



Pluto and the platypus: An odd ball and an odd duck - On classificatory norms



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ABSTRACT

Many astronomers seem to believe that we have *discovered* that Pluto is not a planet. I contest this assessment. Recent discoveries of trans-Neptunian Pluto-sized objects do not militate for Pluto's expulsion from the planets unless we have prior reason for not simply counting these newly-discovered objects among the planets. I argue that this classificatory controversy — which I compare to the controversy about the classification of the platypus — illustrates how our classificatory practices are laden with normative commitments of a distinctive kind. I conclude with a discussion of the relevance of such “norm-ladenness” to other controversies in the metaphysics of classification, such as the monism/pluralism debate.

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1. Pluto's fall from grace

Many influential astronomers now suppose that we've been laboring under the delusion of a simple and familiar solar system. Nine planets no more: the International Astronomical Union (IAU) resolved to define ‘planet’ in such a way that Pluto is excluded from their ranks; it is now classified as a “minor planet”. According to their definition, a planet is a celestial body that:

- is in orbit around the Sun,
- has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and
- has cleared the neighborhood around its orbit.

On this definition, Pluto is not a planet. Recent observations show that it fails condition (c). Pluto's vicinity turns out to be crowded with other Pluto-sized objects.

Wails of protest rise up from some corners. Being a “minor planet” is cold comfort. What about tradition? *What will we tell*

the children? Homely mnemonics must now be changed: “My Very Eager Mother Just Served Us *Nothing!*”¹ *We cannot just change our minds like this!* Of course, such appeals should not affect the IAU's resolve. The history of science is replete with mind-changes that reflect new knowledge. Indeed, it took the scientific revolution to popularize the belief that the *Earth* is a planet on a par with the other “wandering stars”. But the discussion about Pluto so far, like a brown dwarf, has given off more heat than light (even in scientific corners). In particular, some astronomers hold that there is a uniquely correct understanding of ‘planet’ dictated by recent discoveries at the edge of the solar system and so there is a straightforward sense in which we *discovered* that Pluto is not a planet — much like we discovered that whales are not fish, that the platypus is a mammal, or that there is no such thing as phlogiston. Early on in the dispute, Gibor Basri and Michael Brown, the astronomers who made some of the key discoveries that led to Pluto's “demotion” from the ranks of the planets, responded to the tradition-mongers arguing for maintaining Pluto's planetary classification in stark terms: “either tradition or logical consistency must be abandoned” (Basri & Brown, 2006, p. 210;). Of course the matter is not so simple. One can consistently classify Pluto as a planet by making compensatory adjustments to other claims about the solar system

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¹One version (“My Very Eager Mother Just Served Us Nine Pizzas”) records the “traditional” order of the nine familiar planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto.

— for example, by recognizing perhaps a few thousand more planets as part of the solar system.²

What, then, motivates Pluto's reclassification? Does the IAU's decision amount to the laying down of an arbitrary *convention* or does it reflect the *discovery* that Pluto is not a planet? That this is a false dilemma can be seen by making plain the role of *norms* informing our classificatory practice. This paper will examine the Pluto fracas — interesting in its own right — in beginning an investigation of these norms, offering an initial sketch of what relevant norms might be in this case and how we might identify, defend, and criticize classificatory norms in general. Philosophers of science have been growing more comfortable with the idea of epistemic and methodological norms involved in theory choice. The present norms, however, fit uneasily in this category. Rather than guiding acceptance of certain theories, the kind of norms with which I am concerned appear to influence how we carve nature up into different kinds of things. In this sense, they are more like *metaphysical* or *ontological* norms. However, since I take no stance here about the metaphysics of classification, I will simply call them *classificatory norms*. Though to some degree voluntary, I argue that they should not be thought of as mere conventions. Their activity shows us, I believe, that a deep variety of classificatory pluralism may be more widespread — and in a certain way inevitable — than previously recognized. It has gone unnoticed, in part, because it can obtain even when its outward effects (*viz.* disagreement) are hidden.

2. Anomaly and classificatory revision

2.1. An oddball

Historical precedent sides with science's propriety in renovating folk-taxonomic categories — in several ways. A stock example is the discovery that Whales are mammals and not fish. Superficially, whales and sharks have much in common. But as we learned more about their traits and evolutionary history, deep divisions were revealed: whales have *more* in common (both physiologically and phylogenetically) with land-mammals than they do with sharks.

Similar discoveries often significantly affect high-level categories (e.g., higher taxa like families or phyla). We discover, for example, that '*Reptilia*' does not name a monophyletic taxon (a group all of whose members descend from a common ancestor). As such, cladism — an influential school of systematics — does not recognize it as a legitimate potential referent of '*Reptilia*'.³ To retain the category, the cladist must expand or contract its membership — say, by including birds or excluding crocodiles. Suppose we contracted the category to exclude the crocs. It might then be tempting to say that we discovered that crocodiles are not reptiles.

These two examples illustrate different ways in which we might claim to have discovered that Pluto isn't a planet: first, by

²One might wonder, given that scientists are sometimes mistaken in their self-descriptions (or evidently mistaken in their assessments of the logic of the situation, as Brown seems to be), whether the Pluto case is worthy of philosophical attention (thanks to an anonymous referee for raising this concern). Are the sentiments described here common among the astronomical community? Admittedly, I have no statistically-representative opinion surveys to share on this; but it is not difficult to find the rhetoric of discovery used by influential astronomers and science writers (see, e.g., Tyson, 2009; Brown, 2010). In any case, I am less concerned with how representative or *prima facie* plausible the view that astronomers discovered Pluto's non-planetness is as I am to use the case as a springboard to consider a general but apparently unrecognized feature of classification and classificatory disputes in science.

³There are other examples: some suggest that *Rodentia* should be contracted to exclude Guinea pigs from the folk-category, lest it include highly non-paradigmatic rodents (see LaPorte, 2004, p. 63).

discovering something about Pluto that disqualifies it for fit within the category *Planet*; or second, by discovering facts that prompt the revision (or annihilation) of the category itself, excluding Pluto in the process. Does either model accurately describe Pluto's situation? Before addressing this question, let us consider why Pluto was *initially* grouped with the planets.

One initial answer points to the fact that Clyde Tombaugh found Pluto while looking for a planet — the so-called *Planet X*, the trans-Neptunian planet Percival Lowell reckoned was causing orbital perturbations for Neptune and Uranus. This answer only goes so far, though. Granted, the search for Planet X is what got Tombaugh looking so carefully; but he *might* have found Pluto if he had been looking for a comet or asteroid in that part of the sky. Would it have been identified as a planet? We cannot say with any certainty — expectations about what they should find might well have played a role in the initially inflated mass-estimates of Pluto. Early information-gathering efforts centered on determining Pluto's size and orbital characteristics, which were pretty clearly characteristic of a *planet* (as they were thought of in the early 20th century), rather than, say, a comet. V.M. Slipher wrote in the *Lowell Observatory Observation Circular* (May 1, 1930) that Tombaugh's discovery "appears to be a Trans-Neptunian, noncometary, non-asteroidal body that fits substantially Lowell's predicted longitude, inclination and distance for his Planet X" (Slipher, 1930; quoted in Hoyt, 1980, p. 212).

As astronomers learned more about Pluto, however, confidence that Tombaugh had found Lowell's Planet X waned. We learned that Pluto's brightness was due in large part to its high albedo rather than size (originally estimated to be similar to Earth's mass; in fact, it's about 1/5th Earth's diameter and less than 0.2% its mass).⁴ We learned of its eccentric orbit, straying far from the ecliptic of the solar system, and crossing the path of Neptune in a 3:2 orbital resonance, unlike any of the other planets. In short, as the *Cambridge Companion to the Solar System* notes: "Pluto is an anomaly. It is much smaller than the giant planets that occupy the outer parts of the planetary system, and is comparable in size to some of their satellites. Pluto is smaller than Saturn's satellite Titan and all four of Jupiter's largest moons" (33). The influential astronomer Stuart Ross Taylor deems Pluto's anomalousness as clearly sufficient to exclude it from the planets:

Tiny Pluto is commonly referred to as the ninth planet. The mass of Pluto, even when Charon is included, is very small. It amounts to less than one fifth of the mass of the Moon, 1/2000 of the mass of the Earth or 1/64000 of the mass of Jupiter. Pluto has a highly inclined and eccentric orbit. Sometimes it is inside the orbit of Neptune In the frozen twilight, nitrogen ice lies on the surface of Pluto. As Pluto [gets] closer to the Sun, it warms up a little. The nitrogen evaporates and forms an atmosphere. As Pluto retreats from the Sun, the atmosphere freezes out again. It is apparent that Pluto is not a planet, although no doubt it will long continue to be referred to as the ninth planet for a combination of traditional and sentimental reasons. (1998, pp. 99–100)

Taylor here suggests an explanation of why, if Pluto was so anomalous, astronomers continued to classify it as a planet. The anomalies were not discovered until *after* it was grouped with the

⁴Though this was a matter of controversy for decades, it also turned out the "perturbations" Lowell thought he observed were far too subtle to be genuinely informative (being within the range of observational error for the time); Pluto was far too small to be causing them anyway. The fact that Clyde Tombaugh found Pluto in the vicinity of where Lowell predicted it would be seems to have been due to good luck and Tombaugh's diligence. Pluto thus represents a sort of Gettier case for reference. Tombaugh did not find what he was looking for.

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