall between us and the vast unknown space around our little blue planet. I feel that there is a barrier dividing us from the answers to our universe's secrets, but with more technology and motivation for space travel, we can slowly break these barriers. When you take a photo in front of this painting, it looks as though you are the center of the spacecraft. Since we are traveling to a metal asteroid that could provide insight into our own metal core, I want to depict the idea that when you stand in front of the painting, you are the core of the spacecraft. The journey to Psyche is one that anyone can support and get excited about, and by acting as the core of the spacecraft, you are joining our journey to a metal world. Join us in our [#JourneytoPsyche](#).

# Arrival

After arriving at (16) Psyche in 2026, the mission plan calls for 21 months spent at the asteroid, mapping it and studying its properties. This will be accomplished in four planned orbits, which will bring the Psyche spacecraft successively closer to the Psyche asteroid. Each orbit will collect information on the asteroid to help accomplish the mission's science goals.



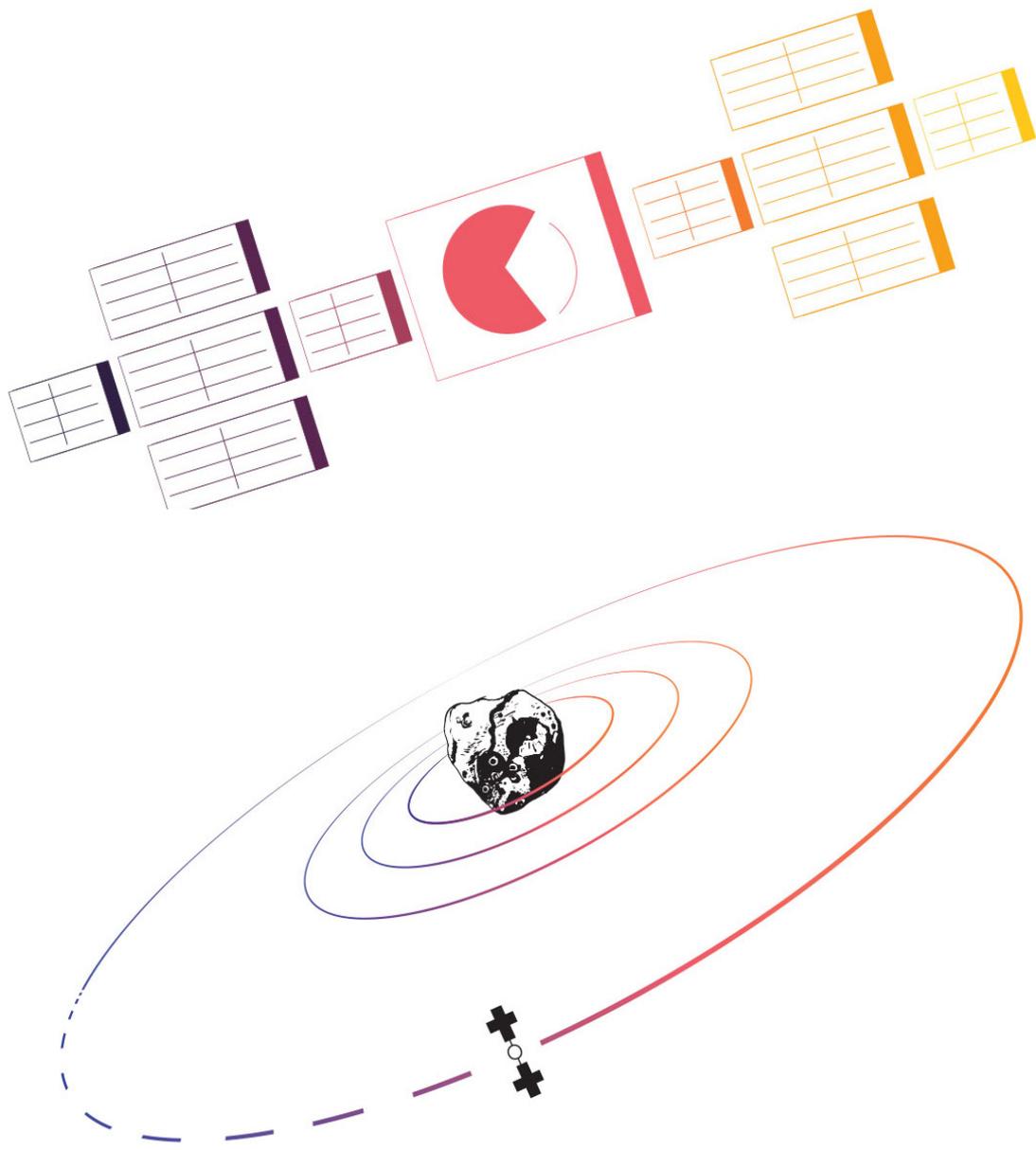


## Transfer

Rachel McNeil

*painting*

This piece explores the transfer of information between the asteroid Psyche and the Earth. The mission to Psyche the asteroid could provide us with more information about Earth's core. Thus, this piece depicts what information scientists have discovered so far about Psyche through the white infographics and pieces of data. The Earth is green and blue and appears to be merging with a ball of orange, red, and black, which represents the information about Earth's core Psyche could provide. Instead of depicting what Psyche, a metallic asteroid, could possibly look like, I decided to focus on the data transfer about cores by portraying an image of what someone would usually think of when talking about the Earth's core.



## Psyche Designs

Sophie Hullinger  
*digital art*

In this project I wanted to create three designs that focus on different aspects of the Psyche mission while using consistent color palettes. When viewed all together, the designs create an abstract narrative of the asteroid and how we are getting to it. Design 1 is an exploration of texture on the surface of (16) Psyche through layering three colored versions of a pen drawing of the asteroid. Design 2 focuses on the four rings of the orbiter's staging orbits at the asteroid. Design 3 is a simplification of the exterior of the Psyche orbiter.

# Approaching 16 Psyche

composed and arranged by Ryan G. Powell

The image displays a full musical score for a marching band, titled "Approaching 16 Psyche" by Ryan G. Powell. The score is written in 4/4 time with a tempo of 152 beats per minute. It features a variety of instruments including woodwinds (Piccolo, Flute, Clarinet in Bb 1, Clarinet in Bb 2+3, Bass Clarinet, Alto Saxophone 1+2, Tenor Saxophone, Baritone Saxophone), brass (Trumpet in Bb 1, Trumpet in Bb 2+3, Horn in F 1+2, Horn in F 3+4, Trombone 1, Trombone 2+3, Baritone, Tuba), and percussion (Snare Drum, Tenor Drums, Bass Drum, Cymbals). The score includes dynamic markings such as *mf* (mezzo-forte) and *mp* (mezzo-piano) throughout. The woodwinds play a melodic line in the beginning, while the brass and percussion provide a driving, rhythmic accompaniment.

## Approaching 16 Psyche

Ryan Powell

*music - marching band*



I wrote this marching band tune while thinking about the Psyche spacecraft coming up upon the asteroid. I tried to capture the excitement and beauty of the final moments before it enters orbit around the Psyche asteroid. I went pretty heavy on the brass and percussion during the main theme to really keep it driving forward. There are also a lot of little pointillistic elements, particularly with the woodwinds in the beginning, which I had imagined as stars sparkling in the background as the spacecraft travels. Parts were written for full marching band with the hope of it being recorded as well! I really enjoyed creating this piece—I hope you enjoy it, too.



## Psyche's Journey

Ben Conway

*3D rendering with digitally-painted textures*

This image shows the Psyche spacecraft on its way to the Psyche asteroid, with a partial circle representing the asteroid's lost outer layers. It is a 3D rendering, with digitally-painted textures and one procedurally-generated texture. The spacecraft was modeled based on the technical diagrams I was provided. I referred to NASA photos for the appearance of Earth and Mars, and the shape of the Psyche asteroid was based on data from the paper "Radar observations and shape model of asteroid 16 Psyche." The beam of light represents the spacecraft's laser communications system. There are some subtle details in the background—several silhouettes of the Psyche spacecraft are hidden there, and there are 16 stars that represent the 16 Psyche Inspired interns. The representation of the asteroid's lost layers resembles a keyhole, signifying the knowledge that this mission will unlock. (Planet reference images: STScI-PRC97-09a; NASA Satellite Camera Provides "EPIC" View of Earth.)



**Psyche Wide**  
Miguel Montañez  
*digital art*

This piece was made digitally with only halftones (small dots of color), and it only uses the Psyche colors!



## **Orbit**

Stacy Woodruff

*specular hematite, stainless steel wire*

This pendant is made from a glittering, rough-cut piece of specular hematite that is suspended by an orbit of fine stainless steel wire. A miniature version of the Psyche probe is strung on the orbit wire. I used a hardened steel washer for the orbit frame. I chose these materials because they contain high levels of iron, reflecting our predictions for (16) Psyche's composition.

# Thoughts from the Interns

## **Ben Conway:**

*“My favorite piece was Humanity’s Psyche. I wanted to show the human side of space travel and the importance of working together.”*

## **Olivia Ferrel:**

*“Psyche Inspired is unlike anything I’ve done artistically or academically. Every meeting and project was entirely new territory to explore and required a lot of collaboration, research, and feedback, and resulted in so much growth in my artistic style and the way I think about space.”*

*“I don’t have much of a scientific background. I’ve always had a lot of interest in earth sciences, but never in space, and I’ve taken very few science courses as a student. My lack of experience made me want to apply for Psyche Inspired even more. It helped get my foot in the door to approaching things I haven’t explored before, and it gave me a better understanding of how I can expand my interests and create art that might not have been in my comfort zone previously.”*

*“My favorite part of having the privilege to participate in Psyche Inspired has definitely been the challenge. Challenges to grow, connect, collaborate, create, and reflect have made the whole experience so incredible.”*

## **Rachel McNeil:**

*“I was motivated to experiment with new art techniques outside of drawing and marker renderings to convey scientific concepts in more abstract ways.”*

*“My favorite piece is my first piece ‘Transfer’. My intent with this piece was to configure a concept in a way that pushes the viewer to question...”*

## **Jessika Raisor:**

*“I am pursuing a career in scientific communication through art and animation and have always wanted to be a part of NASA since I was a kid. Psyche Inspired was the perfect combination of what I wanted!”*

# Thoughts from the Interns

## **Jessika Raisor (continued):**

*“Overall, my favorite piece is the animated video just because of the fabulous reception it got. It’s the first time any of my work has been so widely received and with such enthusiastic and emotional responses.”*

## **Addison Rizer:**

*“I’ve never joined a creative project like this. Everything I’ve written has been for myself and myself alone. This required me to create in a community setting and on a deadline.”*

*“Psyche seemed like a good way to push myself out of my creative comfort zone. I tend to feel like I’m writing the same thing over and over again, so this felt like a good way to go beyond that and do something new.”*

*“I don’t have much of a scientific background. I think that made discovering Psyche really impactful to me, as I had very little information. Everything I learned about Psyche was new and exciting.”*

*“My favorite part of this experience was Psyche’s community. Everyone is so different but so excited about Psyche and what they can bring to it.”*

## **Carissa Tinoco:**

*“Psyche Inspired works towards addressing and mitigating the communication gap between scientists and the general public by presenting artistic compositions that are not only scientifically accurate, but also appealing and inviting to those who do not normally feel included in STEM.”*

*“Psyche Inspired is a program in which I was able to mesh my passion for art and science together. While there are already other artistic spaces out there that can provide me the artistic freedom I want, I wouldn’t have found as big, let alone nationwide, of a community of those also passionate about science.”*

*“My favorite parts of Psyche Inspired were how collaborative and nationwide its space was, the artistic freedom I had with a new and exciting subject, and being in on a NASA mission that is ongoing.”*

# Meet the Interns



**Chloe Carriere**  
*Arizona State University*  
Chemical Engineering



**Brenton Chase**  
*Phoenix College*  
Forensic Psychology



**Ben Conway**  
*California College of the Arts*  
Illustration



**Olivia Ferrel**  
*Arizona State University*  
Public Service & Public Policy



**Sophie Hullinger**  
*University of Michigan*  
Art & Design



**Rachel McNeil**  
*Emory University*  
Environmental Sustainability  
Management



**Miguel Montañez**  
*Arizona State University*  
Interdisciplinary Studies



**Ryan Powell**  
*Albion College*  
Music

# Meet the Interns



**Jessika Raisor**  
*Columbus College of  
Art & Design*  
Animation



**Addison Rizer**  
*Arizona State University*  
English



**Dagan Sassarini**  
*Arizona State University*  
Chemical Engineering



**Carissa Tinoco**  
*University of California, Berkley*  
Molecular Environmental Biology  
(Concentration in Environment &  
Human Health)



**Anna Vanderberg**  
*University of Michigan*  
Art & Design



**Stacy Woodruff**  
*Arizona State University*  
Public Service & Public Policy



**Angela Wroblewski**  
*University of Maryland*  
Astronomy & Physics

# Meet the Coordinators



**Brooke Owen**

*Arizona State University*

Psyche Student Collaborations &  
Psyche Inspired Student Manager



**Brianna Orrill**

*Arizona State University*

Psyche Inspired Program &  
Outreach Intern

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