"It's a good thing the guy in charge of naming galaxies was into chocolate bars and not Chinese food. Otherwise, the Milky Way might have been named Moo Goo Gui Pan, and who wants to have to learn about that?"
— Paul Paternoster.

The Milky Way: A History

In the beginning...
- Earth is the center of the universe
- Galileo saw individual stars in the Milky Way
- Later we saw:
  - Stars
  - Nebulae
  - Clusters

Nebulae
- Planetary
- Supernovae
- Dark
- Emission (HII, ionization)
- Reflection
- 1880’s suggested Spiral Nebulae

Earl of Rosse
- Built a telescope and studied nebulae
  - Catalogue by William Herschel
- Spiral shape
- Different than other nebulae

Schools of thought
- Lord Rosse
  - Liked Immanuel Kant's idea of Island Universes
  - Far away from the Milky Way
  - Not very popular
- Everyone else
  - Spiral Nebulae we just part of Milky Way
  - Very popular
1920’s
- April 1920 - National Academy of Science
- Shapley-Curtis Debate

Harlow Shapley
- Young astronomer
- Famous for finding size of Milky Way
  - $100,000 \text{ ly} = 30,660 \text{ pc}$
- Went with popular belief
  - Spirals are inside Milky Way
  - Similar to Globular Clusters

Herber Curtis
- Older, more experienced astronomer
- Believed like Lord Rosse
  - Island Universes
  - Rotating systems far away from Milky Way

Conclusion?
- There was no conclusion
- What is needed to decide if they are in or out of the galaxy?
- Distances!!!

Edwin Hubble
- Telescope was named after him
- He was originally a lawyer
- Started in Chicago, then to California
- 1923 - studied the largest Spiral Nebula with his assistant
  - Andromeda Nebula
Cepheids!

• Using the best technology of the time
  – 100-inch telescope
  – Photographic plates
• Thought he found a Nova
• Really found a Cepheid variable star
  – Looked for more
• Remembered Henrietta Leavitt’s work

Distance

• Used Leavitt’s P-L relation to find the absolute magnitude of Cepheids
• Results gave a distance
  – ~263,000 pc
  – Today: 2.2 million light-years or 674,510 pc
  – Definitely bigger than 30,660 pc
• The debate was finally ended
• Spiral Nebulae are outside the Milky Way

Name change

• Spiral nebulae are now called Spiral galaxies
• Milky Way is one of BILLIONS
• We will start with the Milky Way and work our way out into the Universe