

Challenger
LEARNING CENTER
of Hardin County



The Otter Creek Astronomical Observatory

The Observer

November 2006 (#6)

On July 1, 2006 the observatory closed for overhaul and installation of new equipment. We are removing our 10-inch Meade SCT and its mount and replacing it with a large refracting telescope with a custom-fabricated mount. We will also be installing new computer equipment. The observatory re-opened for Daytime (Solar) programs in October. Night programs will not be offered while the work continues. This is being done both for the safety of our visitors and for the safety of equipment which may currently be partially installed or sealed against dust.

Upcoming Observatory Programs

November 18, 2006 – 11:00 am – 1:00 pm EST

December 16, 2006 – 11:00 am – 1:00 pm EST

January 13, 2007 – 11:00 am – 1:00 pm EST

February 10, 2007 – 11:00 am – 1:00 pm EST

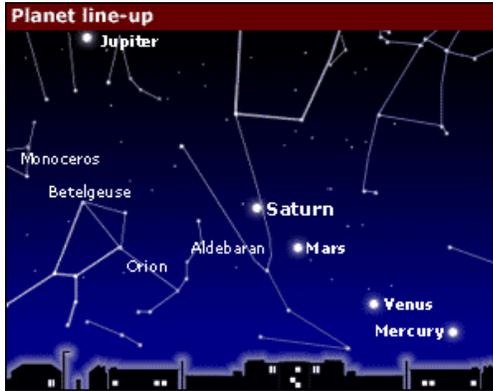
Daytime programs are held "rain or shine"--the observatory is open regardless of weather.

Visit the Otter Creek Observatory web page at

www.ottercreekpark.org

Pluto used to be the most distant planet in our solar system. Until recently that is, when the International Astronomical Union (IAU) passed a resolution to change all that by not calling it a planet any more. Well, technically at least, since they are now calling it a “dwarf planet”.

But before we get into that, let’s talk a little about some of the other planets. The ones you might know and the most recognizable are the brightest ones like Venus, Mars, Jupiter, and Saturn. These



are pretty spectacular, (especially when they line up near each other as they did in 2002) because they are easily visible without telescopes or binoculars and they move around among the stars quite a bit. Pluto, unfortunately, isn’t bright and doesn’t “move around” much at all from our point of view. In fact, it takes large telescopes to be able to

see Pluto, and then it only appears as a little dot of light because it is so far (39 times as far as we are from the Sun) and so small (smaller than the United States). Also, Pluto stays in roughly the same patch of the sky for your entire life. For example, in 2006 it meanders around a small part of the constellation Sagittarius for the entire year.



Venus



Mars



Jupiter



Saturn

Another planet, Mercury (which is the closet to the Sun) sneaks around the Sun very quickly and never is far up in the horizon, but at least you can see it once in a while with your own eyes if you know where to look and the timing is right. Now things get a little more complicated, for the other two planets we haven’t mentioned, Uranus and Neptune, also require a telescope to be seen. But Uranus and Neptune are gas giants, like Jupiter and Saturn; they are much bigger than planets like Mercury, Venus, Earth, and Mars. They are called gas giants because they are big and “gassy” - made up mostly of hydrogen. But they can claim that as big as they are, they should be called planets, just for size.

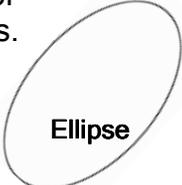
So now this brings us back to Pluto. We said Pluto “used to be called a planet”. What happened, and this has caused a big buzz all over, was that astronomers decided to reclassify Pluto into a different category of objects called “dwarf planets”. Some might argue that’s like saying that a miniature horse isn’t really a horse, and others might say, that’s just a term. We all know it’s still a horse, even if it is small. While we’re at it, small dogs like teacup poodles are still dogs, right? Anyway, the objects in this “dwarf planet” group include a famous asteroid called Ceres and an object



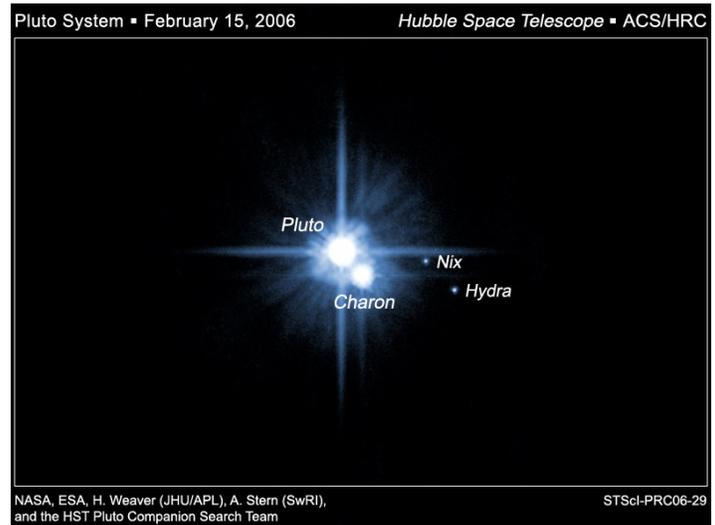
Ceres as seen by the Hubble Space Telescope

known as Eris*. Eris is the latest good-sized object to be discovered in solar system. Astronomers originally called it UB 313. For a while it had the nickname “Xena”. It is even further from the Sun than Pluto and a little bit larger than Pluto.

So Pluto has a hard time defending its title as planet. It isn't big. It is bigger than Ceres in size but smaller than Eris. Pluto and Eris both have moons -- Pluto's is Charon; Eris's is Dysnomia† (pronounced diss-NOH-mee-uh). Charon is very large compared to Pluto -- no other planet has a moon that is so large compared to its own size. Astronomers argued that Pluto with Charon could be thought of as a 'double planet'. But then Eris, which is just a bit larger, would also have to be called a planet. But then, Ceres could also be called a planet since it is just a little smaller, about the size of Charon. But then, what about other objects of this sort of size that have been discovered (more on them in a minute) or might be discovered? We might find ourselves in the future with dozens of planets. Trying to memorize names of planets would be really a tough homework assignment!



So during the recent meeting of the Twenty-Sixth General Assembly of the IAU, a resolution was adopted to define a planet in a new way. One unusual feature that Pluto did have that made it not so 'planet-like' was its unusual orbit which is highly elliptical or egg-shaped. All the other planets have orbits that are much more circular. In fact, Pluto's orbit is so elliptical that it gets inside Neptune's orbit once in a great while and is actually closer to the Sun than Neptune! It did this from 1979 to 1999. Then in 1999, it got back out of Neptune's territory and won't trespass again for 228 years. So Pluto was singled out for trespassing on private property! The other part of the resolution said that a dwarf planet isn't a satellite (a moon). That meant that, whatever we decide to call Pluto, we probably shouldn't call it a satellite, since it has Charon (and in fact two tinier moons called Nix and Hydra). So with that, Pluto got inducted into the new club of "dwarf planets".

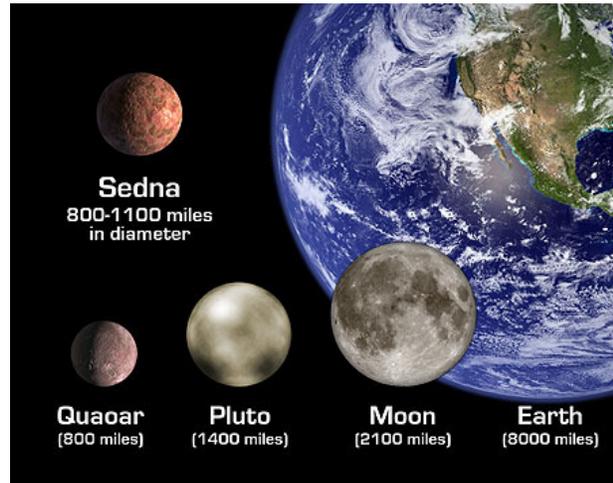


* Eris is named for the Greek goddess of strife and discord, who stirs up jealousy and envy to cause anger and fighting among people. In the story of the Trojan war, it was Eris who started the quarrel that ultimately led to the war. The discovery of Eris was a large part of what led astronomers to revise their definition of what a planet was, ultimately resulting in the scientific quarrels that led to Pluto's reclassification.

† In Greek mythology Dysnomia was the goddess of lawlessness and was Eris's daughter.

To make things even more interesting, there are several other objects out beyond Pluto, discovered in the last few years. Among them are Quaoar, Sedna, Varuna, 2002 AW197 and 2004DW. The picture below shows a size comparison of some of the larger objects compared to our planet and the Moon. Sedna is one of the most distant solar system objects observed to date and Sedna's orbit is extremely elliptical (remember, egg-shaped), even more than Pluto's. Quaoar on the other hand has a very circular orbit.

Now, I know, you are thinking "wait a minute, you said that the IAU team decided to call Pluto a dwarf planet because of the elliptical shape of its orbit. Well, that means Quaoar could qualify as a (dwarf) planet". I might agree with you on that but we will have to wait and see, since the IAU will define a process to determine how to classify borderline objects such as Quaoar. Moreover, there is a whole family of objects beyond Neptune's orbit called Trans-Neptunian Objects and many of these objects tend to blur the line between planets and other types of objects. Currently



astronomers don't tend to think of them, like Quaoar or Sedna, as planets at all. There is an especially interesting group of a dozen and a half Trans-Neptunian Objects called "Plutinos". They are called this because they share an orbital period that is roughly about two-thirds that of Neptune, like Pluto. That is, they all orbit the Sun two times in the same time frame that Neptune orbits the Sun three times and much like Pluto they also have fairly elliptical orbits.

Well, there's been a lot of fuss about this decision, partly for sentimental reasons. Our parents and grandparents have grown up with Pluto being a planet. Besides, whenever we hear the name Pluto, many of us think of the beloved Walt Disney cartoon canine by that name and who doesn't love Walt Disney cartoon characters? There was a time too when we thought that Pluto was all alone out there in the vastness of the outer solar system, much like a dog left outside on a cold winter's night. But Pluto isn't going anywhere any time soon. He will always be out there, taking his sweet time orbiting the Sun in his usually lazy fashion. And as we have seen, Pluto's got plenty of new pals like Quaoar, Sedna and the Plutinos and there are more objects turning up all the time out there.

Text of the IAU resolutions on Pluto
(http://www.iau.org/fileadmin/content/pdfs/Resolution_GA26-5-6.pdf)

RESOLUTION 5

Definition of a Planet in the Solar System

Contemporary observations are changing our understanding of planetary systems, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation "planets". The word "planet" originally described "wanderers" that were known only as moving lights in the sky. Recent discoveries lead us to create a new definition, which we can make using currently available scientific information.

The IAU therefore resolves that planets and other bodies, except satellites, in our Solar System be defined into three distinct categories in the following way:

- (1) A planet¹ 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, and
 - (c) has cleared the neighbourhood around its orbit.

- (2) 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) shape²,
 - (c) has not cleared the neighbourhood around its orbit, and
 - (d) is not a satellite.

- (3) All other objects³, except satellites, orbiting the Sun shall be referred to collectively as "Small Solar System Bodies".

¹ The eight planets are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

² An IAU process will be established to assign borderline objects into either dwarf planet and other categories.

³ These currently include most of the Solar System asteroids, most Trans-Neptunian Objects (TNOs), comets, and other small bodies.

RESOLUTION 6

Pluto

The IAU further resolves:
Pluto is a "dwarf planet" by the above definition and is recognized as the prototype of a new category of Trans-Neptunian Objects¹.

¹ An IAU process will be established to select a name for this category.