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The Little Planet with a Big Problem

What is the definition of a planet? Most people would simply describe a very large body orbiting around a celestial star. Even with this deceptively simple explanation, many objects in our solar system would fall under this classification such as asteroids and comets, yet most would agree both are not planets. Since its accidental discovery, a case of mistaken identity, Pluto's self classification as a planet has fallen under heated debate for several decades until finally finding its place among the stars.

Before any consensus can be made about Pluto's planetary status, the argument must first begin with what the definition of a planet must be. Throughout the ages man has gazed upon the nightly heavens and attempted to name these bright objects, neither star nor sun nor moon. The first definition came about when early human believed Earth to be the center of the universe, the geocentric model, surrounded by the sun, moon, and five bright objects: Mercury, Venus, Mars, Jupiter, and Saturn. Early star gazer observed that the five bright objects did not follow the same motions as other stars did, eventually these planets became to be called "wandering star." And so these wandering stars were named *planasthai*, which means to wander (Weintraub 3). To this day astronomers have accepted the Copernicus model of the Solar System, the Earth is a planet and it revolves around the sun, yet astronomers have not reach a general definition of a planet, which could draw the distinct boundaries between planet and other celestial bodies, and would be generally accepted by all. Every definition is different based on the limitation imposed onto the space object (Britannica 1). For example the Oxford English Dictionary states:

Any various rocky or gaseous bodies that revolve in elliptical orbits about the Sun and are visible by its reflective light, esp. each of the nine major planets...any of various smaller bodies that revolve around these; a similar body revolve around another star (Weintraub 4).

The problem with a modern definition of a planet today is astronomers have yet to fully understand the universe in its entirety. Base on this definition given, the moon would be classified as a planet yet everyone would agree the moon or any moon orbiting around a planet is not considered a planet. Which space object is a planet and which is not has always been a “historical and cultural consensus” (Britannica 3). This vague notion of what is and is not a planet has created controversy of one “planet” ever since its discovery.

Discovered by an amateur astronomical farmer, Pluto symbolized the United States hope during the Great Depression and its foray in planetary discovery. Young Clyde W. Tombaugh, born and raised as a wheat farmer, found an interest in space and telescopes, always constructing bigger and better telescopes. After writing to the Flagstaff observatory and receiving a surprising invitation to assist in their search for Planet X, Tombaugh enthusiastically agreed to assist in their research (D’Alto 3). The so called ninth planet “X”, first theorize by Percival Lowell, became Tombaugh main job, taking pictures of star in the night sky for eight hours a day. Soon after beginning his job the stock market crashed in 1929, forcing the observatory to limit amount of supplies they could use. Tombaugh worked tediously and arduously every night for almost an entire year and then after comparing a several photographs on February 18, 1930 his dedication and dreams smiled back at him (Weintraub 136-7). A fourth photograph confirmation verified

the existence of a ninth planet, proved Lowell's prediction, and vindicated the no longer amateur astronomer, Tombaugh. In any other time era in the U.S. such news would only foster the interest of scholarly men and women, yet at the beginning of the Great Depression this one victory in science caused a triumphant stir in America. The New York Times front paged the discovery, entitling it "Ninth Planet Discovered on Edge of Solar System" (D'Alto 3). Although the credit for discovery lay in the hands of a farm boy, the credit of naming the planet goes to a young English girl of eleven years, Venetia Burney. Burney believed since Pluto receives such little light from the sun, it would seem apt to name the distant dark planet after the Roman God of the Underworld. As names poured from across the world, one name won out with a unanimous vote, Pluto (5-6).

As America celebrated its first discovery of a planet, the jubilation became replaced with doubt and controversy. In the coming months as more astronomers from around the world collected data Pluto's very existence shrunk. Different astronomers all calculated the size, distance, orbit, and angle of the planet, each coming up with varying figures. Some described Pluto as larger than the Earth while other data concluded Pluto was merely three-fourth of Earth's mass (Weintraub 139). Astronomers utilize several mathematical equations and techniques, such as its reflective surface, gravitational field, and orbit relative to Earth, to unveil Pluto's secrets. As the fog of mystery cleared way, people began to realize the massively decreasing size of Pluto since its original predicted size. Pluto's future as a planet did not look bright (D'Alto 7). Astronomers debated over the size of Pluto. Nicholson believe Pluto's mass ranged from 0.69 to 1.19 Earth's mass, Bower estimated the distant planet to range from 0.1 to 0.3 Earth's size, while

Kuiper measured Pluto to be a measly 10,300 km across (Weintraub 141). Whatever the belief over the size of the planet, the numbers were decreasing and none of them match the original hypothesis that Pluto, the supposedly Planet X, the gas giant, was 6 times the mass of Earth. The endgame came after the discovery of Pluto's moon, Charon. This final discovery along with decades of calculations led Pluto's final mass to be 450 times less massive than Earth (144).

Though increasing evidence may seemingly favor the overthrow of Pluto's status as a planet, some evidences do support the idea that Pluto may indeed be a planet. In the year 2006, already telescopes have discovered two more small moons orbiting around Pluto. They are designated S/2005 P 1 and S/2005 P 2. Few probes have been sent throughout the solar system researching small minor objects with one probe, New Horizon, sent in 2006 towards Pluto to study the size, composition, and any other irregularities that might pique the interest of astronomers. Its schedule in reaching Pluto should be in the year 2015. Although Pluto may not be considered a planet in the eyes of astronomers, it still fascinates scientist enough to continue their study of the distant object (Liu 1). Pluto will forever have its place in the minds of the people and its place in the solar system.

After cultivation of new data and heated arguments, in the summer August 2006, the IAU, International Astronomical Union, made the decision that would determine the final classification of Pluto. In the coming years before the assembly in 2006, Pluto's peculiar characteristics have astronomers questioning its planetary status. During the 1990's the IAU continue on their stance claiming Pluto has not changed its status as a planet nor do they take any position on the debate (Weintraub 224). With the discovery of the Kuiper Belt, debris left over

after the formation of the solar system, and several other large objects, some larger than Pluto, many astronomers wanted a reclassification of Pluto. Then in the summer of 2006 the IAU gathered a general assembly to create a definition of a planet. The new definition, approved by the general assembly, excluded Pluto as a planet, but reclassified it as a dwarf planet along with a couple of other orbiting objects. The new definition demanded a space body could claim planetary status if it fit three criteria: its primary orbit must be around the sun, its spherical shape must be molded by its own gravitational pull, and the gravitational pull has removed any debris and ice around the planet. Pluto follows the first two rules, but did not fit the third criteria. It does though fit the dwarf planet definition, following the first two criteria, but not the third and its primary orbit must be around the Sun (Britannica 2). “The debate over the status of Pluto leads us naturally back to the question...What is a planet? If we can answer this last question, if we can define a planet, perhaps we can decide whether Pluto...merit the designation planet” (Weintraub 184). Although the IAU attempted a strict definition of a planet, it still contains a vague notion of a planet. Until the human race understands the universe more, man must continue to learn as much as possible.

When talking about Pluto and the debate over its classification one cannot exclude the subject of the Kuiper belt. Gerard Kuiper proposed the idea, though original postulated by K.E. Edgeworth, that the remaining debris not used in the formation of the solar system would still exist beyond Neptune (Weintraub 150-1). First believed to originally belong as a moon of Neptune that somehow escaped, Pluto now is believe to be part of a much larger belt that consist of large asteroids, and debris, remnants of the creation of the solar system. These objects, including Pluto, are called KBO, Kuiper Belt Objects. Several more objects have been

discovered, much of which are icy debris made of methane, and nitrogen. Like the asteroid belt it circles around the sun, but unlike the asteroid belt, the Kuiper belt is much more massive, in length and size. Currently, Pluto holds the record for largest KBO, though more KBO's are being discovered. Several smaller KBO share the same orbit as Pluto does, and are dubbed Plutinos (Kuiper 1219).

Although Pluto may not be classified as a planet, as a scientific object of study, Pluto and its satellites remains a fascinating celestial body to investigate. The puny body of Pluto cannot even compare to its Jovian brothers. Its mass is a little over 2300 kilometer in diameter, comprised of 65% rock and 35% ice. This icy exterior gives the small planet a great reflective cover, bouncing more light off from the sun. Scientist believe the inner core of Pluto consist of solid rock, surrounded by a thick layer of nitrogenous ice. The atmosphere on Pluto changes as the dwarf planet moves closer or away from the sun, like seasonal change. When Pluto orbits closer to the sun the frozen ice melts and vaporizes into the atmosphere, releasing nitrogen, methane, and carbon dioxide. The gases fall back flat onto the surface as Pluto drifts away from the sun, cooling down the planet and freezing the atmosphere (Stern 4). Not only does the small size of Pluto appear particular when compared to any other planet, but its eccentric orbit differs from the eight inner planets. Unlike the eight planets that lay on a flat orbit orbiting in almost a circular motion, Pluto orbit at an incline with an erratic elliptical revolution. Always facing each other, Pluto constantly stares back at its moon, Charon. They orbit each other, with the center of gravity not in Pluto but between each other. Two other moon have been recently

discovered before the launch of New Horizon, originally designated S/2005 P 1 and S/2005 P 2, now named Nix and Hydra. Base on calculations and reflective surface of the small objects, astronomers estimate the two small moons are 46 and 61 kilometers respectively. Studies continue to research the origins of these moons and whether more exist to create a small ring structure similar to Jupiter's. Before the IAU decision to classify Pluto as a dwarf planet, some pointed towards Pluto's three moons as evidence for Pluto to reclassify again as a normal planet of the solar system.

The discovery of Pluto not only sparked the interest in the scientific world, but stirred the imagination of the general public. In America, "Plutomania was in full swing", with bottle water coming from Pluto to competitive Pluto horses having a connection with the distant planet. During this time generation observe the creation of the iconic Disney character, Pluto the Hunter Dog. This media frenzy of Pluto pushed the interest of people into outer space. Now that even a farm boy can discover a planet, why not the average person. New amateur astronomers spent nights counting the stars, wishing upon them, and keeping the hope of alive during the Great Depression. Suddenly, Tombaugh became a celebrity in America, a Cinderella fairytale come true. "The first American in the space" so to speak, Clyde Tombaugh's work continued as an astronomer, photographing the stars, inspired others to follow in his lead. Although in the coming years, scholars have debated the status of Pluto, equals side arguing whether Pluto is a planet or not, the general opinion in the average person, especially school children, favor the planetary status of Pluto. Although the people's support kept Pluto alive until the very end, Pluto will remain in the heart of many people as a planet (D'Alto 6-7).

Its very existence controversial before its discovery, Pluto faced decades of arguments against its right to be named a planet. Found by an American farmer, Clyde Tombaugh, whose dream was not only fulfilled but also provided inspiration and hope to a desperate country during a depressive time. Even after its discovery, mystery still hinge upon whether Pluto should be even be classified as a planet. After astronomers across the world debated the issue, the final decision was laid down by the International Astronomical Union. The discovery of Pluto's moon and the Kuiper belt with its many KBO put Pluto into a new classification of celestial body, a dwarf planet. Not only did Pluto enhance astronomer's understanding of the universe, but also became a pop culture in America. Although the IAU does not consider Pluto a normal planet, its influence still remains among the general population. "When Joseph said unto his father; O my father! Lo! I saw in a dream eleven planets and the sun and the moon, I saw them prostrating [bowing] themselves unto me" (Surah XII Verse 4). Maybe someday when astronomers understand the universe better, Pluto may rejoin the ranks of planet.

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