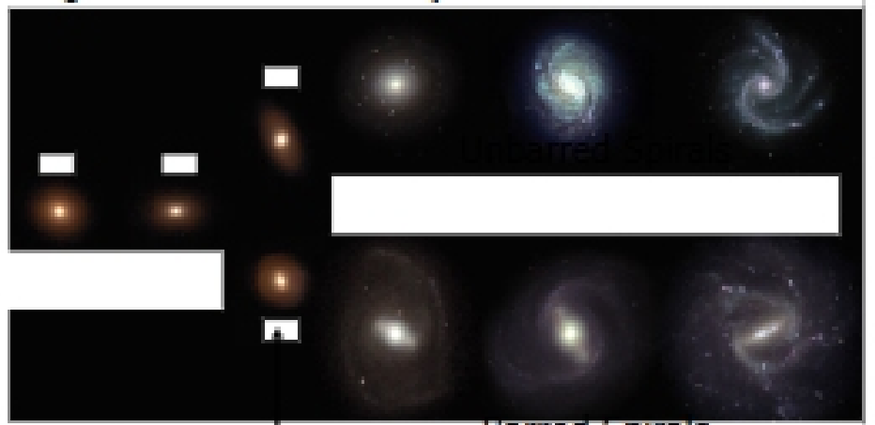
# Questions of the Day

- What is the Hubble sequence, and how do the properties of galaxies vary along it?
- What determines the colors of galaxies?
- How can we measure the motions of stars and gas within galaxies?



# The galaxy population can be organized into a sequence:



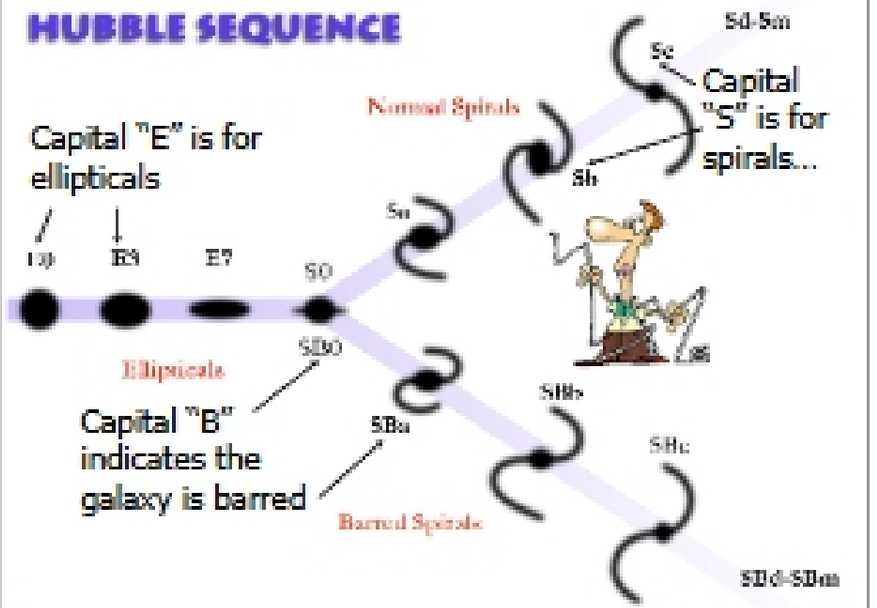

Ellipticals

Lenticulars

Barred Spirals

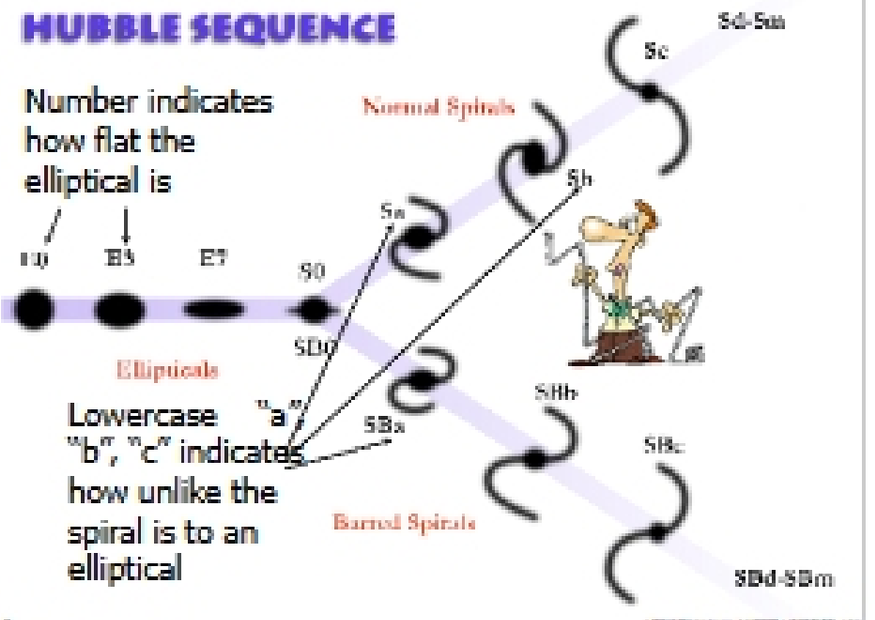


# HUBBLE SEQUENCE






# HUBBLE SEQUENCE



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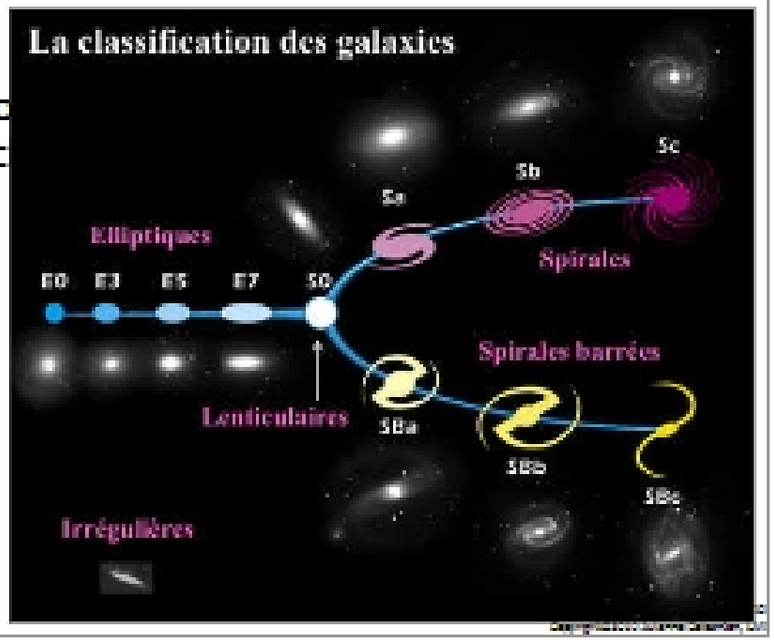
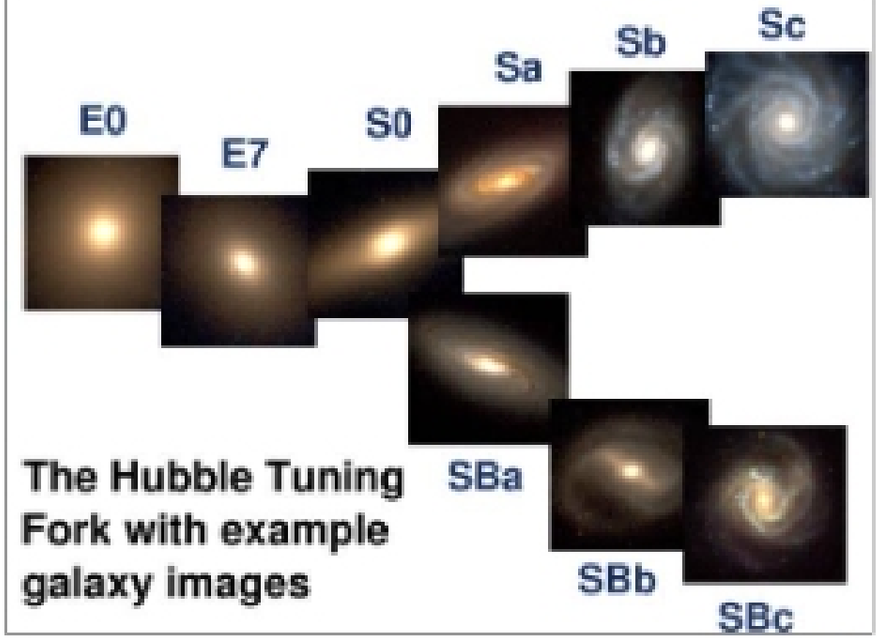
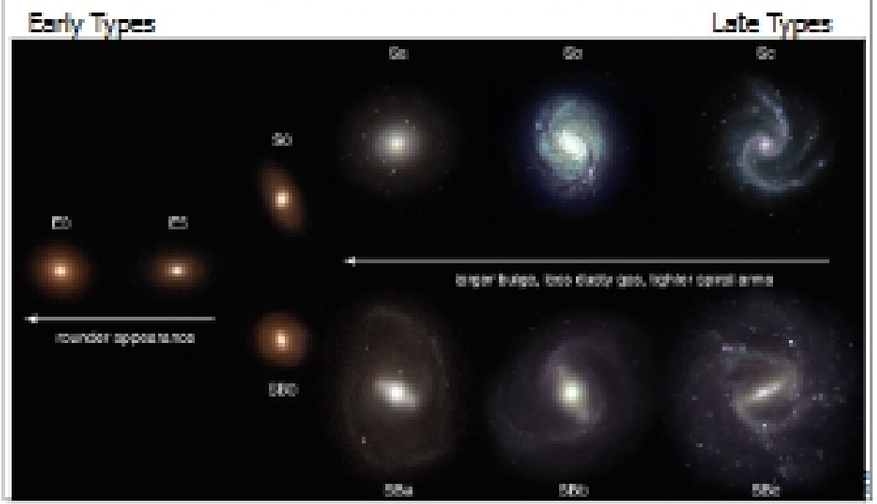


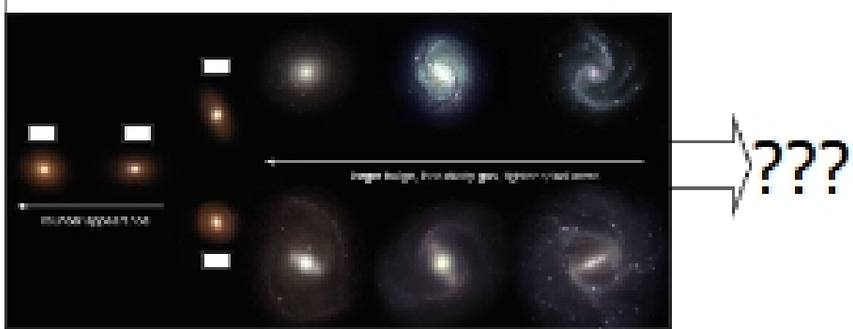




The Hubble Tuning Fork with example galaxy images

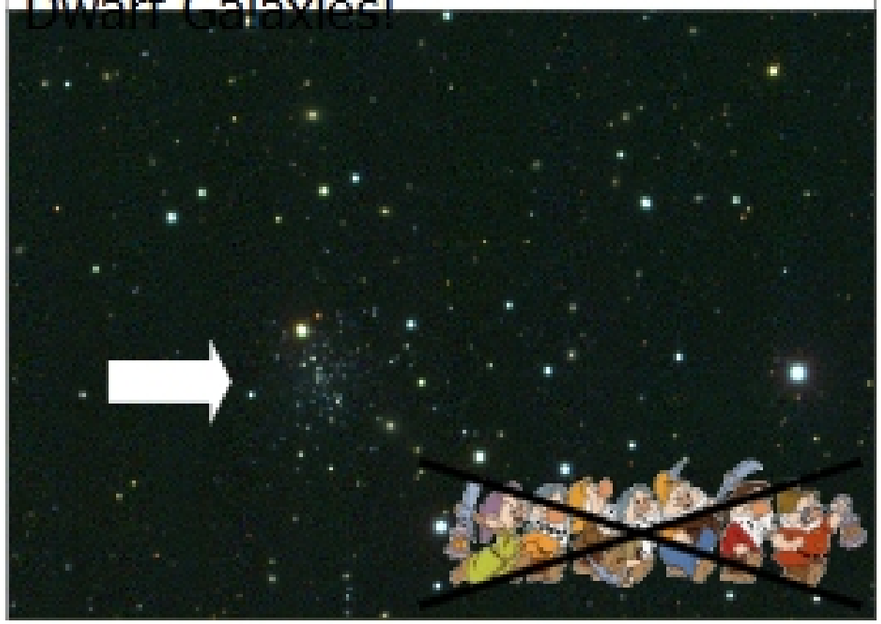
1. "Bulge-to-Disk Ratio"
2. Lumpiness of the spiral arms
3. How tightly the spiral arms are wound




There are galaxies beyond the Hubble Sequence that continue this trend.



## Dwarf Galaxies!



## "Dwarf" or "Irregular" galaxies tend to have more chaotic appearances...

- Low mass ($10^7$-$10^9$ stars, vs $10^{10}$ for spirals)
- High star formation rates (usually)
- No obvious bulge or spiral patterns.
- Most numerous type of galaxy in the Universe!

## Dwarf galaxies from the Sloan Digital Sky Survey.

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