The Future Sun

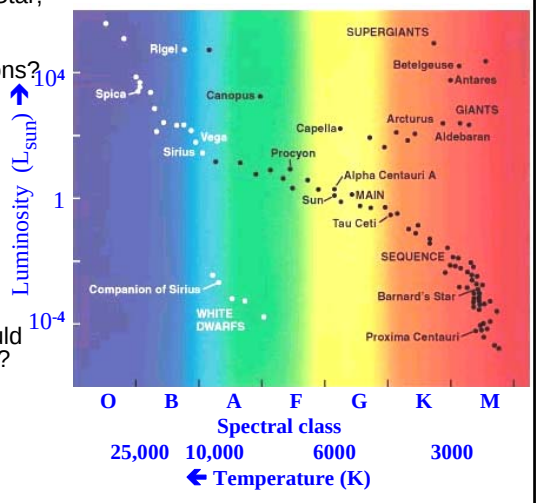
- Homework 5 is due Wed, 24 March at 6:30am
  - One answer is wrong. See email
- OBAFGKM extra credit
  - Angel: Lessons>Extra Credit
  - Due 11:55pm, 31 March
- Answer on Q36 on Test 2 was wrong.
  - It will be regraded.
- Final exam (new, later time)
  - 6 May, **3:00-5:00**, BPS 1410

- Giants are dying stars; white dwarfs are dead stars
- Why does the sun die?
- What will the sun become when it dies?

Hertzsprung-Russell (H-R) Diagram

- Stars: A-Aldebaran; B-Barnard's Star; C-Capella; D-Rigel

1. What do you need to know about stars to answer the next 4 questions? Pick one correct ans.
   a. Hot-plate model of star
   b. Model of the solar interior
   c. How to read H-R Diagram
   d. Spectrum of black body
   e. Energy generation in the sun
2. Which is the hottest star?
3. Which is the smallest star?
4. Which is the biggest star?
5. If stars A-D replaced the sun, would people be able to live in Michigan?
   a. YNNN
   b. NYNN
   c. NNYN
   d. NNNY
   e. NNNN

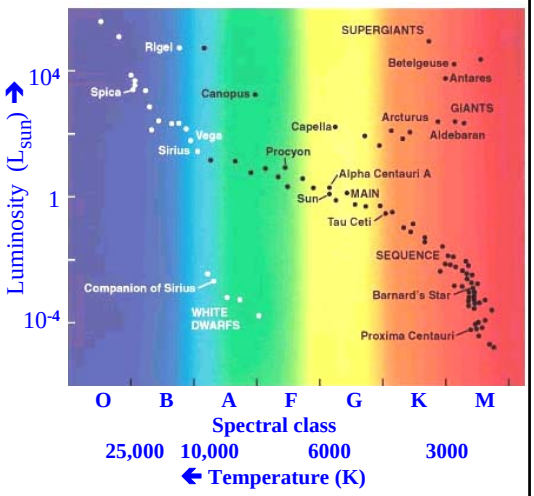


[see Fig. 11.10]

Hertzsprung-Russell (H-R) Diagram

- Stars: A-Aldebaran; B-Barnard's Star; C-Capella; D-Rigel

1. What do you need to know about stars to answer the next 4 questions? Pick one correct ans.
   a. Hot-plate model of star: $L=R^2T^4$
   b. Model of the solar interior X
   c. How to read H-R Diagram
   d. Spectrum of black body: Hotter=>bluer
   e. Energy generation in the sun X
2. Which is the hottest star?
3. Which is the smallest star?
4. Which is the biggest star?
5. If stars A-D replaced the sun, would people be able to live in Michigan?
   a. YNNN
   b. NYNN
   c. NNYN
   d. NNNY
   e. NNNN



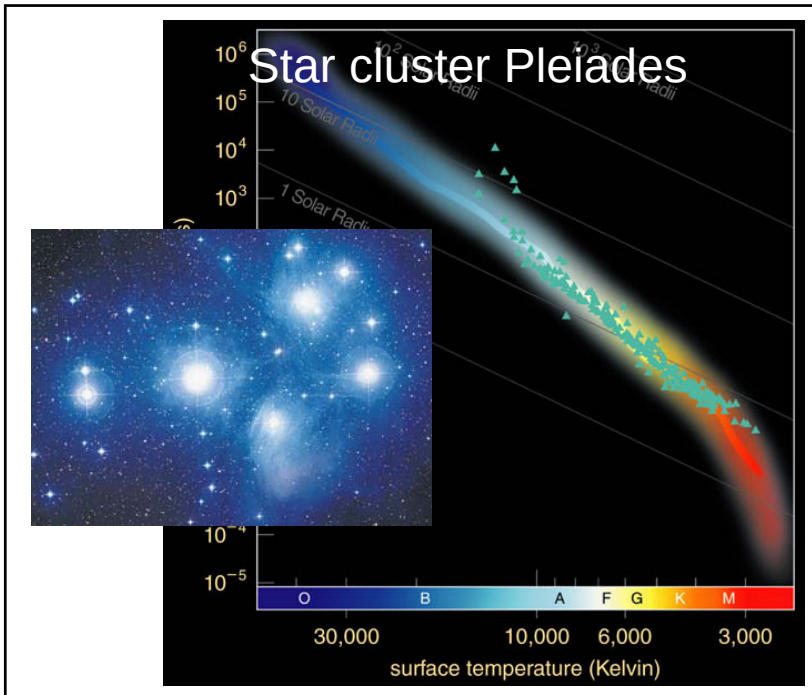
[see Fig. 11.10]

Giants are dying stars; white dwarfs are dead stars

- Evidence on giants from star clusters
  - Compare members of a population. (Twin study)
- All stars in a cluster are born at once.
  - Formation time is the collapse time of the cluster, which is very short.
- I am a G star like the sun. I have 100,000 fraternal twins, some weighing 30 times my mass, some 1/10 of my mass.

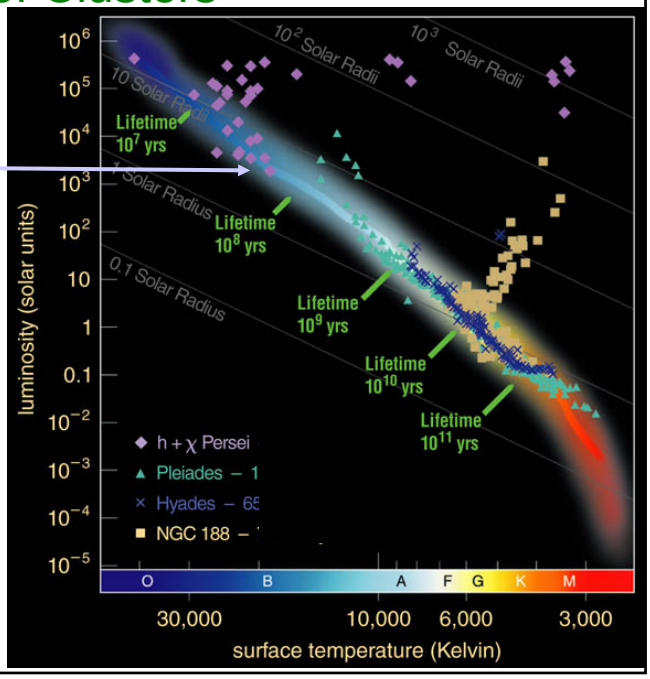
M80

Pleiades

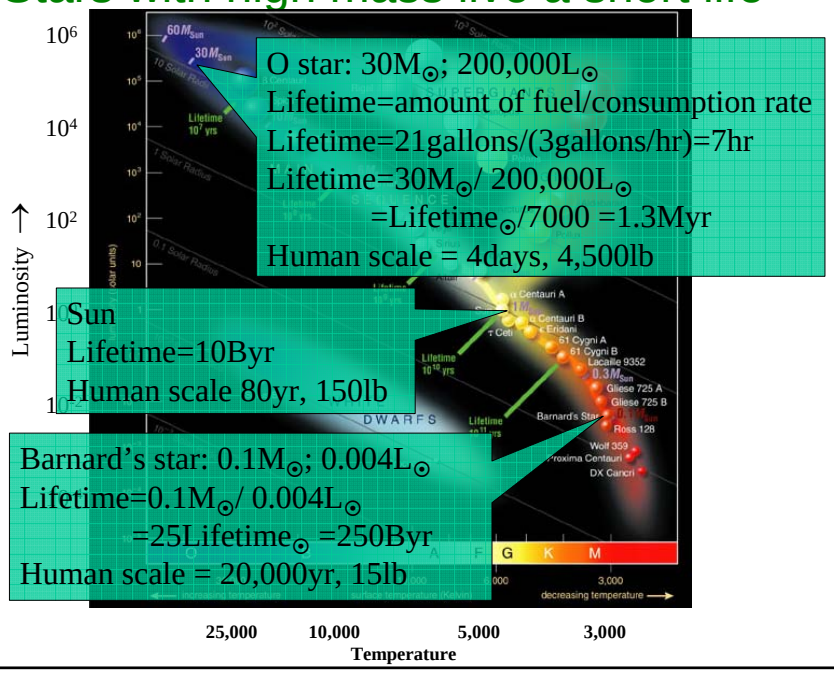


HR Diagram of Clusters

- Not all fainter stars were observed.
  - For all star clusters, main sequence extends to cooler stars beyond observations
- In what ways are HR diagrams of H+χ Perseus, Pleiades, Hyades, & NGC188 different?
- Q Which is false
  a. Hottest stars in Perseus are hotter than hottest stars in Pleiades.
  b. Most stars are on the main sequence.
  c. NGC188 has small range of luminosity
  d. Some clusters have giants.



Stars with high mass live a short life



O star: $30M_\odot$; $200,000L_\odot$
Lifetime=amount of fuel/consumption rate
Lifetime=21gallons/(3gallons/hr)=7hr
Lifetime=$30M_\odot$/ $200,000L_\odot$
=Lifetime$_\odot$/7000 =1.3Myr
Human scale = 4days, 4,500lb

Sun
Lifetime=10Byr
Human scale 80yr, 150lb

Barnard's star: $0.1M_\odot$; $0.004L_\odot$
Lifetime=$0.1M_\odot$/ $0.004L_\odot$
=25Lifetime$_\odot$ =250Byr
Human scale = 20,000yr, 15lb

H-R Diagrams of star clusters

- Q2 There are no A stars in M80 because
  a. they never formed.
  b. they died and disappeared
  c. all stars became redder as they get older.
  d. they are too faint to see.

H-R Diagrams of star clusters

- Q3 The hottest dwarfs in Pleiades are A stars. The hottest dwarfs in M15 are F stars. Pleiades is ___ than M15.
  a. older
  b. younger