

Required Annotations		Student-Created Annotations		Summary / Questions / Reflection	
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CAMBRIDGE, Massachusetts — Before he started the whole alien spaceship thing last year, the chairman of Harvard University's astronomy department was known for public lectures on modesty. Personal modesty, which Avi Loeb said he learned growing up on a farm. And what Loeb calls "cosmic modesty" — the idea that it's arrogant to assume we are alone in the universe, or even a particularly special species.

You can find a poster for one of these lectures in Loeb's office today, though it's a bit lost among the clutter: photos of Loeb posing under the dome of Harvard's enormous 19th-century telescope; thank-you notes from elementary schoolchildren; a framed interview he gave *The New York Times* in 2014; his books on the formation of galaxies; his face, again and again — a **bespectacled** man in his mid-50s with a **perpetually** satisfied smile.

Loeb stands beside his desk on the first morning of spring courses in a creaseless suit, stapling syllabi for his afternoon class. He points visitors to this and that on the wall. He mentions that four TV crews were in this office on the day in the fall when his spaceship theory went viral, and now five film companies are interested in making a movie about his life.

A neatly handwritten page of equations sits on the desk, on the edge closest to the guest chairs.

"Oh, this is something I did last night," Loeb says. It's a calculation, he explains, supporting his theory that an extraterrestrial spacecraft, or at least a piece of one, may at this moment be flying past the orbit of Jupiter.

Since publishing his controversial paper, Loeb has run a nearly nonstop media circuit, embracing the celebrity that comes from being perhaps the most academically distinguished E.T. enthusiast of his time—the top Harvard astronomer who suspects technology from another solar system just showed up at our door. And this, in turn, has left some of his peers **nonplused** - grumbling at what they see as a flimsy theory or bewildered as to why Harvard's top astronomer won't shut up about aliens.

What you can't call Loeb is a **crank**. When astronomers in Hawaii stumbled across the first known interstellar object in late 2017 — a blip of light moving so fast past the sun that it could only have come from another star — Loeb had three decades of Ivy League professorship and hundreds of astronomical publications on his résumé, mostly to do with the nature of black holes and early galaxies and other subjects far from any tabloid shelf.

So when seemingly every astronomer on the planet was trying to figure out how the interstellar object (dubbed 'Oumuamua, Hawaiian for "scout") got to our remote patch of Milky Way, Loeb's extraordinarily confident suggestion that it probably came from another civilization could not be easily dismissed.

"Considering an artificial origin, one possibility is that 'Oumuamua' — pronounced Oh-mooah-mooah — "is a lightsail, floating in interstellar space as a debris from an advanced technological equipment," Loeb wrote with his colleague Shmuel Bialy in *Astrophysical Journal Letters* in November — thrilling E.T. enthusiasts and upsetting the fragile orbits of

space academia.

"'Oumuamua is not an alien spaceship, and the authors of the paper insult honest scientific inquiry to even suggest it," tweeted Paul Sutter, an astrophysicist at Ohio State University, shortly after the paper published.

"A shocking example of **sensationalist**, ill-motivated science," theoretical astrophysicist Ethan Siegel wrote in Forbes. North Carolina State University astrophysicist Katie Mack suggested Loeb was trolling for publicity. "Sometimes you write a paper about something that you don't believe to be true at all, just for the purpose of putting out there," she told the Verge.

Most scientists besides Loeb assume 'Oumuamua is some sort of rock, be it an asteroid ejected from some star in meltdown hundreds of millions of years ago, or an icy comet wandering the interstellar void. But it's moving too fast for an inert rock, Loeb points out — zooming away from the sun as if something is pushing it from behind. And if it's a comet spewing jets of steam, the limited observations astronomers made of it showed no sign.

Loeb argues that 'Oumuamua's behavior means it can't be, as is commonly imagined, a clump of rock shaped like a long potato, but rather an object that's very long and no more than 1 millimeter thick, perhaps like a kilometer-long **obloid** pancake — or a ship sail — so light and thin that sunlight is pushing it out of our solar system.

And while he's not saying it's definitely aliens, he is saying he can't think of anything other than aliens that fits the data. And he's saying that all over international news.

"Many people expected once there would be this publicity, I would back down," Loeb says. "If someone shows me evidence to the contrary, I will immediately back down."

In the meantime, he's doubling down, hosting a Reddit AMA on "how the discovery of alien life in space will transform our life," and constantly emailing his "friends and colleagues" with updates on all the reporters who are speaking to him.

In a matter of months, Loeb has become a one-man alternative to the **dirge** of terrestrial news.

"It changes your perception on reality, just knowing that we're not alone," he says. "We are fighting on borders, on resources. It would make us feel part of planet Earth as a civilization rather than individual countries voting on Brexit."

So now he is famous, styling himself as a truth-teller and risk-taker in an age of overly conservative, **quiescent** scientists.

"The mainstream approach [is] you can sort of drink your coffee in the morning and expect what you will find later on. It's a stable lifestyle, but for me it resembles more the lifestyle of a business person rather than scientists," he says.

"The worst thing that can happen to me is I would be relieved of my administrative duties, and that would give me even more time to focus on science," Loeb adds. "All the titles I have, I can dial them back. In fact, I can dial myself back to the farm."

Loeb grew up in an Israeli farming village. He would sit in the hills and

read philosophy books imagining the broader universe, he says, a fascination that led him into academia and all the way to 'Oumuamua.

"I don't have a class system in my head of **academia** being the elite," he says, as he leads a reporter into the locked chamber of the Great Refractor — an enormous 19th-century telescope where he sometimes does photo ops. "I see it as a continuation of childhood curiosity—trying to understand what the world is like."

He joined Princeton University's Institute for Advanced Study in the late 1980s "where Einstein used to be," he noted. He later took a junior position in Harvard's astronomy department, where "for 20 years no one had been promoted from within. They tenured me after three years."

As he tells it, his life story sounds like a cerebral version of "Forrest Gump" — Loeb always single-mindedly pursuing his science and intersecting with the giants of the field, whom he regularly name-drops. Stephen Hawking had dinner at his house. Stephen Spielberg once asked him for movie tips. Russian billionaire Uri Milner once walked into his office and sat on the couch and asked him to help design humanity's first interstellar spaceship — which he is now doing, with a research budget of \$100 million and the endorsement of Mark Zuckerberg and the late Hawking.

Loeb mentions casually that when he was 24 years old he got a private audience with the famed physicist Freeman Dyson — and then pauses for effect beneath the 20-foot shaft of the Great Refractor, grinning until he realizes the reporter doesn't know who Freeman Dyson is.

At midday, Loeb leaves the telescope and his office and descends to a bare white classroom to introduce the basics of astrophysics to a dozen new students.

If he's mastered the national news interview by now, his lecture begins a bit **stilted**. He looks down at the table as he speaks. He asks the freshmen at this most prestigious of universities to go around the table and list their hobbies.

Ten minutes later, Loeb goes off script.

"Did anyone hear the name 'Oumuamua?" he asks. "What did it mean?"

Almost everyone nods, and freshman Matt Jacobsen, who came to Harvard from an Iowa farm town, volunteers quietly: "There was speculation that it was from another civilization."

"Who made that speculation?" Loeb asks, smiling.

There's an awkward silence in the room, and then Jacobsen cries, "Was it you? Oh my gosh!" and the professor smiles wider.

Questions

1. Read the following paragraph from the article that is in italics.

Most scientists besides Loeb assume 'Oumuamua is some sort of rock, be it an asteroid ejected from some star in meltdown hundreds of millions of years ago, or an icy comet wandering the interstellar void. But it's moving too fast for an inert rock, Loeb points out — zooming away from the sun as if something is pushing it from behind. And if it's a comet spewing jets of steam, the limited observations astronomers made of it showed no sign.

Which of the following conclusions is MOST supported by the paragraph above?

- a) 'Oumuamua is already providing scientists with valuable data about other galaxies far away.
 - b) 'Oumuamua is going to be the key that will convince scientists that life exists beyond Earth.
 - c) Loeb believes that other scientists are making assumptions that do not match the data about 'Oumuamua.
 - d) Loeb believes that other scientists are not aware that comets are supposed to spew jets of steam.
2. Which of the following claims does the author support the LEAST?
 - a) Loeb has had a long and distinguished career as an expert in astronomy.
 - b) Loeb is known to be quite humble and modest by his colleagues and friends.
 - c) Loeb's speculations about 'Oumuamua have caused a significant amount of media attention.
 - d) Loeb enjoys engaging with prominent figures in his field and journalists.
 3. Which of the following BEST explains how the author describes Avi Loeb over the course of the article?
 - a) The author first describes Loeb as a thoughtful, brilliant man who is known for being an expert in astronomy. Then he is described as a man suddenly obsessed with aliens who is causing his friends and colleagues to worry.
 - b) The author first describes Loeb as a man who has tried to promote modesty as an important human value. Then, he is described as a man who finds it hard to be modest because he has become the most accomplished astronomer in history.
 - c) The author first describes Loeb as the first astronomer to capture the attention of the international media. Then, he is described as a person who has beaten the odds by rising out of an Israeli farming town to the halls of Harvard.
 - d) The author first describes Loeb as a man who values and encourages others to embody modesty. Then, he is described as a man whose clear enthusiasm about his success and fame seems a bit at odds with this focus on modesty.
 4. According to the article, what role has the media played in Avi Loeb's theory about 'Oumuamua?
 - a) The media pressured Loeb to state definitively that 'Oumuamua was a piece of alien technology without sufficient evidence.
 - b) The media generated interest in and familiarity with Loeb's theory that 'Oumuamua could be a sign of extraterrestrial life.
 - c) The media inspired Russian billionaire Uri Milner to design the first interstellar spaceship used to encounter aliens.
 - d) The media encouraged Loeb to reference the work of other scientists like Dyson and the late Hawking in his research on aliens.