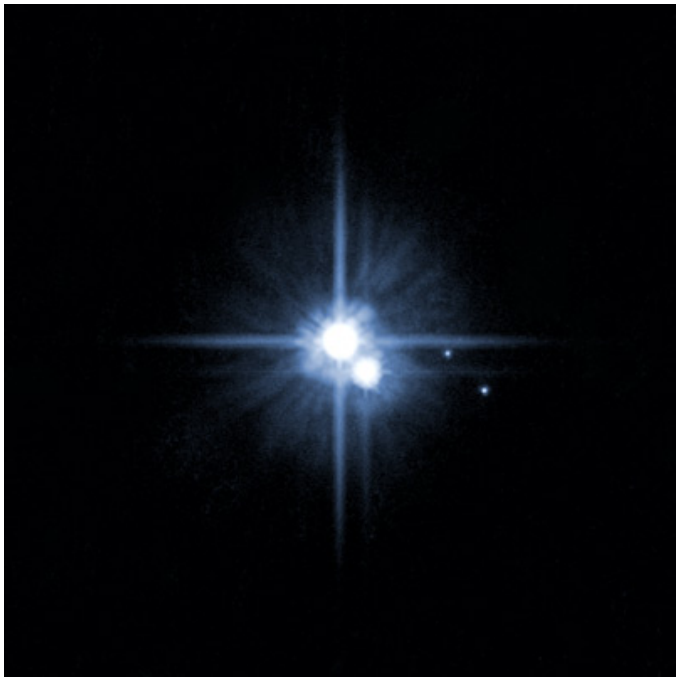
THE PEOPLE'S PLANET
REACTIONS TO THE DISCOVERY OF PLUTO



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ILLUSTRATIONS

1. INTRODUCTION: AND THEN THERE WERE EIGHT

Even through the best telescopes on Earth, Pluto[1] looks like a small star, one of millions of lights that pierce the night sky. Even space telescopes show little more than a hazy orb of white and blue. Yet despite Pluto's small stature and its immense distance from our home planet, we know more about it today than ever. At less than the size of our moon, Pluto has a mass of 1.3×10^{22} kilograms and is roughly 1500 miles in diameter. The length of one day there is almost six and a half Earth-days. Its surface temperature hovers around 44 degrees Kelvin, its orbit is 247.7 Earth-years long, and it is 5,906,380,000 kilometers from the sun.[2] We know a lot about Pluto. Except what to call it.

Since the discovery of Pluto in the spring of 1930, people have recognized it as the ninth planet in our solar system. However, in August of 2006, the International Astronomical Union (IAU) endangered Pluto's status when it voted on the official definition of the word "planet." Prior to this year, no formal definition for the word existed; however, the recent discovery of dozens of Pluto-sized objects at the edge of the solar system required the astronomical community to take action.[3] At the 27th annual convention of the IAU, a special committee proposed that in order to bear the title of "planet" an object must meet three criteria: it must be round, orbit the sun, and clear the

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[1] In order to be as clear and concise as possible, this essay will refer to Pluto by name throughout, although it did not actually receive the name "Pluto" until about ten weeks after its discovery. Similarly, this essay will typically refer to Pluto as a *planet* – despite the recent reclassification – since that was the general opinion about the nature of the object in the immediate months after its discovery, and for the following 76 years.

[2] Zoe Kashner, ed., "Pluto," *The World Almanac and Book of Facts 2007* (New York: World Almanac Education Group, Inc., 2007), 337.

[3] Eris was the straw that broke the camel's back. The object, discovered in 2006, was actually larger than Pluto, either making Eris a planet or Pluto *not* a planet. See John Johnson, Jr., "The name fits: Minor planet, major fuss." *Philadelphia Inquirer*, 15 September 2006, 15 (A).

area of its orbit.[4] Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune all pass these tests. Pluto, however, does not, namely because it resides in what astronomers now call the Kuiper Belt – a region at the edge of the solar system populated with potentially hundreds of Pluto-sized bodies – and because its moon Charon, is nearly as large as Pluto itself.[5] Consequently, as decided by of a majority vote of roughly 400 astronomers, on August 24, 2006, Pluto lost its planetary status. It was now a dwarf planet.[6]

The public reacted with surprising passion to the news of Pluto's demotion. Many people around the world wrote letters and staged protests in defense of Pluto's right to planethood. Others published articles that supported the IAU's decision. Regardless of their camp, most people did not realize that the debate that they had now joined was more than 76 years old. Thanks to Pluto's small size and eccentric orbit, astronomers had debated about its planetary nature since the day of its discovery. Only with the detection of the Kuiper Belt objects in the 1990s did Pluto's planethood arouse suspicions in wider circles.[7] Nonetheless, the core question – *Is Pluto a planet?* – was by no means new.

Historians have thoroughly examined the scientific debate surrounding the nature of the former planet. In the process they expertly describe the search for Pluto, its discovery, and the steady accumulation of data pertaining the distant member of our solar

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[4] "IAU 2006 General Assembly: Result of the IAU Resolution votes," International Astronomical Union [online press release], 24 August 2006; accessed 30 November 2006; available from http://www.iau2006.org/mirror/www.iau.org/iau0603/index.html.

[5] *Ibid.*

[6] According to the IAU, "A 'dwarf planet' is a celestial body that (a) is in orbit around the Sun, (b) has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, (c) has not cleared the neighbourhood around its orbit, and (d) is not a satellite." See "Result of the IAU Resolution votes."

[7] For instance, some textbooks prematurely revoked Pluto's planethood, schoolteachers started discussing the issue in science class, and the Rose Center at the American Museum of Natural History opted not to include Pluto in its giant model of the solar system. See David H. Freedman, "When is a planet not a planet? Arguments for and against demoting Pluto," *Atlantic Monthly*, February 1998.

system. However, these works devote relatively little attention to an important component of Pluto's history: how people came to accept the planet as a planet. Surprisingly, there was no formal declaration and no true scientific explanation of Pluto's planethood. The origins actually lie in the seemingly insignificant opinions and comments of regular people living in the 1930s. Much like its demotion, Pluto's discovery was an instant sensation, exciting people around the world to record their thoughts and feelings. This essay examines those initial reactions to the discovery of Pluto in order to show how scientists and non-scientists alike came to recognize Pluto as a planet and integrate it into their understanding of the universe.

We set the stage by first describing the hunt for and discovery of "Planet X" in 1930. Next, the essay looks at a broad cross-section of reactions from both scientists and non-scientists that attest to the widespread public interest in the planet's discovery. These comments also reveal the discovery's various degrees of significance at the time.

In the following section, the essay hones in on the relevance of the discovery to astronomers and their science. It describes the ways in which the Pluto related to the state of American astronomy in the 1930s, and to more specific issues of contemporary science. Here we also learn about the initial debate pertaining to the planetary status of Pluto and the somewhat arbitrary way in which astronomers began to think of it as a planet.

In the next section, the narrative widens out to consider the variety of reactions from the average man and woman of the 1930s as expressed in hundreds of newspaper articles and letters. These reactions incorporated current events, political satire, countless jokes, and hundreds of suggestions for names. They also attest to a temporarily revived

interest in astronomy. These reactions show how the planet Pluto became a natural part of peoples' understanding of the universe.

Lastly, the essay looks at the integration of Pluto into formal education. The entrance of Pluto into the classroom would solidify the object's planetary status as an enduring fact of science of history that has proved challenging to overcome.

The reclassification of Pluto as a dwarf planet is an important event, but not for the reasons one might expect. Pluto never *was* a planet. To understand why people thought of it as a planet for almost eighty years, it is necessary to explore the initial reactions to its discovery in the spring of 1930.

2. LOWELL, TOMBAUGH, AND X: THE DISCOVERY OF PLUTO

The discovery of Pluto was in many ways a chance occurrence. Of the two men who share the credit for the discovery, one craved the attention that eccentric scientific theories generated, and the other was a 22-year-old farm boy with no training in astronomy. Yet somehow these two successfully concluded what was in some ways a one hundred fifty year search for the last planet in our solar system.

The origins of this search can be traced back to the sighting of Uranus in 1781, the first modern discovery of a planet as it required the use of a telescope to locate.[8] William Herschel initially encountered Uranus in his attempt to understand the arrangement of the stars in our galaxy. After observing the unusual object for several nights, he asked some fellow stargazers to calculate its mass and orbit. These computations revealed that Herschel had in fact discovered a seventh planet.

[8] The innermost six planets are all visible to the naked eye and have been studied for thousands of years.

In the 1830s astronomers began to grapple with Uranus's deviations from its calculated orbit. Ultimately, they came to the conclusion that the gravitational effects of an undiscovered eighth planet might be responsible. Since the eighth world would be too faint to locate even with a telescope, for the first time astronomers relied solely on mathematics to locate a celestial body. Two young experts in celestial mechanics, John Couch Adams of England and Urbain Jean Joseph Leverrier of France, set out independently to calculate the location of the missing planet. Just months apart from each other in 1846, both men actually reached similar conclusions as to where the planet would be found (at right ascension $22^h\ 53^m\ 26^s$).[9] However, Leverrier is traditionally credited with the discovery of Neptune since observers verified his conclusions first.[10]

The Modern Search

By 1905, Neptune still failed to account for all of the perturbations in the orbit of Uranus. Consequently, astronomers began to speculate about the existence of yet another missing planet.[11] Of those most interested in the search for the possible ninth world, Percival Lowell is the most important. Lowell was one of the most famous astronomers of his time, best known for his internationally publicized, and severely criticized theory that the scratches on the surface of Mars were canals created by intelligent beings.[12] The hunt for the missing planet immediately caught his attention because, as historian William Hoyt notes, "Lowell concerned himself largely with…[astronomical] problems

[9] Clyde W. Tombaugh and Patrick Moore, *Out of the Darkness*: *The Planet Pluto* (Harrisburg, Pa.: Stackpole Books, 1980), 59.
[10] "Third Planet Found in Modern Times," *New York Times*, 14 March 1930, p. 14 (A).
[11] See William G. Hoyt, *Planets X and Pluto* (Tucson: University of Arizona Press, 1980), 74-82, for a brief description of these speculations.
[12] *Ibid.*, 80.

that…[brought] prestige and fame to the person who solved them."[13] The absence of the ninth planet posed such a problem. As a result, between 1905 and 1909, Lowell conducted a rigorous search for a trans-Neptunian body.

Figure 1: Percival Lowell on the porch of his residence at the Lowell Observatory in Flagstaff, Arizona.[14]

For this project Lowell used his personal facility, the Lowell Observatory in Flagstaff, Arizona (which he originally built in 1894 to examine the surface features of Mars). Under Lowell's direction, the observatory staff photographed specific sections of the night sky and then searched the photographs for small streaks that would indicate the movement of a planet. Simultaneously, the staff gathered data on the perturbations of Uranus and Neptune against which to compare the photographic evidence. In a second

[13] *Ibid.*, 82.
[14] Hoyt, 107.

concerted search from 1910 to 1915, Lowell used the mathematical data to guide the photographers.[15]

Unfortunately, neither search yielded results. However, Lowell's ten years of investigation were not in vain, for the summary of his work, "Memoir of a Trans-Neptunian Planet," would guide the efforts of future planet-hunters. In his memoir, Lowell concluded that the ninth planet, dubbed "Planet X," would be found in one of two locations 180^{o} apart: heliocentric longitude of 84^{o} or 262.8^{o}. He also deduced that the planet would have a mass between that of the earth and Neptune, a brightness of 12-13 magnitudes, and an inclination of orbit at about 10 degrees.[16] In hindsight, we know that Lowell's calculations were wrong. There are no perturbations in the orbit of Uranus that cannot be traced back to Neptune's gravity. The perceived disruptions were merely the products of the inadequate tools available to astronomers in the nineteenth and early twentieth centuries. In other words, Lowell's calculations had no real bearing on the later discovery of Pluto. However, astronomers would not recognize this for decades, and in the meantime Lowell's work would be the foundation of the hunt for Planet X.

The convergence of several factors led to the temporary derailment of the planet search in 1916. With the death of Percival Lowell on November 16, the observatory lost its guiding visionary and a substantial portion of the funding that he provided. The onset of World War I and the realization that the observatory's telescope was poorly equipped for the task at hand only exacerbated these problems. As a result, the Lowell Observatory suspended its hunt for the ninth planet indefinitely.

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[15] *Ibid.*, 91.
[16] Henry Norris Russell, "Planet X," *Scientific American*, July 1930, 22. The writer did not have access to Lowell's memoir. However, this article includes a photocopy of the conclusion of Lowell's work.

The Search Continues

The arrival of Clyde W. Tombaugh in Flagstaff in 1929 allowed the search to resume. Vesto Melvin Slipher, who had become the observatory's director after Lowell's death, hired the 22-year-old Tombaugh after receiving his written request to join the staff. Tombaugh was an avid amateur astronomer who hoped to turn his hobby into a profession. However, he knew of only one observatory by way of a 1924 issue of *Popular Astronomy*.[17] Coincidently, Slipher needed someone to man the observatory's new 13-inch Lawrence Lowell telescope. So in January 1929, Tombaugh set out from his family farm in Kansas to assume his duties in Arizona.

Tombaugh's move provides an extreme example of the incorporation of amateurs into the field of astronomy, one trend of the early twentieth century. While other sciences at the time excluded amateurs, professional astronomers encouraged amateur involvement in order to make use of the scores of data that casual observers could supply. Conversely, amateurs benefited from the recognition that came from making tangible contributions to scientific progress.[18] Tombaugh represents an extreme case because he was technically a professional astronomer for the Lowell Observatory. Nonetheless he was an amateur in every other sense of the word, having never received a college degree,

[17] Tombaugh and Moore, 24.

[18] Marc Rothenberg, "Organization and Control: Professionals and Amateurs in American Astronomy, 1899-1918," *Social Studies of Science* vol. 11 (1981): 311-316. The American Astronomical Society, for instance, was 15% amateur in the first decade of its existence. Additionally, professionals sought to include amateurs so the former could regulate the work of the latter. Amateurs also acted as the innovators of astronomy at a time when increasing scientific specialization locked professionals into a certain line of work that limited their abilities to experiment. See John Lankford, "Amateurs and Astrophysics: A Neglected Aspect in the Development of a Scientific Specialty," *Social Studies of Science*, vol. 11 (1981): 297-298.

nor any training in astronomy beyond his experiences with a homemade telescope in his backyard. Tombaugh even admitted to the papers after his discovery of Pluto that he wasn't "a real astronomer."[19]

Figure 2: Clyde W. Tombaugh standing next to his homemade telescope at his farm in Kansas in 1928.[20]

At Slipher's request, Tombaugh resuscitated the search for Planet X. The director instructed him to photograph eastward along the ecliptic – the plane on which the other eight planets orbit the sun – and by mid-June he had taken roughly one hundred hour-long exposures of the night sky.[21] At this point, Slipher also asked his new employee to begin examining the plates for potential planet candidates. To aid him in his search,

[19] "Star-finder tells story," *New York Times*, 15 March 1930, 11.
[20] Hoyt, 180.
[21] Tombaugh and Moore, 117.

Tombaugh used a blink comparator, a machine that rapidly switches between two plates several times per second in order to make shifts of celestial bodies more apparent. Tombaugh typically spent about nine hours per day "blinking," and continued his photographing assignment the rest of the time. He maintained this routine until the winter of 1930.[22]

The Discovery

On the afternoon of February 18, 1930, the long search bore fruit. That morning Tombaugh blinked the plates taken on January 23 and 29. As he examined the scene, he noticed "a little image popping in and out."[23] Tombaugh excitedly measured the shift between the images on the two plates, and the 3.5-millimeter difference suggested that the object was trans-Neptunian. After Slipher and another colleague examined the plates, the three men seemed to agree that they had at last laid eyes on the missing trans-Neptunian planet, Lowell's Planet X.

Observatory staffers monitored the object's behavior for the next three weeks, all the while remaining silent about the find. Their reluctance to go public arose from the noticeable differences between Lowell's predictions for Planet X and the astronomers' actual observations. For one, Tombaugh's planet was six degrees away from one of the two possible locations predicted by Lowell. Furthermore, the object had no disk, suggesting that it was much smaller than Lowell had predicted. These factors prompted Slipher to take caution before identifying the discovery as Planet X.

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[22] David H. Levy, *Clyde Tombaugh: Discoverer of Planet Pluto*, (Tucson: University of Arizona Press, 1991), 3.
[23] *Ibid.*, 4.

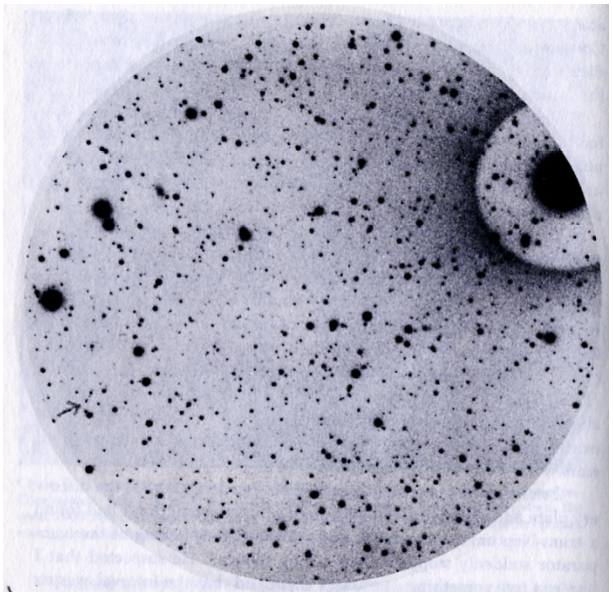

Figure 3: A portion of the January 23, 1930, photographic plate on which Tombaugh located Pluto. The arrow in the left middle points to Pluto, and the large circle at the top right is the brightest star in the region, Delta Gemorium.[24]

Slipher was right to be conservative, as scientists would prove decades later that the discovered object was not Lowell's planet.[25] Nevertheless, in order to give other astronomers time to observe the specimen before it dipped too low in the sky, on March 12 Slipher sent an announcement to Percival Lowell's nephew Roger Lowell Putnam, who was then the observatory's trustee and president of Harvard University. Putnam would pass the note on to the Harvard College Observatory, which would then release the news to the public.[26] Slipher timed all of this so the press would first learn of the ninth planet on March 13, 1930, the 149th anniversary of the discovery of Uranus and what would have been Lowell's 75th birthday.

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[24] Tombaugh and Moore, 128.
[25] The debate about whether or not Planet X and Pluto were the same planet actually lasted until 1978 when the U.S. Naval Observatory discovered Charon, the first of Pluto's moons. Only then were astronomers able to calculate Pluto's mass by studying the gravitational effects of Charon on the larger body. The calculation forced the conclusion that Pluto is not nearly massive enough for its gravity to affect nearby planets like Uranus, and therefore, not Lowell's planet. For more, see Hoyt, 245-246.
[26] Tombaugh and Moore, 131.

In short, one of the most important scientific achievements of the twentieth century was in some ways the product of an inaccurate mathematical calculation, superior eyesight, and luck. Admittedly, to simply call the find "lucky" does not do Tombaugh justice. To quote Hoyt again, "[T]he odds in favor of discovery were substantially enhanced by the implementation of a purposeful, systematic plan of observation," and the fact that Tombaugh was "intellectually prepared for discovery, and thus…predisposed to recognize the unusual, the improbable and even the incredible."[27] Nonetheless, the discovery of Pluto does represent a remarkable chance occurrence that, for a landmark scientific accomplishment, involved little actual science.

Lucky or not, the discovery of Pluto was an important event, one that captivated the public from day one.

3. THE SIGNIFICANCE OF PLUTO

On March 14, 1930, people around the world found the news stamped in bold letters across the front page of their morning papers. "Ninth Planet Discovered on Edge of Solar System," *The New York Times* declared.[28] "Scientists' Cameras Locate Ninth Planet," read *The Washington Post*.[29] "Ninth World Discovered Afloat in our Solar System," announced *The Los Angeles Times*.[30] The page-one stories about the discovery of Pluto attest to the popularity of the find. But what was the inherent value of such an event? What was the significance of the discovery of the trans-Neptunian planet to the people of the 1930s?

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[27] Hoyt, 5-6.
[28] "Ninth Planet Discovered on Edge of Solar System; First Found in 84 Years," *New York Times*, 14 March 1930, 1.
[29] "Scientists' Cameras Locate Ninth Planet," *Washington Post*, 14 March 1930, 1.
[30] "Ninth World Discovered Afloat in Solar System," *Los Angeles Times*, 14 March 1930, 1.

The rarity of planetary discovery immediately indicated the importance of Tombaugh's find. Pluto was only the third planet ever discovered, and the first in 84 years. Newspapers immediately compared the event to the previous planetary discovery. One *New York Times* article called it "the greatest [find] since the location of Neptune,"[31] and another explained that "[n]ot since Adams and Leverrier discovered Neptune in 1846 has there been such excitement in astronomical circles."[32] These first articles, many of which occupied multiple columns, summarized the history of modern planetary discovery, described the motivations for hunting more planets, the mathematical methods used, and the similarities between the techniques implemented in 1846 and 1930. In providing the historical context, these articles allowed readers to appreciate the rarity of Tombaugh's achievement.

A New Perspective

Secondly, as reported by *The Los Angeles Times*, the significance of the discovery of Pluto rested mainly "in the realization of the increased size of the solar system."[33] Prior to 1930, the solar system ended with Neptune at nearly 2.8 billion miles away from the sun. Pluto ultimately tacked on another one billion miles, although estimates for its distance from the earth varied tremendously at first.[34] As Harvard astronomer Harlow Shapley said, the discovery "really gives us [a] pretty definite feeling of expansion."[35]

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[31] "Ninth Planet Discovered on Edge of Solar System," 1.
[32] Waldemar Kaempffert, "The New Planet," *New York Times Magazine*, 23 March 1930, 3.
[33] "Study of New Planet Pushed," *Los Angeles Times*, 15 March 1930, 2.
[34] One astronomer suspected that Pluto's orbit launched the object out 40 billion miles from the sun. See "Leuschner doubts it is a planet," *New York Times*, 15 April 1930, 6.
[35] "Shapley sees proof of universal law," unidentified newspaper, 15 March 1930, David Peck Todd Collection, Manuscripts and Archives, Sterling memorial Library, Yale University, New Haven, Connecticut. Dr. Shapley's comment harkens back to "The Great Debate" of 1920. The Great Debate refers to the actual debate between Shapley and H. D. Curtis over the size of universe. Shapley argued that the

In a similar vein, the discovery and the new realization of the size of the solar system gave many people reason to briefly consider the place of mankind in the universe. For some, it served as a reminder of the insignificance of the earth in the larger scheme.[36] For others, Pluto showed that in the vastness of space, the earth was now less alone. For example, *The Washington Post*, called the trans-Neptunian planet "a prodigal brother," and Dr. Robert Aiken of the Lick Observatory noted that the planet, " 'demonstrates that our little family of worlds is not such a puny thing as modern telescopes have made it appear in comparison with the known universe.' "[37]

Several writers used the discovery to highlight the rare conditions that allowed life to emerge on our planet. In particular, a popular syndicated columnist, Heywood Broun, imagined that the planet might be home to advanced life forms who had spotted our planet eons before. Perhaps they "found our existence interesting," he wrote.

> Think of the wonder it caused out there to be told that around this place called Earth there beat a heat so intense that oxygen, known to them as a broth to be taken with oyster crackers, was a gas. And the fact that a good solid and substantial thing like nitrogen could melt into invisibility might well convince them that on the Earth life would be entirely inconceivable.[38]

Similarly, an article on Pluto in *The New York Times Magazine* read: "Life is, cosmically considered, extremely precarious…[L]engthen or shorten the day materially, rob the

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Milky Way galaxy comprised the whole of the universe (the Gaseous Cloud Theory) while Curtis countered that our galaxy was one of many in a larger universe (the Island Universe Theory). Both astronomers had evidence to support their claims, leading to an on-going academic debate about the scale of the universe. Ultimately, Edwin C. Hubble's discovery of extragalactic Cepheid variable stars in 1923 and 1924 proved to astronomers that other galaxies exist well outside of the Milky Way. Upon realizing the immeasurable size of the universe, Shapley admitted to feeling a sense of expansion. For more, see Steven G. Brush, *The History of Modern Science: A Guide to the Second Scientific Revolution, 1800-1950* (Ames: Iowa State University Press, 1988), 488-491. As an additional side note, years after the discovery of Pluto, Clyde Tombaugh claimed that the event caused the greatest ruckus among astronomers since the Great Debate. See Tombaugh and Moore, 144.

[36] "A few ciphers, more or less," *Christian Science Monitor*, 19 April 1930, 20.

[37] "A newly found planet," *Washington Post*, 15 March 1930, 6 (A); "Study of New Planet Pushed," 2.

[38] Heywood Broun, "It Seems to Me," unknown newspaper and date, David Peck Todd Collection.

atmosphere of its oxygen and water vapor,…increase the distance of that mass from the sun and every living thing dies."[39] If only for a short time, the discovery of Pluto reminded people that if they were alone in the universe, their lives were extremely precious.

Individual Glory and National Praise

The detection of Pluto had perhaps the strongest impact on the reputation of the late Percival Lowell. As mentioned above, during his life Lowell drew tremendous criticism from many members of the scientific community who condemned not only his sensational theories but even his methods and personal integrity.[40] Because of the ridicule he faced, Lowell carried out his search for the trans-Neptunian planet in secret. Only in 1915 did he publicly discuss the results of his search, and they were not well received.[41]

However, when Tombaugh spotted what many people believed to be Planet X not far from one of the spots Lowell had named fifteen years before, newspapers and astronomers suddenly praised the mathematician for his foresight and intellect. Princeton University's Henry Norris Russell, one of the most respected astronomers of the time, wrote of Lowell in *Scientific American*: "[T]he discovery of this new planet has justified him by his works despite the doubts of many of his contemporaries."[42] A feature in *The New York Times Magazine* perhaps offered the highest praise. The article credited Lowell for discovering the planet with "nothing but paper, pencils, a book of logarithms, his fine mathematical gifts, and a complete knowledge of all the work on the planets that has been

[39] Kaempffert, 3.
[40] Hoyt, 80.
[41] *Ibid.,* 85-86.
[42] Russell, "Planet X," 22.

done before him." "To sit thus at a desk and make astronomical discoveries of the utmost importance," the article continued, "surely that is glory."[43] Although he was no longer alive to reap the benefits, Lowell ultimately received the recognition he set out to attain in 1905, despite the fact that his predictions for Planet X had no more scientific credibility than his theory of life of Mars.

In addition to glory for Lowell, the discovery also generated praise for Tombaugh and his colleagues. "I wish to extend my congratulations to the workers at Flagstaff for their persevering efforts in searching for this planet," wrote John Pitman, a professor of mathematics and astronomy at Swarthmore College. "I know that you people at Lowell Observatory have made an extremely valuable contribution to astronomy."[44] Morris Peck, an old friend of Lowell's expressed his approval that the "accurate calculations of Dr. Lowell [had] been persistently and skillfully followed up by the present staff to a definite result: a discovery of epochal importance."[45]

Between Lowell and Tombaugh, the discovery gave people reason to celebrate the American values that gave rise to the social and economic progress of the Roaring '20s. Lowell suddenly spoke to the intellectual potential of America. His work also represented American persistence and independent thinking. Similarly, the press used Tombaugh to show how the average American, raised in a rural setting without much technical training, could apply an appreciation for hard work and perfection to accomplish magnificent feats.[46] One article even put the spotlight on Reverend Joel Metcalf and C.A.

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[43] Kaempffert, 3.
[44] John H. Pitman, Swarthmore College, to Vesto Melvin Slipher, 5 May 1930, Lowell Observatory Archives, Lowell Observatory, Flagstaff, Arizona.
[45] Morris Peck V. M. Slipher 19 June 1930, Lowell Observatory Archives.
[46] "Star-finder tells story," 11. For more on Tombaugh's thoughts on the influences of his upbringing on the discovery of Pluto see Tombaugh and Moore, 117 and 142.

Robert Lundlin, the respective designer of and lens-maker for the Lowell Observatory telescope, to show how the collaboration of many uniquely skilled Americans led to the discovery of the ninth world.[47] In the spring of 1930, American citizens were still riding the wave of progress that had carried them through 1920s.[48]Although the stock market had crashed less than six months before, and many already felt the tremors of mounting economic challenges, Americans in 1930 had good reason to believe that life would only get better.[49] The discovery of Pluto reflected the innovation, individualism, persistence, and collaboration that had allowed Americans to transform the United States into one of the most successful countries in the world.

American Pride

Because the discovery of Pluto aroused a sense of American triumph, it became the source of tremendous pride for many Americans. The Lowell Observatory received several letters that revealed feelings of satisfaction over the "American discovery." Archie M. Newton wrote on behalf of the Amateur Telescope Makers' Society: "[W]e are

[47] "Intensify Study of New Planet," unknown paper, 15 March 1930, David Peck Todd Collection, Manuscripts and Archives, Sterling memorial Library, Yale University, New Haven.
[48] By that time Americans had witnessed the emergence of manufacturing companies like U.S. Steel, Ford, and General Motors; they had confronted social issues like prohibition and women's suffrage; and they had welcomed electrical power, automobiles, and mass marketing into their daily lives. For more see David M. Kennedy, *Freedom from Fear: The American people in Depression and War, 1929-1945* (New York: Oxford University Press, 1999), 13.
[49] *Ibid.*, 58-9. The common assumption is that from start to finish, The Great Depression consumed the United States in the 1930s. In this light, most historians view the discovery of Pluto as an event that lifted peoples' spirits and gave them hope in a dismal decade. However, as David Kennedy writes on page 58: "The stock market had by April 1930 recouped about one-fifth of its slippage from the speculative peak of the preceding autumn. Some rural banks had begun to crack, but the banking system as a whole had thus far displayed surprising resilience in the immediate wake of the crash…The still sketchy reports on unemployment were worrisome but not unduly alarming. Major employers were apparently abiding by their pledge to maintain wage standards, and private industry as well as local and state governments had publicly acceded to Hoover's request to accelerate construction projects." In other words, most of the effects of the Depression had not yet appeared by the spring of 1930. Hence, the discovery of Pluto cannot be seen as an event that allowed Americans to escape from their daily lives. Rather it was an exclamation point to a decade of progress.

deeply gratified that this great honor should come to America, and especially to the Southwest."[50] Similarly, the Chancellor of the University of Kansas wrote: "It was a great personal satisfaction that the new planet awaited complete discovery by my good Hoosier friend [Slipher, a graduate of Indiana University] and by a young man from my adopted state of Kansas." [51] A.E. Douglas of the University of Arizona added briefly, "Congratulations on new planet. Glad discovery made in Arizona."[52]

Praise from overseas added to the pride that Americans felt in discovering the latest planet. The Italian astronomer Emilio Bianchi told *The New York Times*: "The discovery of the new planet is a triumph for America, crowning many triumphs gained in the last few years." He went on to say that the discovery demonstrates how the superior scientific facilities in the U.S. "are at the disposal of all scientists who possess an abundance of learning and tenacity and genius."[53] One day later, speaking in London, Sir Oliver Lodge declared in light of the recent find that "America is doing extraordinarily wonderful work."[54]

A "Brilliant Piece of Work"

Because Tombaugh's discovery was significant on so many levels, people from all walks of life took it upon themselves to send letters of congratulation, to request information, and to express their excitement to the Lowell Observatory. Hailing from Minnesota, A.V. Taylor wrote, "[I]t is with much interest that I have been reading the

[50] Archie M. Newton to Clyde W. Tombaugh, 17 March 1930, Lowell Observatory Archives.
[51] E. H. Lindley to V. M. Slipher, 21 March 1930, Lowell Observatory Archives.
[52] A. E. Douglas to V. M. Slipher, 14 March 1930, Lowell Observatory Archives.
[53] "Italians get photos of Lowell planet," *New York Times*, 26 March 1930, 10.
[54] "Lodge lauds feat of finding planet." *New York Times.* 27 March 1930, 8.

newspaper accounts of the recent discovery, and I wish to express my congratulations."[55] William Mitchell, writing from a steel manufacturing company in Ohio believed that the observatory's was a "a most remarkable discovery" and a "brilliant piece of work."[56] Walter Bennett, a lawyer from Arizona, added, "This is easily the greatest astronomical discovery of the century."[57] And one man from New Jersey exclaimed in the post-script of his letter, "The new planet is being talked of by everyone in the office this morning!"[58]

Leading academic figures sent their best wishes to the Lowell staff as well. "Indiana University sends hearty congratulations," wrote William Lowe Bryan.[59] "Congratulations upon your observatory finding a lost planet," said the president of the University of Montana. "For a number of years I have known that the solar system was lacking something."[60] Everett Yowell of the Cincinnati Observatory wrote to "add [his] congratulations" on "a fine piece of work."[61]

Perhaps most surprising was the generous praise that astronomers bestowed upon Tombaugh's find in the newspapers. The more reserved, like Princeton's J. Q. Steward, labeled the discovery " 'an important and interesting addition to our solar system,' " while the most enthusiastic hailed it as " 'one of the greatest discoveries in the history of science.' "[62] Other astronomers publicly labeled the discovery of the trans-Neptunian

[55] A. V. Taylor to V. M. Slipher, 18 March 1930, Lowell Observatory Archives.
[56] William H. Mitchell to V. M. Slipher, 14 March 1930, Lowell Observatory Archives.
[57] Walter Bennett to V. M. Slipher, 15 March 1930, Lowell Observatory Archives.
[58] E. August D…[?] to V. M. Slipher, 14 March 1930, Lowell Observatory Archives.
[59] William Lowe Bryan to V. M. Slipher, 15 March 1930, Lowell Observatory Archives.
[60] L. B. McMullen to V. M. Slipher, 28 March 1930, Lowell Observatory Archives.
[61] Everett I. Yowell to V. M. Slipher, 15 March 1930, Lowell Observatory Archives.
[62] "New Planet Found, First in 84 Years," *New York Times*, 14 March 1930, David Peck Todd Collection.

object the astronomical event of the century, and one of the greatest events " 'in the history of astronomy.' "[63]

Astronomers and members of the general public alike recognized the significance of the discovery. In fact, it excited them enough to write to strangers in the Arizona desert and to publicly equate the find with some of the most important discoveries in the history of science. These reactions show that the discovery of Pluto was not just of passing significance to a small group of people; the planet would continue to figure into the daily lives of a number of men and women for months on end, laying the foundation for general public acceptance of Pluto as a planet.

4. PLUTO AND ASTRONOMY IN THE 1930s

Those for whom the find carried particular significance were the astronomers of the 1930s. As one newspaper columnist joked, "The discovery of a planet is to an astronomer what a discovery of a new exemption is to the average income tax payer."[64] These men were as excited as any about the discovery, especially because Pluto related to several issues of contemporary science. In the weeks immediately following the discovery of the planet, astronomers linked it to theories of planet formation, to competing theories of gravity, and to the possibility of extraterrestrial life. Furthermore, as astronomers learned more about the Pluto, it challenged their understanding of the order of the universe as they tried to answer the question: what is it?

[63] "Get Further Views of Ninth Planet," *New York Times*, 15 March 1930, 8; "New Planet Found," David Peck Todd Collection.
[64] H. I. Phillips, "The Once Over," *Washington Post*, 19 March 1930, 6.

The Rise of American Astronomy

On the broadest scale, the discovery of Pluto reflects several trends of the early twentieth-century that would elevate American astronomy to its position of international prominence by the 1940s. For one, the Lowell Observatory's hunt for Planet X is a perfect example of a focused observational undertaking. Unlike Europeans in the traditional centers of astronomy who largely focused on theoretical work, American astronomers at the time applied themselves to concerted observational projects.[65] The strong leadership of V. M. Slipher and the methodical search methods employed by Tombaugh are also representative of the time period. The twentieth century brought a new power structure to astronomy in America. Most observatories became hierarchical, data-gathering organizations, presided over by a powerful director and employing "factory methods for the acquisition, reduction, analysis, and publication of data."[66] The focus and unique organization of American astronomy allowed for more productive and purposeful projects such as the search for a missing planet. Lastly, the praise that the Lowell staffers earned from university faculty members speaks to the concentration of astronomers in institutions of higher learning. Due to the unique structure of American colleges and universities, school presidents controlled the resources and goals of their institutions, and possessed the authority, as well as the private funding, to add or expand departments for the accommodation of new specialties. Hence, as universities grew

[65] John Lankford, *American Astronomy: Community, Careers, and Power, 1859-1940*, (Chicago: University of Chicago Press, 1997), 396-397.

[66] *Ibid*., 402. Beyond individual observatories, the greater astronomical community also fell under the strong direction of a "power elite," composed of the directors of the leading observatories and members of the National Academy of Sciences, who controlled the discipline's resources and defined its activities. Furthermore, the emergence of national publications and organizations around the same time – such as the precursor to *Popular Astronomy* and the American Astronomical Society – helped to disseminate information, unify the astronomical community, and enforce the new power structures. For more see Lankford, *American Astronomy*, 4 and 376. See also Rothenberg, 309, and Robert Smith, *The Expanding Universe: Astronomy's 'Great Debate' 1900-1931* (Cambridge: Cambridge University Press, 1982), 53.

around the turn of the twentieth century, they could support more specialized departments with more astronomers, and provide them with better facilities.[67] The discovery of Pluto provides a focused illustration of the main trends that defined American astronomy in the 1930s and it justified the claim that some made about astronomy "becoming an American science."[68]

Pluto and the Origins of the Solar System

At a much more specific level, Pluto immediately figured into ideas about the origins of the solar system. In 1930, there existed two main theories of planet formation. One, the Nebular Hypothesis, held that the solar system began as a hot, rotating gas cloud. Due to the speed of rotation, rings of gas then separated from the larger cloud, cooled, and eventually condensed into planets orbiting the molten sun.[69] The second proposal, known as the Tidal or Planetesimal Theory, suggested that the planets were products of a near collision between our sun and another star. According to this explanation, the gravity of a nearby drifting star ripped gaseous material out of the sun's atmosphere. Over time this gas condensed into solid particles (called planetesimals) that accreted to form planets.[70] Although the Nebular Hypothesis was the older of the two theories, by the 1920s astronomers generally accepted the Tidal Theory as more accurate.

Harvard University's Harlow Shapley was one of the first to apply the news of the trans-Neptunian body to theories of planetary formation. In an address to the Philadelphia

[67] Lankford, *American Astronomy*, 388-91. A survey conducted in 1931 reveals that 64 colleges and universities had observatories and that the nation led in number of personnel devoted to astronomy. See Lankford, "Amateurs and Astrophysics," 286.
[68] "Lodge lauds feat of finding planet," 8.
[69] Steven G. Brush, *A History of Planetary* Physics, vol. 3, *Fruitful Encounters: The Origin of the Solar System and of the Moon from Chamberlin to Apollo* (Cambridge: Cambridge University Press, 1996), 3-4.
[70] *Ibid*., 8.

Forum on March 15, Dr. Shapley explained that the discovery "discredits more than ever 'that already pretty well discredited nebular hypothesis' "[71] because the theory could not account for a planet at such a tremendous distance from the sun.[72] He cautioned, however: " 'Whether the finding of the new planet and the results of the studies centering upon it will tend to prove or disprove the tidal evolution theory remains to be seen.' "[73]

J. Q. Steward of Princeton University provided the most detailed information about the relationship between the new object and theories of planet formation. According to the Tidal Theory, Steward explained, all of the planets traveled around the sun very erratically until the friction of residual planetesimals pulled them into nearly circular orbits. After learning about the eccentric nature of Pluto's orbit, Dr. Steward told *The New York Times* that Pluto might be "an object which was exempt from the influences that coerced the other planets and so is following the same sort of path that they followed when the solar system was young." Further investigation of Pluto's composition and orbit might then help astronomers to understand what the solar system looked like at the outset of its formation.[74]

Ultimately, the planet played little role in the process of investigating the formation of planets, especially after astronomers began to restore their faith in a modified version of the Nebular Hypothesis towards the end of the decade.[75] Nonetheless, in the weeks after the discovery of Pluto most scientists who voiced an

[71] "New Planet Found," David Peck Todd Collection.
[72] "World glasses swing skyward to new planet," *Christian Science Monitor*, 15 March 1930, 1.
[73] "New Planet Found," David Peck Todd Collection.
[74] "Key to Planet birth seen in new body," *New York Times* 15 April 1930, 6. However, not all astronomers believed that the discovery of Pluto would help them to uncover the mystery of planet formation. Dr. Robert Aiken of the Lick Observatory in California told the press the Pluto would not "modify existing theories of the probable origin or nature of the solar system." Even Dr. Stewart said, "[Pluto] may support the theory, and it many work against it." See "Study of new planet pushed," *Los Angeles Times*, 15 March 1930, 2; and "Key to Planet birth seen in new body," 6.
[75] Brush, *Fruitful Encounters*, 8.

opinion said that "the discovery was very important in helping to complete the story of the origin of the solar system."[76]

Newton vs. Einstein

In the realm of celestial mechanics, Pluto figured into the on-going conflict between Isaac Newton's Theory of Gravitation and Albert Einstein's Theory of Relativity. In 1687, Newton proposed in his *Principia* that the force of attraction between two bodies is proportional to the product of the bodies' masses and inversely proportional to the square of the distance between them. The theory of gravity as determined by Newton is still one of one of the most important mathematical descriptions of our universe. However, in 1916 Einstein challenged Newton's work when he published the General Theory of Relativity, a mathematically complex concept suggesting that gravity was the geometrically necessary consequence of the "shape" of space.[77] Needless to say, this explanation was more technically demanding than Newton's, which led many to defend the superiority of the simpler theory of gravity that had functioned properly for centuries. In 1930, the debate still dragged on, and scientists as well as general enthusiasts used the discovery of the trans-Neptunian planet to champion the classical theory of gravity over the modern.

Pluto lent itself beautifully to the pro-Newton argument since Percival Lowell had relied solely on the classical theory of gravity to determine the location of Planet X. Charles Lane Poor, a professor of celestial mechanics at Columbia University was the

[76] "Lodge lauds feat of finding planet," 8 (A).
[77] Albert Einstein, *Relativity: The Special and the General Theory*, trans. Robert W. Lawson (New York: Three Rivers Press, 1961).

most outspoken Newtonian. " Einstein didn't enter into it at all," he told *The New York Times*.

> [T]he calculations which saw the [ninth] planet mathematically before there was any telescope capable of seeing it optically…were made without the slightest reference to his relativity theories, either special or general…[The discovery] is a very great triumph for Newton's basic theory of gravitation as a description of the facts…as distinguished from Einstein's attempt to substitute what he calls a four-dimensional curvature of space-time.[78]

Poor was not alone in his criticism of Einstein. The Italian astronomer Emilio Bianchi saw " 'the American discovery as substantiating Newton's theory of the law of gravity.' "[79] Clyde Fisher, the curator of the American Museum of Natural History in New York explained: " '[T]he discovery of this new planet at [this] time…will serve as a demonstration of how closely Newton described [the cosmos].' "[80]

Ultimately, Pluto did not a play a part in the verification of Relativity. Later experiments would verify the theory and astronomers would come to understand that for very large bodies moving at slower speeds, Newtonian gravity describes celestial mechanics quite adequately. Nonetheless, in the words of one contemporary reporter, Pluto "[gave] new life to the Einstein-Newton controversy."[81]

Life on Pluto

Scientists also pulled the planet into a handful of discussions regarding rather unusual scientific topics.[82] Included among them was the possibility of the existence of

[78] "Triumph of Newton Seen in Discovery," unknown newspaper, 15 March 1930, David Peck Todd Collection.
[79] "Planet X photographed," *Los Angeles Times* 26 March 1930, 1.
[80] "Triumph of Newton Seen in Discovery," David Peck Todd Collection.
[81] *Ibid.*
[82] For instance, some believed that the trans-Neptunian body might resuscitate Bode's Law, an old theory disproved by the discovery of Neptune that a mathematical pattern determined the distance of the planets from the sun. Harlow Shapley told the press that he believed the discovery of the object demonstrated the

life on the new world. Tombaugh made his discovery at a time when many still believed in the possibility of life on the moon, on Mars (as demonstrated by Lowell), and elsewhere in the universe. Nonetheless, most scientists quickly dismissed the possibility of life on Pluto. For example, Sir James Jeans of the Royal Observatory explained that " 'the new planet can have no inhabitants...[because its] distance from the sun must make it far too cold.' "[83] Still, logic did not prevent at least a few scientists from entertaining the idea for hypothetical purposes. George Van Biesbroeck of Yerkes Observatory told the papers that due to the frigid climate, "[If] there is a form of life on the new planet we can be sure it is totally different from that on the earth."[84] Several others explained that to hypothetical Plutonians the sun would look no brighter than Jupiter appears to the naked eye on Earth.[85]

The Hunt for More Planets

Of more practical concern, the discovery of Pluto convinced a number of astronomers that there were still more planets out there waiting to be located. The Yale Observatory's Frank Schlesinger told *The New York Times*, "[I]t is easy to predict that other major planets will be added to our solar system," though they would be increasingly

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existence of a universal law that controls everything. One *New York Times* writer offered the possibility that the discovery implied the existence of "a new, completely ununderstandable physics" that would "rack our poor brains trying to understand." And perhaps the most unique claim originated from H. P. Gillette, a Californian scientist who told the *Los Angeles Times* that Pluto was the trans-Neptunian planet that he believed was responsible for earthquakes and rainfall cycles on Earth. For more information, see Tombaugh and Moore, 84; "Shapley sees proof of universal law," David Peck Todd Collection; "By-Products," *New York Times*, 23 March 1930, 4; and "Letters to the Times," *Los Angeles Times*, 17 March 1930, 4.

[83] "May Alter Theories of Solar System," *New York Times*, 16 March 1930, David Peck Todd Collection.

[84] "Get Further Views," 8.

[85] "May Alter Theories of Solar System," David Peck Todd Collection.

difficult to find.[86] When asked about the possible existence of other planets, S. B. Barrett of Yerkes Observatory explained, " 'Oh surely…there must be [more]…We know there are no big ones because of the perturbation, but there must be small ones, probably like the one just discovered.' "[87]

Newspaper articles reveal that at least a handful of astronomers attempted to find these possible planets. A. E. Douglas reported that his observatory staff had started searching for two more bodies by photographing a "suspected region of the sky."[88] Others chose to reexamine photographic plates taken in earlier years for planet candidates. The Dominion Observatory in Canada even had temporary success, announcing on April 24 that astronomers there had unwittingly photographed a trans-Neptunian in 1924.[89] The calculations of A. D. Crommelin showed that the object was in fact trans-Neptunian; however, it was never photographed again and soon faded out of the news as a result.[90] Despite the fate that this alleged tenth planet met, *The Chicago Tribune* was quick to joke: "[D]iscovering one new planet is all right, but it starts everybody doing it and we haven't even found a name for the first [one] yet."[91]

The variety of connections between Pluto and contemporary scientific topics explain why so many members of the scientific community hailed the discovery as a landmark event. In the first weeks after the Lowell Observatory's announcement, the planet became involved in discussions about the origins of the solar system, the challenge to Newton's theory of gravity, the possibility of extraterrestrial life, and the existence of

[86] "Ninth Planet Discovered on Edge of Solar System," 1.
[87] "Third Modern Discovery," *Chicago Daily Tribune*, 14 March 1930, 1.
[88] "Two more planets sought," unknown newspaper, 24 March 1930, David Peck Todd Collection.
[89] "New Planet Believed Seen," *Los Angeles Times*, 24 April 1930, 1.
[90] Hoyt, 250.
[91] "A line o' type or two," *Chicago Daily Tribune*, 24 April, 12.

more missing planets. All of these connections show that the discovery of Pluto was not an isolated scientific achievement. Yet the biggest debate surrounding the discovery concerned the nature of the planet itself. As details about the planet emerged, astronomers began to wonder whether it was actually a planet after all.

Planet, Comet, or Something New?

The first doubts resulted from the lack of information that the Lowell Observatory released about Tombaugh's find. In his original announcement, V. M. Slipher supplied the position of Pluto as of March 12 but not the earlier recorded positions that dated back to January. He did so intentionally. Slipher wanted to bring further recognition to Percival Lowell by having his observatory be the first to calculate the orbit of the new planet, which could only be done with many positions that spanned an extended length of time. If Slipher released the early positions to other astronomers, they would be happy to calculate the planet's orbit and take the credit.[92] But if he stayed quiet, the others would have to wait months to accumulate the necessary data. In other words, Slipher's silence bought time.

Unfortunately, it also had the detrimental effect of causing some astronomers to second-guess the nature of the discovery. The first was Dr. John Jackson of the Royal Observatory in Greenwich. On March 21, a *New York Times* article quoted him extensively about the international view of the discovery. Jackson congratulated the

[92]Astronomers around the country put enormous pressure on Slipher to release the pre-announcement positions of the new object. Almost hostile requests came from Seth B. Nicholson of the Mount Wilson Observatory, A. O. Leuschner of the Students' Observatory of the University of California at Berkeley, and the U.S. Naval Observatory. Even Roger Lowell Putnam, the observatory's trustee wrote to Slipher on March 15, 1930: "Every one is hot on the subject. Let us feed them what they want." For more on astronomers' attempts to seize the earliest positions from the Lowell Observatory, see Hoyt, 201-4.

Lowell Observatory astronomers on finding *something*, but stated that the lack of available information hinted at the object's being non-planetary. "[T]he thing that seems strangest of all to me," he told the reporter,

> is the fact that the Americans have given out to the world scarcely any details beyond the bare announcement…Every year we have been given much more immediate information on the discovery of a new comet than in the case of this far more important discovery, if, indeed, it is what the Lowell Observatory claims…I am not doubting the Americans' observations, but doubting that what they found is what they claim.[93]

A second cause for doubt among astronomers was the discrepancy between many of Lowell's predictions for the trans-Neptunian planet and observations of the actual object. Again, Dr. Jackson's critique in *The New York Times* pointed out that the planet "'wasn't found in the place Professor Lowell predicted for it,'" nor did the object exhibit the anticipated brightness.[94] Others followed his lead. Harold L. Alden of the Yale University Southern Astronomical Station told the press, contrary to Lowell's prediction, "[T]he object discovered is too small to create the disturbance [of Uranus] that is taking place."[95] A. O. Leuschner added: " 'Lowell predicted that "Planet X" would prove to be seven times as large as the earth. It is highly improbable that the newly discovered object can be anywhere near that size.' "[96] The differences between the traits of Lowell's predicted planet and the one actually discovered led many to believe that the object was not a planet at all.

On the other hand, others believed that the new object might be a planet, just not "Planet X." In France, Fernand Balbet declared: " '[T]he newly discovered planet, although trans-Neptunian, is not that of Lowell,' " because it was too small, " 'and [that]

[93] "3 British Experts Doubt New Planet," *New York Times*, 21 March 1930, 3.
[94] *Ibid.*
[95] "Doubt new planet is one forecast," *New York Times*, 2 April 1930, 10.
[96] "Identity of Planet 'Sure' Slipher Says," *New York Times*, 16 April 1930, 14.

the Lowell planet remains to be discovered.' "[97] Yale's Schlesinger stated clearly his belief that the object discovered was indeed a planet, albeit " 'one that has no relation with the different bodies that have been suggested in discussion of discrepancies in the path of Uranus.' " Again, it was simply not big enough.[98] His colleague E. W. Brown, an expert in celestial mechanics, had examined Lowell's work and reached the conclusion that the 1915 predictions lacked scientific credibility.[99] As a result, the object could not match the predictions for Planet X because the foundations of any such predictions were unfounded.

As members of the scientific community began to question the nature of the discovery, those in the Lowell Observatory camp strenuously defended their claim that Tombaugh had found a planet, most likely Planet X. As Slipher reaffirmed to the press in April: "[On] March 13…we believed [the object] to be the ninth member of the planetary family and so stated. Today, we are more in that belief [than ever.]"[100] Slipher had good evidence with which to support his claim. For one, although Tombaugh had found the object in a different spot than Lowell predicted, it was a mere 6^{o} away from one of Lowell's predicted locations and in range to affect the orbit of Uranus. Even scientists could not accept the probability that Tombaugh had found an object of Pluto's size by chance, let alone one that inhabited the same region identified by Lowell. Secondly, astronomers accounted for the seemingly inconsequential mass of the planet with the theory that its surface did not reflect light well. With a low reflectivity, only the portion

[97] "Planet Not Lowell's, Frenchman declares," *Christian Science Monitor*, 17 April 1930, 1.
[98] "Harvard-Yale Rivalry Active Among Planets," *Chicago Daily Tribune*, 19 April 1930, 14 (A).
[99] "Admits new body looks like planet," *New York Times*, 19 April 1930, 10. Of course, we now know that Brown was correct to refute Lowell's claims. For a more detailed explanation of Brown's refutation of Lowell, see Dorrit Hoffleit, *Astronomy at Yale: 1701-1968* (New Haven: Connecticut Academy of Arts and Sciences, 1992), 109-110.
[100] "Identity of Planet 'Sure' Slipher Says," 14; see also Hoyt, 204.

of the planet that reflected light adequately would be visible on Earth, belying the true size of the body. That astronomers outside of Flagstaff supported the claim for planethood reinforced the Lowell Observatory's stance. For example, J. S. Paraskevopoulos from South Africa, the Austrian physicist Hans Hoerbiger, and, later, John Jackson, who changed his mind after initially speaking out against the discovery so strongly, all agreed that even if it did not belong to Lowell, at the very least Tombaugh had found a planet.[101]

That's not say these astronomers believed Tombaugh had found another planet of the ordinary variety, however. As more information became available from observatories around the world the "planet" began to look unlike anything else in the solar system. The object's orbit, which Slipher finally calculated on April 12 with the help of his college astronomy professor, provided the most surprising information. According to these calculations, it would take 3000 Earth-years for the object to orbit the sun. The planet's orbit also had an eccentricity of 0.9 and an inclination of 17^{o} 21^{m}. In other words, the orbit was incredibly large and highly elliptical (whereas most other planets have nearly circular orbits), and the body traveled significant distances above and below the plane of the other planets over the course of its year.[102] Only comets exhibited any of these features. Indeed, many astronomers preferred to think of Pluto as a comet.[103]

Others had trouble classifying the object at all. Harlow Shapley told *The New York Times*: "The preliminary orbit indicates [that the object is a] remarkable type of

[101] "South Africa Films Locate New Planet," *New York Times*, 25 March 1930, 6; "Links new planet to icy cosmos idea," *New York Times*, 29 March 1930, 8; "Science," *Time Magazine*, 12 May 1930, 68-69.
[102] We now know that Pluto's actual orbital eccentricity is 0.249 (almost 15 times that of the Earth), and that its inclination is 17.16^{o} For more facts see Kashner, 337.
[103] "Theory of Comet Pressed by Briton," *New York Times*, 24 March 1930, 9. Another astronomer explained the planet's quirkiness by suggesting that Pluto originally belonged to another solar system until it was "torn from its orbit by the disruptive approach of still another star and shot off into space." See "Doubts Planet Theory," *Chicago Daily Tribune*, 28 April 1930, 2.

member of the solar system not comparable with known asteroids and comets, and perhaps of great importance in cosmogony."[104] Roger Lowell Putnam wrote to Slipher in April, "If it is not strictly planetary, [the object] comes into a wholly new class, which is, in some ways, more exciting."[105]

As interesting and confusing as they were, the unique features of the planet fueled an interest in the discovery that no one anticipated. Over the next few years, astronomers wrote dozens of scientific articles pertaining to the planet in the leading astronomical journals and popular science magazines.[106] Correspondence reveals that astronomers also had personal stakes in the nature of the planet. Henry Knox-Shaw of Oxford bet Dr. Jackson a shilling that Tombaugh's object would turn out to be a planet. Similarly, Schlesinger bet one colleague a chocolate cake.[107] The ongoing scientific discourse attests to the sustained intellectual interest in the nature of the planet among astronomers. Secondly, the friendly competitions reveal that astronomers had a personal interest in the results of the discovery as well. Perhaps most importantly, these reactions demonstrate that even scientists didn't know how to classify Pluto. As one *New York Times* article summarized:

> "Planet X, after all our glad excitement over it, turns out to be only something new to worry about. It may not be a planet at all. If it is, it is the most eccentric one we have…It has the wild, carefree ways of a comet, and yet it is thousands of times too bright for a comet. It is something new. It has the astronomers sitting up nights wondering."[108]

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[104] "'Planet X' Orbit Raises More Doubt," *New York Times*, 14 April 1930, 19.
[105] Roger Lowell Putnam to V. M. Slipher, 15 April 1930, Lowell Observatory Archives. It seems only Tombaugh was disappointed with his discovery, admitting years later, "I was terribly dismayed that the new-found planet was so unorthodox in nature." See Tombaugh and Moore, 139.
[106] Examples include feature articles written by Henry Norris Russell in the July, November, and December 1930 issues of *Scientific American*, articles in the March 1950, March 1960, and March 1968 issues of *Sky and Telescope*, and several others in the 1930 and 1931 issues of *Popular Astronomy*.
[107] Henry Knox-Shaw to Harlow Shapley, 25 March 1930; Frank Schlesinger to Henry Knox-Shaw, 12 April 1930, Yale Observatory Archives, Yale University Observatory, New Haven, Connecticut.
[108] L. H. Robbins, "Pride, Reason – And So Forth," *New York Times,* 20 April 1930, 118.

A Planet is Made

So how did Pluto become recognized as a planet? In the simplest sense, astronomers decided that the object was neither cometary nor asteroidal, and therefore it became a planet for lack of a better name.[109] However, Pluto's orbit forced the final decision. As astronomers outside of Flagstaff sought to verify the planet's existence they used Slipher's orbit to find images of the body on old plates. Over the next few months, these men and women uncovered fifteen pre-discovery images of Pluto dating back to 1914 from observatories around the world (including two from the Lowell Observatory).[110] In turn, the number of images allowed for better calculations of the planet's orbit. Although unusual, the consistency of Pluto's path around the sun led to its acceptance among astronomers as a planet. A. D. Crommelin's calculated orbit of 265.3 years, though incorrect, particularly made Pluto seem compatible with its nearest neighbors in the solar system.[111] In the words of Princeton's Henry Norris Russell,

> The [most recent] calculations… leave no doubt outstanding about the main characteristics of this most interesting object…[The] claim of the newcomer to rank as a planet is decisively confirmed…[T]here can be no hesitation in assigning the new body to the ninth place among the sun's more important attendants.[112]

That was all. Scientists conducted no further inquiry to better classify the object. There was no formal declaration, no notice in astronomical society bulletins, and certainly no vote declaring Pluto's planetary status. Pluto became a planet because its orbital period seemed a reasonable length and because no better name existed. Granted,

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[109] Hoyt, 212.
[110] *Ibid*., 214.
[111] *Ibid*., 213.
[112] Henry Norris Russell, "How Pluto's orbit was figured out," *Scientific American*, December 1930, 446. However, some still hesitated to call Pluto a planet. In a paper for the Astronomical Society of the Pacific written two years after the discovery of Pluto, A. O. Leuschner made a point of referring to Pluto as *an object* even though it was universally regarded as a planet by that time. For more see A. O. Leuschner, "The Astronomical Romance of Pluto," *Publications of the Astronomical Society of the Pacific*, vol. 44, no. 260 (1932): 199.

John Jackson labeled it "the queerest planet ever discovered" and "a type of which we have no previous knowledge."[113] Nonetheless, Pluto assumed its planetary status because astronomers decided to call it by that name. Hence, just as the search for Pluto stemmed from Percival Lowell's desire for publicity, and just as Tombaugh's discovery depended on luck as much as method, 76 years of scientific acceptance of Pluto as a planet relied mostly on personal opinion.

The discovery of Pluto carried tremendous significance to astronomers in the 1930s. Because it was largely the product of the organization of early twentieth century American astronomy, the discovery of the planet factored into astronomers' thoughts on several issues of the day: the origins of the solar system, Newtonian gravity versus Relativity, extraterrestrial life, and the possibility of finding more planets. Of greater importance, reactions from the astronomical community reveal that from the time of Pluto's discovery even scientists did not know how to classify it. Ultimately, acceptance of Pluto as a planet came down to the ability to calculate a dependable orbit, and the simple decision to refer to Pluto by that title.

This choice would have significant ramifications. With professional astronomers to rely on, the average men and women of the 1930s would incorporate Pluto into their lives as the ninth planet in the solar system.

5. THE PUBLIC RESPONDS

Because astronomers and newspapers often spoke of Pluto within a scientific context, it would have been understandable if the public interest quickly waned following

[113] "Admits new body looks like planet," *New York Times*, 19 April 1930, 10.

the discovery. After all, Pluto was so small, so far away, and seemingly so irrelevant to everyday life.

Yet that was not the case. For months after the announcement of Pluto's discovery, the ninth planet captured the public imagination, becoming one of the most commonly discussed issues among people of all backgrounds. The composition and reception of these many diverse public reactions to the event softened and integrated the scientific talk of the planet into the mainstream. As a result, people brought Pluto into their awareness of the cosmos, and came to accept the object as the ninth planet in the solar system.

Public Education

The process of incorporating Pluto into the collective consciousness began with public efforts to learn about the new object. Around the world, people turned to astronomers for information. In California, Professor Wendel P. Hogue expounded upon the discovery at a meeting of the Hollywood Breakfast Club.[114] Sir Oliver Lodge spoke about the event at London's National Liberal Club,[115] and in mid-October Professor Anne S. Young gave a public lecture on Pluto at the open night of the Harvard College Observatory.[116] One letter further suggests that astronomers would find receptive audiences in Wyoming, New Mexico, Colorado, Utah, and several other southwestern states.[117]

[114] "Publisher sees 1930 as success," *Los Angeles Times*, 20 March 1930, 22.
[115] "Lodge lauds feat of finding planet," 8.
[116] "Events tonight," *Christian Science Monitor*, 17 October 1930, 4.
[117] L. B. McMullen to V. M. Slipher, 28 March 1930, Lowell Observatory Archives.

Museums did their part to spread word of the new discovery as well. An exhibit on Pluto at the American Museum of Natural History drew thousands.[118] Clyde Fisher, the curator of the museum also attempted for months to book Tombaugh for a lecture there, although it appears he never consented.[119] A letter to the Lowell Observatory asking for display materials suggests that a museum in Buffalo, New York planned to assemble an exhibit of its own.[120]

The most descriptive account of public interest comes from Harlow Shapley. Already scheduled to speak at the Jayne Foundation in Philadelphia on March 14, the Harvard professor modified his talk to include mention of Pluto. As a result, Shapley described in a letter to Slipher, the Foundation "changed the lecture place…when it became evident that about a thousand more people would try to get into the ballroom than it could accommodate." As for enthusiasm at the lecture, after the lecturer showed a slide of "Percival Lowell sitting at the business end of the 24-inch refractor, he got a 'hand' as great or perhaps even bigger than he ever received before."[121]

The large crowds, the popular exhibits, and the number and longevity of public talks on Pluto attest to the public receptivity to the new member of the solar system. Already people were making an effort to learn about Pluto, and in the process they integrated it into their knowledge of the universe.

For those unable to attend lectures or visit museums, radio shows and newsreels brought Pluto into their homes and neighborhoods. During the 1920s, radio and film

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[118] "American Museum Chart of the New Planet," *New York Times,* 30 March 1930, 26.
[119] Clyde Fisher to C. W. Tombaugh, 27 March, 5 April, 9 and 14 May 1930, Lowell Observatory Archives.
[120] Nick D'Alto, "The American Planet," *American History*, vol. 40, no. 4, 1 October 2005, 35; C. E. Cummings to V. M. Slipher, 29 March 1930, Lowell Observatory Archives.
[121] Hoyt, 200.

(now with sound) became common features of American life, and both media clamored to work Tombaugh's discovery into the latest productions.[122] The National Broadcasting Company requested information from the Lowell Observatory for a radio program it planned to air in April.[123] Similarly, the American Museum of Natural History offered to air Tombaugh's prospective lecture on WOR, "one of the largest broadcasting corporations in the east."[124] As for newsreels, a letter from Sandford E. Greenwald discloses that an image of "Planet X" appeared in Paramount Sound News no. 69, which was released nationally on March 31.[125]

WHERE THE NEW PLANET HAS BEEN LOCATED.

Figure 4: A star chart from page 14 of *The New York Times* on March 14, 1930 highlighting the location of the newly discovered planet.[126]

[122] Kennedy, 13.
[123] Henry M. Hyde to V. M. Slipher, 15 April 1930, Lowell Observatory Archives.
[124] C. Fisher to V. M. Slipher, 5 April 1930, Lowell Observatory Archives.
[125] Sandford E. Greenwald to V. M. Slipher, 31 March 1930, Lowell Observatory Archives. It is most likely this "talky" that provided one overzealous Harvard student with the photographic evidence he thought he needed to calculate an initial orbit for Pluto. Harlow Shapley pointed out that this was probably "the first newsreel position of an astronomical object that has ever been obtained." See Hoyt, 205.
[126] "Where the new planet has been located," *New York Times,* 14 March 1930, 14.

At the very least, people across the country could pick up any major newspaper or magazine to learn about the discovery of Pluto. A number of lesser-known publications covered the news as well, most notably Clyde Tombaugh's home county paper, the Larned *Tiller and Toiler*.[127] Some papers encouraged people to find the planet for themselves, providing sky maps and star charts to direct the eyes of amateur observers. One even printed Pluto "hats," diagrams of the night sky that readers could prop over their heads to help them locate the new object.[128]

The abundance of newspaper content, radio programs and newsreels pertaining to Pluto further demonstrates the vast appeal of Tombaugh's discovery. Like public lectures and museum displays, they too supplied people with the necessary facts to understand Pluto's place in the solar system.

Pluto on Earth

The media so effectively educated the public about the scientific characteristics of the new object that within days of the discovery, non-scientists knew enough about Pluto to mention it in the context of very earthly current events. For instance, Heywood Broun, a popular syndicated columnist of the day, compared the brutal temperatures on Pluto to those in Antarctica, recently recorded by Admiral Richard Byrd who was about to complete his three-year exploration of a portion of the continent.[129] One senator also

[127] D'Alto, 32.
[128] D'Alto, 35.
[129] Heywood Broun, "It Seems to Me," David Peck Todd Collection; "Byrd and his men," *Washington Post*, 21 June 1930, 6.

mentioned the planet in two articles for *The Washington Post*, once comparing Pluto's mystery to the balance of government, and then relating it to the current senate race.[130]

"A Line o' Type or Two," a recurring column in *The Chicago Tribune* had particular fun comparing the distant world to current events. On March 17 the writer, identified by the initials R. H. L., suggested calling the new planet "Naval Parley" after the conference in London between several world powers to reach an agreement on the limitations of their navies.[131] "[I]t doesn't do anything," he explained, "it isn't going to do anything, and it gives us a pain in the neck."[132] Two days later the same columnist went on to make a case for naming the object "Alcapone" after the famous gangster who had just been freed from jail.[133] Then again on March 25, R. H. L. jokingly recommended "Claudius H." as a name in honor of the new national chairman of the G. O. P. "The name is extremely appropriate," he reasoned, "because the new planet cannot be seen by the naked eye and lots of the Republican bosses say they simply can't see Mr. Huston as chairman of the national committee, even with magnifying glasses."[134]

These many quips reveal that writers quickly became comfortable enough with the planet to link it to events that had greater relevance to daily life. In the process, writers helped to generate a broader public acceptance for the planet and used humor to make it a part of events on Earth.

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[130] 97th Senator, "From a Senator's Diary," *Washington Post*, 4 May 1930, 15; 97th Senator, "From a Senator's Diary," *Washington Post*, 25 May 1930, 15.
[131] "The Naval Conference," *Pacific Affairs* [online article]; accessed 10 February 2007; available from http://www.jstor.org/view/0030851x/dm991797/99p0320o/0 jstor.org.
[132] "A line o' type or two," *Chicago Daily Tribune*, 17 March 1930, 14.
[133] "A line o' type or two," *Chicago Daily Tribune,* 19 March 1930, 14.
[134] "A line o' type or two," *Chicago Daily Tribune,* 25 March 1930, 14.

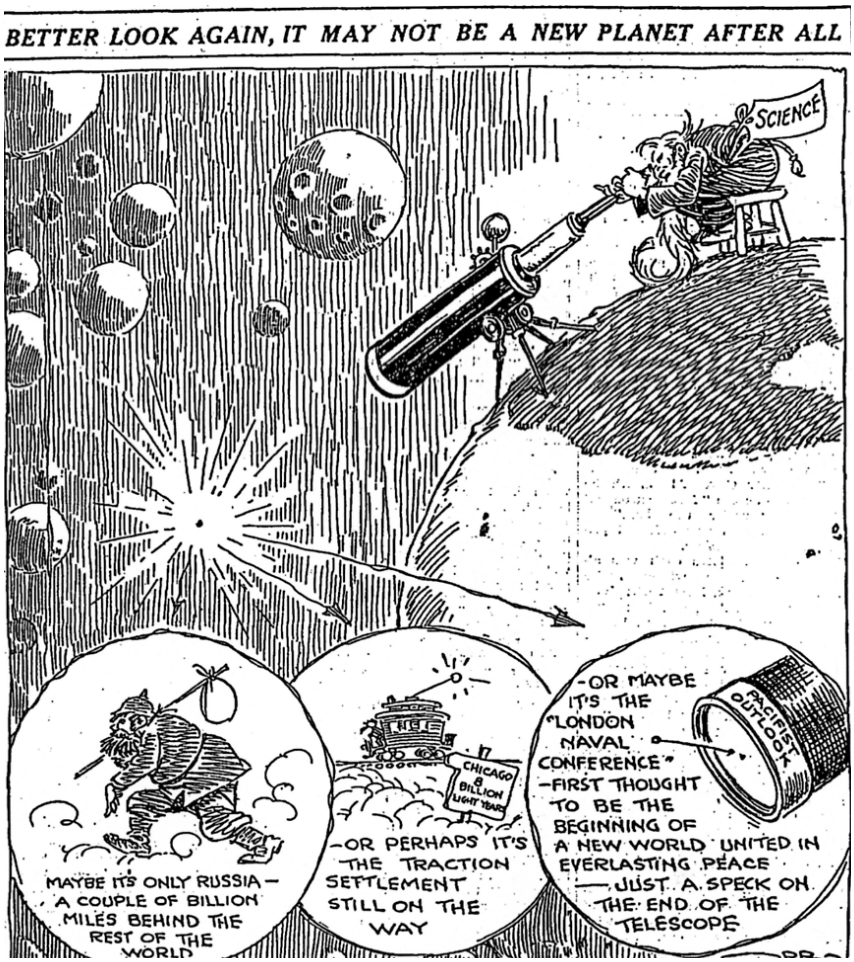

Figure 5: A cartoon from page 1 of *The Chicago Daily Tribune* on March 15, 1930, demonstrates the ways in which people anchored the planetary discovery to more earthly events. [135]

Pluto in Politics

Journalists particularly used humor to link the planet to political affairs. For instance, in the wake of the stock market crash of 1929, then-President Herbert Hoover called upon the leaders of the banking system, manufacturing industries and Congress to stabilize and revitalize the economy.[136] Poking fun at Hoover's spirited attempt at reform, *The New Yorker* wrote: "Those who speak of the ninth planet as a member of the solar system only show their ignorance. It has not been confirmed by the United States

[135] "No title," *Chicago Daily Tribune*, 15 March 1930, 1.
[136] Kennedy, 51-54.

Senate."[137] Similarly, *The Philadelphia Inquirer* reported, "[T]here has been an oversight somewhere. So far as we have learned the Senate hasn't yet taken action on the new planet."[138]

On another political stage, satirists used Pluto to highlight the contention between the Republican and Democratic parties. In one *Washington Post* article "Senator Dum" and "Representative Dummer" discussed the discovery, claiming that President Hoover "'had a statement all ready accepting the new planet in the name of the Republican party…hailing it…as an indication of what the people can expect with the right party in power.'"[139] Other jokesters pretended to look at the United States from the distance of Pluto, observing that the Republicans were the ones standing in back of the president, and that the Democrats were those standing in his way.[140]

The planet most often figured into complaints about prohibition. For these gags writers imagined communicating with the inhabitants of the trans-Neptunian planet as they investigated the earth. *The Detroit Free Press* called any intelligent beings living on Pluto lucky because they had "never seen, heard or thought of the eighteenth amendment."[141] Referring to the ban on alcohol, Heywood Broun mused that if he related to native Plutonians a history of prohibition, surely "they'd hang up on me and say, 'Don't try to kid us with such silly lies.' "[142]

The various references to Pluto in the context of American politics provide specific examples of the ways in which people brought Pluto into earthly life by

[137] Quoted in "Press comment," *Washington Post* 17 April 1930, 6.
[138] Quoted in "Press comment," *Washington Post*, 24 April 1930, 6.
[139] "Sen. Dum and Rep. Dummer," *Washington Post*, 20 April 1930, 16 (SM).
[140] "'Stimson' heads bill in gridiron review," *New York Times*, 27 April 1930, 1 (M).
[141] Quoted in "Press comment," *Washington Post*, 7 April 1930, 6.
[142] Broun, "It Seems to Me," David Peck Todd Collection.

connecting it to current events. Furthermore, these quotations demonstrate that the novelty and the distance of the new planet made it an excellent vehicle through which political commentators could express their thoughts about the American government. From the frustrations of inter-party squabbling to the absurdity of the 18th Amendment, the incorporation of Pluto into politics only added to the public awareness of the discovery and in some ways helped them to better understand events on Earth.

The Lighter Side of Pluto and its Place in Daily Life

Popular references to the trans-Neptunian planet also handled more accessible subjects than politics. One writer marveled, "Out there they don't know yet who won the world's series of 1905."[143] Another asked, "If an astronomer can find an invisible planet by calculus, we wish he'd try simple arithmetic on our umbrella."[144] Jokes about the discovery applied to nearly every situation. *The Washington Post* reported: "800 scientists east of the Mississippi alone sprained their back doing handsprings within 24 hours of the announcement." The same article went on to mock "the man in the street…[whose] first words upon being told of the discovery were, 'Can you eat it?' "[145] Several months later *The New York Post* wrote that Pluto, with one year then believed to equal 3,200 Earth-years, "seems to be the sort of place in which you easily get rested on a two-week vacation."[146]

More than anything, this evidence reveals that the trans-Neptunian planet was not that distant after all. The ability of so many people to figuratively bring the planet into

[143] *Ibid.*
[144] Quoted in "Brevities," *Christian Science Monitor*, 30 April 1930, 17.
[145] Phillips, "The Once Over," 6.
[146] Quoted in "With time to spare," *Washington Post*, 12 June 1930, 6.

daily affairs – such as misplacing possessions, dreaming of vacation spots and planning for the next meal – further indicates the ease with which men and women integrated Pluto into their knowledge of the universe. Not only was the discovery a triumph of science, it was an event that resonated with the public: something to joke about, something in which people could invest themselves, and something that enabled them to consider their own behaviors from a new, if imagined distance. Because the planet still fit into the common conceptions of human activities, people were able to overcome the physical distance between them and Pluto to incorporate it into their lives.

The more sober views of other writers provide further insight into the connections between the planet and everyday life. For the most part people seemed to think Pluto would have no affect on them. As Broun wrote, "Life, of course, will go on much the same. This new member of the universe is much too far away to affect the price of bread, the course of love or the rate of federal taxes."[147] Similarly, a *Chicago Tribune* column reported, "[The planet is] invisible without a telescope, and there's no use of planning to go there on your vacation. And the fact that [astronomers have] found it won't have any effect on the 18th amendment or the stock market."[148] Yet at least one writer, the aforementioned R. H. L. discussed the effects that Pluto might have on earthly life. "The planet will only help temporarily," he wrote "and then we're liable to slide back in the doldrums again.

> You could tell the wife you got home so late because you wanted to take a look at the ninth planet. The farm board grabbed at it because if they can get the farmers to climb up on top of the barn and stick around there looking for the new planet then they won't be planting wheat and overstuffing the market…[A]nd summer resorts will advertise that their nights are so clear you can read a newspaper by the light from the ninth planet.[149]

[147] Broun, "It Seems to Me," David Peck Todd Collection.
[148] "A line o' type or two," *Chicago Daily Tribune*, 14 March 1930, 14.
[149] "A line o' type or two," *Chicago Daily Tribune*, 15 March 1930, 12.

Of course the new planet would have very real implications for at least one group in particular. *The Los Angeles Times* reported that astrologers credited Pluto for disrupting horoscopes.[150] More specifically, as one *Time Magazine* article explained, "Astrologers are professionally joyous over the New Planet's discovery. They blame all their fortune mis-tellings on its obscurity, [and] now talk of greater accuracy."[151]

Planetary alignments aside, the discovery would most likely have little direct impact on most peoples' daily lives. Nonetheless, the fact that men and women in the 1930s at least considered the ways in which Pluto would influence them demonstrates that the planet had already found a small niche in the collective consciousness.

The Search for a Name

Pluto carved out a larger place for itself through the unofficial contest to name it. Roger Lowell Putnam accidentally made the mistake of telling the Boston papers that the Lowell Observatory welcomed public suggestions for a name. Although the sheer volume of suggestions quickly annoyed the Lowell staff, Putnam's slip-up turned out to be a great marketing maneuver that would sustain public interest in the discovery for months.[152] Ideas from scientists and non-scientists alike poured in from around the world in the form of letters, telegrams, and newspaper editorials. The possible names ranged from the classical and commemorative – such as Icarus, Isis, and Newton – to the narcissistic and ridiculous. Percival Lowell's widow, Constance humbly offered her own

[150] One leading astrologer said, "[T]he little stranger explains why a lot of horoscopes went phooey. Persons born under the influence of Mars often turned out to be pacifists. Children of Venus were like as not sworn to single blessedness. Sons of Sirus, who should be fond of dogs and frankfurters, showed a preference for cats and hamburger sandwiches." "Makes Horoscope Wobble," *Los Angeles Times*, 20 May 1930, 4.
[151] "Percival? Cronos?" *Time Magazine*, 24 March 1930, 28.
[152] Hoyt, 215. Putnam actually wrote to Slipher on March 15 to apologize for the frenzy he had started.

name for the planet.[153] Several recommended Amos or Andy after the characters from a popular radio show. One man even wrote to *The Washington Post*,

> "Since the planet is so hard to see, why not call it Son-of-Wild-Jackass? Since it defied discovery through the centuries, why not call it Farm Relief?…Or, since its discovery was generally reported on the front pages of newspapers, front pages today being what they are, why not call it Scandal?"[154]

Amidst the wisecracks, people deliberated at length about more sensible names for "Planet X." Many championed the idea of naming it Percival or Lowell. Some suggested Peace (or the Latin *Pax*) because "it is so far away,"[155] while others protested the name fearing that it "would put peace a little too far"[156] out of reach. Cronus, the mythical son of Uranus and father of Neptune, understandably received a number of votes. So too did Minerva, the Roman goddess of wisdom, since the discovery was "a triumph of reasoning."[157] Unfortunately, though "Minerva" was actually the most popular name at the observatory and among the public, it was not a viable option since an asteroid had taken the name not long before.[158]

As we all know, the astronomers at the Lowell Observatory ultimately decided upon the name of "Pluto." The Italian astronomer Emilio Bianchi was the first to publicly refer to the planet as such in a *New York Times* article on March 26.[159] However, the name was not a favorite for a long time because it is the name of the Roman god of the

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[153] Constance Lowell to V. M. Slipher, 15 March 1930, Lowell Observatory Archives.
[154] "Something wrong with educational system – 'Cash Register Philosophy,' " *Washington Post*, 27 March 1930, 6.
[155] "Letters to the *Christian Science Monitor*," *Christian Science Monitor*, 17 April 1930, 22.
[156] "By-Products," *New York Times*, 23 March 1930, 4 (E).
[157] "Newly discovered planet will bear name of Pluto," *Washington Post*, 26 May 1930, 22.
[158] As a testament to the popularity of "Minerva," over half of the letters the Lowell Observatory received offered it as a suggestion. See Hoyt, 218.
[159] "Italians get photos of Lowell planet," 10.

underworld and therefore linked to Satan. Furthermore, "Pluto" carried the potential association with "Pluto Water," then a common laxative brand.[160] Nonetheless, Dr. Slipher announced the decision to name the planet Pluto on May 25, crediting Venetia Burney, an eleven year-old London native with the suggestion.[161] The observatory staff reasoned that not only did Pluto fit the tradition of naming planets after Roman deities, as Lowell would have liked, but it was also the name of the god "of the regions of darkness where 'X' holds sway."[162] Furthermore, the first two letters of the name were Lowell's initials, which became the planet's symbol.

The Lowell Observatory staff may have suffered from the public participation in the naming of Pluto. However, the unofficial naming contest may have done the most to generate excitement for the discovery by creating a public investment in the planet that would long outlive the selection of a name.

[160] Sure enough, in the months following the naming of Pluto, the Pluto Water brand launched a successful new advertising campaign. See Figure 6.
[161] Hoyt, 218.
[162] Hoyt, 217.

Figure 6: An advertisement for Pluto Water, a common laxative brand in the 1930s, no doubt capitalizing on the attention given to the recently named planet.[163]

Pluto and Popular Science

Fortunately, all of the public interest in Pluto amounted to more than jokes and arguments over potential names. The discovery also inspired a renewal of public interest in science. In the wake of the Tombaugh's find, newspapers published articles describing the transmission of light and radio waves through space, as well as the possibility of interplanetary communication. One particularly applied to Pluto, explaining that, "If…Neptunian dwellers exist and they understand English perhaps they have already learned…that the astronomers at Flagstaff have sighted their orb and are spying on its

[163] "Display Ad 13 [Pluto Water]," *Chicago Daily Tribune*, 28 January 1931, 13.

action and observing its whirl in space."[164] The discovery of the trans-Neptunian planet also helped to generate excitement for the grand opening of Chicago's Adler Planetarium, the first planetarium in the United States, in May of 1930. Unfortunately, due to the late timing of the discovery, the planetarium did not include Pluto in its depiction of the heavens.[165] Nonetheless, Pluto played a hand in exciting thousands of people to come see the planets in a way that had never been possible before.

On a broader scale, many hoped that the discovery of Pluto would lead to a greater appreciation for science. As *The Nation* explained, "[T]he discovery of the latest planet emphasizes once more that 'science' is not a mere body of verified knowledge; it is also and more importantly, a method of discovery."[166] Clyde Fisher of the American Museum of Natural History told the papers that the discovery showed that "[c]redulity based upon superstition and prejudice is slowly and surely being replaced by experiment and straight thinking."[167] One *Washington Post* columnist added: "Such a remarkable verification should have a significant effect on public confidence in the science of astronomy."[168]

While Pluto may have been the butt of countless jokes, its common association with familiar scientific topics in the 1930s reveals that people also made a concerted effort to fit the planet into their common knowledge of science. By anchoring Pluto to other relatively familiar topics, such as the transmission of radio waves, the motions of the other eight planets, and the scientific method, people began to see the planet as an object that figured into the order of the universe.

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[164] "Man wonders if radio speeds to worlds afar," *New York Times*, 23 March 1930, 12 (XX).
[165] D'Alto, 35. Likewise, the new bronze entrance plaque for the auditorium still showed only eight planets.
[166] "The Ninth Planet," *The Nation* 130 no. 3378 (2 April 1930): 386.
[167] "Third Planet Found in Modern Times," 14 (A).
[168] "A Newly Found Planet," *Washington Post*, 15 March 1930, 6.

From Headlines to Common Knowledge

Pluto would remain a popular topic for some time. At the end of December 1930, reporters hailed the discovery as one of the most significant of the year.[169] In 1931 the media reported on Clyde Tombaugh's reception of the Jackson-Gwilt medal by the Royal Astronomical Society for his work, and later on his decision to attend the University of Kansas.[170] The cultural connections lingered as well. Dozens of short stories in the most popular science fiction magazines featured visits to Pluto over the course of the decade.[171] Most famously, the 1931 Walt Disney film "Mickey's Moose Hunt" further popularized Pluto with the introduction of Mickey's canine pal.[172]

However, as is the case for all news, the headlines about Pluto eventually faded away. By June of 1930, with the rare exception, it had virtually disappeared from the papers. Yet the diminished attention afforded to the planet should not detract from the interest that the general public sustained in the planetary discovery for more than two months in the spring of 1930. The newspaper evidence, in addition to records of lectures, radio broadcasts, museum exhibits, and renewed interest in science show that people were eager to learn about the new object. Equipped with facts, they went on to discuss the planet in very familiar ways, mentioning it alongside political affairs and current events, relating it to everyday activities, helping to find a name for the new object, and cracking joke after joke. All of these colloquial references to Pluto allowed people to familiarize

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[169] "1930 Forms new theories of Universe," *Christian Science Monitor*, 31 December 1930, 1. In this article, the Harvard astrophysicist Harry Plaskett mentions the detection of Pluto first in a short list of the year's notable scientific achievements. Plaskett did not believe the discovery of Pluto was the year's most notable event, however.

[170] "Discoverer of Planet wins British medal," *New York Times*, 10 January 1931, 9; "Discoverer of planet Pluto is soon to enter university," *New York Times*, 11 July 1931, 4.

[171] Stanton Coblentz, "Into Plutonian Depths," *Wonder Stories Quarterly*, Spring 1931. For more Plutonian science fiction see Steven Silver, "Pluto in Science Fiction," [online database]; accessed 7 November 2006; available from http://www.sfsite.com/~silverag/pluto.html.

[172] D'Alto, 36.

themselves with the planet and to incorporate it into their awareness of the universe. In this way, the people of the 1930s helped to make the ninth planet a part of common knowledge for four generations.

6. CONCLUSION: THE EDUCATIONAL AND CULTURAL LEGACY OF PLUTO

Pluto Goes to School

Long before grade-schoolers began to include Pluto in their models of the solar system, people became acquainted with, indeed highly interested in the planet Pluto. Yet it was widespread education that turned the popular event into a part of scientific doctrine. As the headlines faded away, Pluto became an integral part of school curricula, and, consequently, general knowledge. In the process, the planet became more than just a new neighbor or topic of conversation, but a scientifically and historically acknowledged member of our solar system.

Science writers were among the first to bring Pluto into the classroom by including the discovery in their newest science books. Only days after the discovery, W. L. Bass requested information from the Lowell Observatory to include in his forthcoming book, *Celestial Growth.*[173] Similarly, E. A. Fath and Herschel Scott hoped to glean information from Slipher that they could use in their respective texts.[174] Although he did not intend to publish anything larger, John S. Gold of the Bucknell Observatory also mailed a request in October for information to include in a paper for his university.[175]

[173] W. L. Bass to V. M. Slipher, 17 March 1930, Lowell Observatory Archives.
[174] E. A. Fath to V. M. Slipher, 1 April 1930, and Herschel Newton Scott to V. M. Slipher, 15 April 1930, Lowell Observatory Archives.
[175] John S. Gold to V. M. Slipher, 14 October 1930, Lowell Observatory Archives.

Students contributed to the entrance of Pluto into formal education as well. Due to recent socio-economic changes, by 1930 classrooms at all levels held more students than ever, and therefore more minds to express interest in Pluto.[176] For instance, Conway Drawner, age fourteen, had his four-paragraph description of Pluto published in *The Washington Post*.[177] The father of another teenager wrote to the *Christian Science Monitor* to share his thanks for providing numerous articles about the planet that contained " 'valued information to take to school and give to the class.' "[178] As for higher levels of learning, one St. Louis University student asked his professor to request information about Pluto from the Lowell Observatory that he could use in his studies.[179] From Goshen College, D. A. Lehman wrote to Flagstaff for facts on behalf of his students after they "asked [him] to give a talk on the discovery of the 9th planet."[180]

To examine the history of education about Pluto is beyond the scope of this essay. However, the few examples cited above show that educators and students alike quickly integrated the planet into their lesson plans at all levels so that within a matter of years the planet became a staple of elementary education. As school systems expanded, every year millions of youths would then become familiar with a once-ridiculed mathematician and a dedicated young Kansan whose combined work led to the discovery of the ninth planet, the first of the twentieth century, the first found in America, and one unlike any

[176] By 1930, a single wage-earner could generate enough income to support a family. This meant that children who would have worked in the past to help support their families now had access to at least a basic education. Likewise, at the university level, enrolments in American colleges and universities multiplied twenty-two fold between 1860 and 1930. See Kennedy, 28-29 and Lankford, *American Astronomy,* 390.
[177] Conway Drawner, "The New Planet," *Washington Post*, 25 May 1930, 7 (JP). Of course, not all students took to the discovery of Pluto with as much enthusiasm. When reporters asked Jack Hatcher, the editor-in-chief of the student paper at the California Institute of Technology, he accused them of "kidding" and went on to ask if they were referring to a new star. "I haven't heard of any new planets and I surely would have heard," Hatcher said. He later explained that he had been studying so hard for finals that he "couldn't be expected to have heard of it." See "Planet X unknown to senior," *Los Angeles Times*, 22 March 1930, 6.
[178] "The Parent," *Christian Science Monitor*, 29 April 1930, 10.
[179] C. J. Krieger to V. M. Slipher, 25 April 1930, Lowell Observatory Archives.
[180] D. A. Lehman to V. M. Slipher, 9 April 1930, Lowell Observatory Archives.

ever seen. Hence, by the end of 1930 people could identify Pluto both commonly and scientifically as the ninth planet in our solar system.

The Demotion and What it tells us about Pluto

That is, of course, until August 24, 2006. On that day, at the annual conference of the International Astronomical Union in Prague, some 400 scientists voted to pass Resolutions 5A and 6A, transforming Pluto from a planet into a dwarf planet.

As word about the vote leaked out over the next few days, people around the world reacted negatively to the demotion of Pluto. " 'What kind of people are we to kick Pluto out of the solar system just because the poor fellow is small and has a slightly elliptical orbit?' " asked Steve Cavalier of Baton Rouge.[181] " '[T]he IAU definition of planet,' " Mark Sykes criticized from the Planetary Science Institute, " 'does not meet fundamental scientific standards and should be set aside.' " In a poll conducted by the Discovery Channel Store, 13,000 of 15,000 students voted in favor of Pluto remaining a planet. And on September 1, 2006 about 50 friends and colleagues of the late Clyde Tombaugh protested the demotion by waving signs that read, "Size Doesn't Matter" to defend little Pluto's right to maintain its traditional status.[182]

[181] "Letters," *Newsweek*, 18 September 2006.
[182] "Size doesn't matter," [newspaper article on-line]; accessed on 2 December 2006; available from www.plutoisaplanet.com.

Figure 7: On September 1, 2006, about 50 friends and colleagues of the late Clyde Tombaugh gathered at the New Mexico State University, where Tombaugh had been a professor of astronomy, to protest the IAU's demotion of Pluto.[183]

The list of articles, comments, protests held, and jokes relating to the demotion of the former planet is extensive, and certainly amounts to the most attention that Pluto has received since 1930. The question is, why did so many people care about the reclassification of an object nearly four billion miles away?

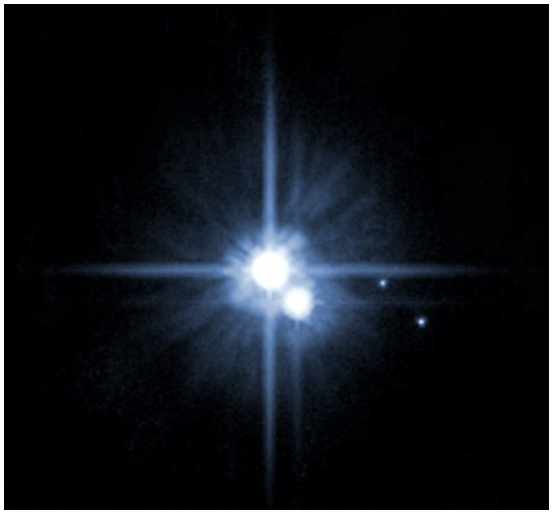
The purpose of this essay has been to explain that people today care about the demotion of Pluto because the ninth planet has fit into the collective consciousness from the day of its discovery. In short, Pluto was the people's planet. It factored into several issues of contemporary science in the 1930s, and astronomers relied on their own opinions about planetary orbits to label Pluto as a planet. In a broader scope, the object expanded the solar system, and gave rise to new feelings of perspective and American pride. More importantly, by actively learning about the planet and by anchoring it to familiar elements in their lives, the people of the 1930s successfully internalized Pluto

[183] *Ibid*.

into their general knowledge of the universe. Scientific facts coupled with public excitement for the event quickly ushered Pluto into worldwide education. From then on, the ninth planet would become a permanent part of every grade-schooler's basic awareness of the cosmos. That is an educational and cultural longevity that one vote by a few hundred scientists would not easily topple.

Nonetheless, whether people like it or not, Pluto is now officially a dwarf planet. In several ways the reclassification is fitting. From a factual standpoint, the existence of the small orb of ice and rock behind four gaseous giants now makes more sense considering it is now not a planet, but one of potentially hundreds of similar objects. Secondly, as discussed above, astronomers never formally recognized Pluto as a planet. Even Clyde Tombaugh, in a book he co-authored in 1980 wrote, "Pluto may be one of a new class of objects existing beyond the orbit of Neptune."[184] Thirdly, Pluto, once the first planet discovered in America and the first discovered in the twentieth century, now has the honor of being the first member of an entirely new class of celestial objects. Lastly, the title change extends Pluto's role in the measurement of scientific progress. In 1930 the discovery of the trans-Neptunian planet served as a testament to astronomers' mathematical and observational abilities, and it gave people a new perception of the size and origins of the solar system. Similarly, the reclassification of Pluto in 2006 attests to the abilities of modern astronomers to detect and study objects that are billions of miles from the sun and use them to better understand the story and nature of our solar system.

[184] Tombaugh and Moore, 193. It is worth noting that Tombaugh had a good relationship with the late Gerard Kuiper, for whom the Kuiper Belt is named. Kuiper was among the first astronomers to suggest the possible existence of the zone at the edge of the solar system that would turn out to contain dozens if not hundreds of Pluto-like objects. Kuiper's thinking no doubt influenced Tombaugh's later thoughts about the nature of Pluto and its place in the solar system.



Figures 8 and 9: One modern artist's rendering of the solar system's first dwarf planet, joined by its largest moon Charon, and the same two bodies as seen by the Hubble Space Telescope in 2006.[185]

Rarely do scientific facts escape the confines of small academic circles to become widely known by the public. The predominant separation of science and popular knowledge may even be necessary for scientists so that they can methodically conduct experiments and collect data without having common assumptions and the need for quick answers contaminate their findings. Knowledge of the planets defies this trend. As children we learn about the nine – now eight – planets, and though not all of the details stick, we come away with a basic understanding that Jupiter is the largest and that Saturn is the one with rings. Certainly we don't review the facts daily, but from time to time, perhaps when gazing at the stars on a clear night, we remember our neighbors in the solar

[185] David A. Hardy, "Pluto and Charon," Solar Voyager [online artwork gallery], accessed 7 April 2007; available from http://images.google.com/imgres?imgurl=http://www.solarvoyager.com/images/art/Pluto%2520and%2520Charon%2520by%2520David%2520A%2520Hardy.jpg&imgrefurl=http://www.solarvoyager.com/dhardy.asp&h=430&w=350&sz=37&tbnid=wYhUZ3Bma46NBM:&tbnh=126&tbnw=103&prev=/images%3Fq%3Dpluto%2Bpictures&start=2&sa=X&oi=images&ct=image&cd=2; H. Weaver and A. Stern, "The Pluto System on Feb. 15, 2006," Hubblesite [online photograph gallery], accessed 7 April 2007; available from http://hubblesite.org/gallery/album/entire_collection/pr2006009b/web.

system. Moments like these serve as reminders that there are strong connections between our daily lives and topics normally considered to belong to the realm of science.

Such is the case with Pluto. Outside of middle school science classes, it is rarely a topic of everyday discussion. Nonetheless, we know it is there; it has been a natural part of peoples' understanding of the universe for nearly eight decades. When the IAU declared that Pluto was no longer a planet, it upset a familiar awareness of the order of the universe, at least enough to spark protests and letter-writing campaigns. The reactions to the demotion of Pluto reveal that as wide as the gap may seem, "science" sometimes consists of more than just facts.

Pluto is no longer a planet as the word is officially defined. However, we know that it is still there. As such it continues to be a part of the common understanding of the universe, just as it was 76 years ago.

Word Count: 12, 524 (excluding headings and captions)

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BIBLIOGRAPHICAL ESSAY

I first learned of the demotion of Pluto while listening to an NPR news report in my car. At the time, my senior essay was the last thing on my mind. I had an advisor, a few potential topic ideas, and several weeks until classes started. Little did I know at the time that I would become intimately familiar with Pluto over the next eight months.

Upon my return to New Haven in September, I learned that my original advisor had little insight into how to investigate the topic that originally interested me (through no fault of his – my idea was simply outside the realm of his expertise.) I spoke to several other professors, and looked into the sources they recommended but they yielded nothing.

Stumped for ideas, I thought back to the subjects that interested me most in my earlier school years. The first thing that came to mind was my penchant for astronomy during middle school. Perhaps I could study the papers of a famous astronomer, I thought. Sure enough, with the help of William Massa of Manuscripts and Archives at Yale's Sterling Memorial Library, I came across the paper collection of David Peck Todd. Todd was a notable historian at Amherst College in the late nineteenth century best known for his work on eclipses. The collection piqued my interest, but I questioned my own ability to turn the study of eclipses into a senior essay. Fortunately, while perusing the collection's finding aid, I noticed that Todd had a hand in the preliminary search for a trans-Neptunian planet, and that he saved a handful of newspaper articles pertaining to the discovery of Pluto. It was then that the recent news of Pluto's demotion came rushing back to me.

Around the same time, I met with the only historian of science I had encountered while at Yale, Ole Molvig, whose lecture course, "History of the Modern Sciences in

Society," I had taken as a sophomore. We discussed several possible essay topics, including something to do with Pluto, and he encouraged me to look into them and report back.

Sources were the key. In the first week of September I used a ProQuest historical search to find newspaper articles relating to the discovery of Pluto. To my amazement, the search yielded literally hundreds of hits. It was then I decided to study the discovery of Pluto. Professor Molvig, thankfully, signed on as my advisor.

However, I wasn't yet sure what aspect of the discovery I would study. Knowing that I had plenty of primary source material to choose from, I set out for secondary sources. Immediately I came across William G. Hoyt's *Planets X and Pluto*, the foremost historical work on the search leading up to the discovery of Pluto and the controversies that have surrounded the planet ever since. Clyde Tombaugh and Patrick Moore's *Out of the Darkness*, as well as David Levy's *Clyde Tombaugh: Discoverer of Planet Pluto* provided further background information about the search for "Planet X," the aftermath of the event, and the life of the discoverer. These three books in particular provided me with a firm understanding of Pluto's history as a planet. Of greater relevance to my cause, they showed me that the discovery and its aftermath had already been well documented. In order to study Pluto, I would have to take a new angle.

Fortunately I did not have to go far to find one. The three main secondary sources revealed that historians had paid relatively little attention to peoples' reactions to the discovery. Most made references to all of the commotion, but not for more than a page or two at a time. Considering the bevy of newspaper articles I had amassed by that time from *The New York Times, The Los Angeles Times*, *The Chicago Tribune*, *The*

Washington Post, and *The Christian Science Monitor*, an examination of public reactions to the discovery of Pluto would be a new take on the event. Moreover, it would provide an excellent point of comparison to the public reactions to the demotion of Pluto that I had experienced only weeks before.

Knowing that I would have plenty of newsprint to read through, I wanted to see just how many different printed materials from the time carried news about the planetary discovery. I spent a full afternoon in Sterling's periodical room going through spring 1930 issues of *The New Yorker*, *The Nation*, *Harper's Magazine*, *Atlantic Monthly*, *The Economist, Time Magazine*, *Scientific American*, and *Science*. (I learned that day how lucky I was to be researching 1930 as many American magazines went into publication right around that year.) On another afternoon I ventured into the stacks to leaf through volumes of *Popular Astronomy* and *Sky and Telescope Magazine*, as well as the monthly notices of numerous astronomical societies, namely the American, the Royal, and the Pacific. Only a handful of the mainstream publications said much about Pluto, most notably *Time* and *The Nation*. The scientific magazines covered the news in greater depth, especially *Scientific American*, which featured three articles about Pluto by Henry Norris Russell. *Popular* Astronomy published several articles pertaining to Pluto over the next few years, as did *Sky and Telescope*. However, the lack of coverage in the astronomical society circulars surprised me. Most made mention of the planet's discovery, but on the whole said very little about it. (I was most surprised when trying to determine how astronomers formally accepted Pluto as a planet and then realized that they hadn't.)

Satisfied with the amount of primary source material I had accumulated, I made an attempt to develop a greater context for myself by learning about the time period in which Tombaugh discovered Pluto. Professor Molvig steered me towards John Lankford's *American Astronomy*, which discusses the rise of the science in America during the nineteenth and twentieth centuries. I also checked out the *Fontana History of Astronomy and Cosmology* for general reference.

So far my search had been fruitful. Yet I finally ran into a barrier when I attempted to contact several museums that I suspected would have records of early exhibits about Pluto. I called the Franklin Institute in my native Philadelphia and the Smithsonian Museum in Washington, D. C., neither of which had any record of an exhibit pertaining to Pluto. I was most frustrated by the American Museum of Natural History in New York, which claimed not to have had any record of previous exhibits even though a *New York Times* article explicitly referred to one. On the plus side, the lack of museum exhibits saved me considerable travel time.

One phone call more than compensated for the other frustrations, and saved me from a cross-country trek. In mid-November I contacted the Lowell Observatory just to see if the staff had any resources it might be willing to share with me. I spoke with Antoinette Beiser who was a wealth of knowledge and more than helpful. By the end of our half-hour chat, I learned that the Lowell Observatory archives had boxes of correspondence in its possession from all corners of the globe pertaining to the discovery of Pluto. Ms. Beiser agreed to look through them and send me the photocopies of about 20 letters. One week later, I had in my possession not 20, but over 200 photocopies of correspondence that the Lowell Observatory received in the spring of 1930. They came

from universities, magazines, and casual fans, and discussed a wide variety of topics. Because these letters were not intended for the public to see, yet still spoke of peoples' excitement at the discovery of a ninth planet, they truly helped me to understand that all of the enthusiasm in the newspapers was genuine. I am indebted to Ms. Beiser for generously sharing so much information with me, for the letters added a new dimension to my paper. As an aside, I must add that Ms. Beiser made my day when she said that to her knowledge no one had ever studied the public response to the discovery of Pluto.

I now had no choice but to actually read my sources. Over the next few weeks I read each newspaper article and typed out any quotations therein that could possibly come in handy for my essay. I organized the quotations in chronological order by newspaper and repeated the process for the Lowell letters. Next, I let the quotations speak to me. As I read through nearly 30 typed pages of quotations, I picked out the themes that seemed most prevalent: relevant scientific issues, doubt about the nature of the planet, naming contests, American pride, and so forth. After a complete read-through I had about 10 themes that encompassed most peoples' reactions to the discovery of Pluto. I would eventually combine them to form the four that would provide the skeleton of my essay: general significance of and excitement over the discovery, Pluto's ties to contemporary science, Pluto's incorporation into popular culture, and the planet's entrance into education. With these broader headings established, I then went through the quotations again to group them into more specific topics, such as Pluto's relevance to theories of planetary formation and its incorporation into political humor. The paper essentially organized itself. Just about every group of quotations would become a paragraph in the essay under one of the four main themes. Now I just had to write them.

Although it was painful at times, I made the wise to decision to write a good deal of my essay during reading week of the fall semester and winter break so that by early February I had a full rough draft to submit to my advisor. This gave me plenty of time to fill in holes and expound upon points that deserved greater emphasis. For this process I made liberal use of new secondary sources. To better put the discovery of Pluto into the context of science in the 1930s I used two articles that discussed the early relationships between amateur and professional astronomers, "Amateurs and Astrophysics" by John Lankford and "Organization and Control" by Marc Rothenberg. For supplementary information about astronomers, I checked out a biography of Percival Lowell by Robert Strauss and a biography of Henry Norris Russell by David DeVorkin. As for more focused issues, Albert Einstein's *Relativity* helped to refresh my memory about his great theory. I used Robert Smith's *The Expanding Universe* and Steven G. Brush's survey *The History of Modern Science* to learn about The Great Debate of the 1920s. The third volume of Brush's *History of Modern Planetary Physics*, *Fruitful Encounters*, also provided me with the necessary background to understand the theories of planetary formation in the early twentieth century. Lastly, I used Jordan Marche's *Theaters of Time and Space* to read about the emergence of planeteria in the United States, which began just months after the discovery of Pluto and, like the "planet," generated tremendous public interest in astronomy.

To flesh out more of the social context of the time, upon Yale professor Jean Christophe-Agnew's advice I read several chapters in David Kennedy's *Freedom from Fear*, an excellent description of American society in the 1930s. That tomb referred me to *Recent Social Trends in the United States*, a sociological report commissioned by

President Herbert Hoover on the state of American life between 1929 and 1933 (again, I was happy I picked the year 1930 to study!). *Recent Social Trends* explained in greater detail the social conditions of the U.S. at the time.

To learn more about Pluto's entrance in formal education, I looked at two volumes of *Curriculum Records of the Children's School*, one from 1932 the other from 1940, and Emily Baker's *Children's Questions* to get a sense of the niche that Pluto found in basic education. Though all of these sources alluded to planetary science education or referred to Pluto directly, the information was not specific enough to be very useful. I also had the time to learn about more eccentric topics. For instance, I perused Willis and Curry's *Astrology, Science and Culture* and P. I. H. Naylor's *Astrology* in the hopes of gleaning some fun facts about the relationship between Pluto, astrology and society. Surprisingly, I found nothing that I could use. I also located a website listing all of the references to Pluto in science fiction stories, which led me to spend a morning in Sterling's microfilm room looking through 1930s issues of two popular science fiction magazines, *Amazing Stories* and *Wonder Stories*. Although I found and got to read bits of this Plutonian science fiction, because most the pieces were written later in the '30s, they were too far beyond the scope of my paper's timeframe to justify a thorough investigation. I spent the last weeks of March plugging this scientific and social background information into my essay, and after several rounds of polishing, had a final draft by the first week of April.

I found the experience of writing my senior essay to be highly educational and rewarding. This project has led me to understand why Pluto should not be considered a planet. Of greater relevance to my major, the dwarf planet at the edge of the solar system

has been my lens into the state of American science and society in the 1930s. Most importantly, the essay allowed me to learn how people made Pluto into a planet and how they incorporated that planet so strongly into common knowledge that almost four generations later, many of us reacted with surprising strength to its demotion. In writing this essay, it has been my goal to convey these realizations to the reader as clearly as possible.