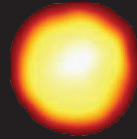


A Rose By Any Other Name: The Peculiar Case of Pluto

by

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Part I—Minor Planet 10,000?

“Mama!” her oldest son hollered from the kitchen, “it’s that reporter again. He wants to know about the Internet vote on Pluto.”

Maria expected the call but was still annoyed at its timing. She popped the last bite of pie into her mouth as she weaved her way through the overcrowded dining room into the messy kitchen.

“Hey, Dr. Ocasio. It’s Jamar Rogers from Boston Science Monthly. How you doing? I hate to bother you—I can hear you’re busy—but we go to press soon and I was wondering if you could give me an update on Pluto.”

As the chair of the Committee on Small Body Nomenclature of the International Astronomical Union, Dr. Maria Ocasio was in charge of naming small bodies in the solar system. She also worked closely with the Minor Planet Center at Harvard University, where astronomical data for asteroids and comets are collected, computed, checked, and disseminated. As their orbital parameters are determined, these small bodies are assigned minor planet numbers. Last month, 158 new asteroids were numbered. This week they had confirmed the orbital characteristics of an asteroid commonly known as “Ehrendfreund,” officially making it Minor Planet 9826. There was now a buzz about assigning the number 10,000 to Pluto.

The reporter continued: “I heard that the Minor Planet Center will be up to 10,000 and are suggesting giving that to Pluto. I’ve even heard they’re voting to demote Pluto to a minor planet. That sounds pretty unscientific to me! What’s your position?”

“Nobody’s demoting Pluto. However, we’re curious about what the community thinks,” Maria explained, as she brushed bread crumbs off a chair before sitting down. “When Clyde Tombaugh discovered Pluto in 1930, most people thought it was a planet. But now we know Pluto isn’t alone. Now we know about a hundred other objects orbiting beyond Neptune—called Trans-Neptunian Objects, or TNOs. They’re catalogued as minor planets. Why not Pluto? What makes it special? Why not award Pluto a ‘dual status’—minor planet 10,000 and the ninth planet? Or maybe we should call it a comet? What do you think?”

“Hey, wait a minute!” Jamar laughed. “I’m the one who’s supposed to be asking the questions. So, is Pluto a comet?”

A sprinkling of frost glittered inside the window above the sink. Maria sighed. “After Pluto was at perihelion—its closest approach to the Sun in 1989—its icy surface warmed and it developed a very tenuous atmosphere. That’s what comets do—except they get a lot closer to the Sun and have huge, extended atmospheres. But Pluto never gets much closer to the Sun than Neptune. Its orbit isn’t eccentric enough to be a comet. It sounds redundant, but Pluto is just one of many Plutinos.”

“Plutinos?” interrupted the reporter. “What are they?”

“Plutinos are a family of TNOs whose orbits are linked to Neptune. They make two complete orbits in the same time it takes Neptune to make three. That’s called orbital resonance, and it keeps them from colliding with Neptune. So far, Pluto is the largest Plutino.”

Maria could hear murmuring and rustling of pages over the receiver. The reporter caught up and replied, “That’s good info. Thanks. One more thing. I’ve got Clyde Tombaugh’s biographer saying that demoting Pluto would be extremely disrespectful to his widow. You know Tombaugh died two years ago, in ’97. This biographer is very pro-Pluto. He said,—and I’m quoting here—‘this whole referendum thing isn’t about science, it’s about people.’ Do you have a comment about that?”

Maria’s youngest daughter poked her head into the kitchen and announced: “Mama! Marcos is telling that story I told you about when his pig got out and the neighbors called the police. You gotta hear it, it’s really funny.”

Maria smiled and replied softly, “I won’t be long.”

“What? Did you say he is wrong?” the reporter cried.

“No, no,” Maria said into the phone. “Tombaugh is the great, hard-working American success story. He discovered Pluto before he even went to college. But as more and more TNOs were discovered, I think he began to see the writing on the wall.”

“OK, one more thing,” Jamar said. “NASA is proposing a robotic mission to Pluto—the Pluto Express. Do you think it will lose funding if Pluto is no longer a planet?”

Maria had spent the last 19 years studying asteroids and comets. To her, the tiniest one was worthy of funding and research. These bodies represented the primordial solar system and held clues to its formation. If Pluto was a rose by any other name, it would still smell as sweet to her and her colleagues at NASA.

“I’m not worried,” she said. “If Pluto Express isn’t funded, it won’t be because of this.”

“All right. One more thing,” the reporter repeated. “If Pluto was demoted to a minor planet, wouldn’t you feel bad for the kids of America? I mean, kids like Pluto. I sure did. Still do!”

Maria rolled her eyes and caught sight of her children’s finger paintings yellowing on the fridge. “Well, yeah, kids like Pluto, but ...” —loud guffaws and shrieks of laughter erupted from the next room—“... but let’s see how the opinion poll goes, Jamar. Then after the Committee meets again we’ll have something for you. But that’s all for tonight.”

After saying their goodbyes, Maria hung up. The laughter in the next room subsided. She rubbed her forehead and then her eyes with both hands. Who would have thought a name mattered so much?

Questions

1. What are the similarities and differences between the terrestrial and Jovian planets? Answer this question by constructing a Venn diagram that includes orbital characteristics (semi-major axis, eccentricity, inclination) and physical characteristics (mass, radius, density, composition).
2. Compare the orbital and physical characteristics of Pluto with those of the other eight planets. Is Pluto more like a terrestrial, a Jovian, or neither? Support your answer with data.
3. Trans-Neptunian Objects (TNOs) and Kuiper Belt Objects (KBOs) are terms used interchangeably. What are these objects?
4. What is orbital resonance and how does it distinguish Plutinos from other classes of TNOs?

5. There actually was a 24-hour email opinion poll among professional and amateur astronomers asking whether or not Pluto should be classified as Minor Planet 10,000. Should the status of Pluto be determined by a vote? Explain why or why not.
6. In general, how do you think Americans voted in this referendum? How do you think people in other countries voted? How would you have voted?
7. What questions do you have for Maria that perhaps the reporter failed to ask?



Part II—What’s a Planet?

Maria heard her assistant’s voice halfway down the hallway. She stopped sipping her coffee to listen. Mikhail’s voice was always loud, but now it was animated. “If Tombaugh had been Russian, this wouldn’t have happened! I can’t believe American astronomers are so attached to what they think is their planet.”

Mikhail stood in her doorway. He had been out of the office for a few days. Obviously, he had just read the letter from the Division of Planetary Science (DPS) of the American Astronomical Society that Maria had left on his desk. He waved the letter with his fingertips like a soiled napkin as he spoke.

“The DPS thinks we’re reclassifying Pluto, and they strongly oppose it. I can’t believe this!” His eyes narrowed jokingly. “Plutophiles!”

The Committee on Small Body Nomenclature had received many comments about Pluto recently, especially since the Minor Planet Center completed its email poll. Professional and amateur astronomers were asked to vote on whether or not Pluto should be Minor Planet 10,000. The results of the poll indicated that the Americans were split only 51% to 49% in favor of it. However, voters in 21 other countries were 82% in favor of Pluto being Minor Planet 10,000.

Mikhail continued loudly, “You’ve seen this. They actually believe that making Pluto a Minor Planet would be interpreted as reclassifying or demoting it. They say it’s harmful to their profession. They say that acrimonious rifts are being created over this. They say there isn’t scientific or historical justification for it. Is that true?” His hand remained suspended in the air, waiting for her reply.

“Welcome back, Mikhail. Have a seat.” Maria smiled and put her cup down. Mikhail remained standing.

“Actually it isn’t,” Maria continued. “Old astronomy books have the first few asteroids classified as planets. Ceres, Pallas, Juno, Vesta—all discovered in the early 1800s—were considered planets for decades. But as more and more of these objects were discovered, they realized there were lots of bodies between Mars and Jupiter—our modern-day asteroid belt. They were all ‘demoted’ from planets and became asteroids or minor planets. But this isn’t about ‘demoting’ Pluto, just giving it minor planet status. And from our survey it looks like the majority of astronomers—except for the DPS—are OK with that.”

Mikhail took a long breath, and then blurted out: “But you know it’s so nationalistic. It’s no coincidence that the symbol for Pluto is Percival Lowell’s initials—the benefactor of the Flagstaff Observatory where Tombaugh discovered Pluto. You know they waited to announce the discovery until Lowell’s 75th birthday. What other planet was allowed to be named after a real person? There was so much hype about the ‘American planet’—even before the observatory released enough data for the International Astronomical Union to review—that when the time came to officially name it, Pluto was so well known, they had to keep the name.”

“You’re right. I won’t argue with you. They got carried away. They didn’t follow protocol. But the work was solid, and, at the time, it did look like the much-searched-for ‘Planet X,’ although now we know it wasn’t and couldn’t have been. But that’s beside the point. As more TNOs are discovered, this controversy is only going to get worse. We need a definition for the word ‘planet’ other than ‘we-know-one-when-we-see-one.’”

Mikhail looked deflated. He liked a good argument. “So ... set up a meeting?”

“Right. Check everyone’s calendar, and schedule it ASAP. The agenda: respond to the DPS and begin a discussion about how to define a planet. Let’s put this Pluto issue to rest. Thanks, Mikhail. It’s good to have you back.”

Mikhail pivoted in the doorway and walked down the hall. Maria picked up her cup, but the coffee was cold. What should Pluto be called? She was beginning to call it a nuisance and was ready to close the discussion for good.

Questions

1. What factors (orbital, physical, historical, social) do you think the Committee on Small Body Nomenclature should consider in defining the word “planet”?
2. As the committee chair, how should Maria proceed? For example, should the committee decide on Pluto’s status and then write the definition? Or, should they define “planet” first and then let Pluto’s status be determined by the definition? Explain your reasoning.
3. What do you think the short term and long term reactions and/or consequences would be if it was decided Pluto was no longer a planet?
4. Considering all the data you examined and all the arguments proposed in this case, how would you define the word “planet”? According to your definition, what is Pluto?