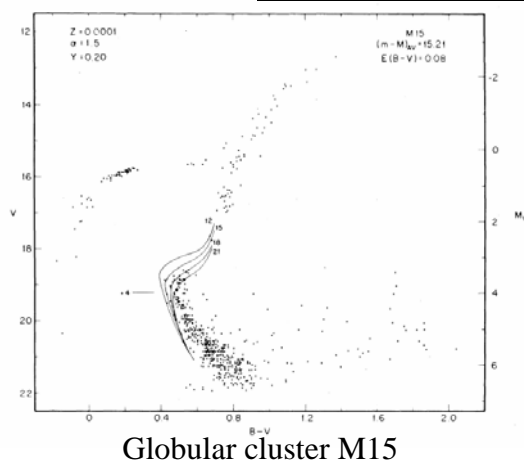


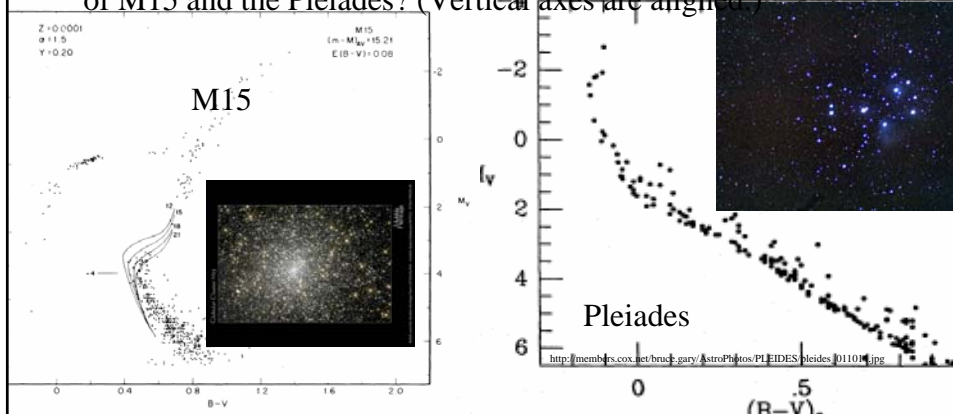
Lifetime of Stars—9 Oct

- How are giants and dwarfs related?
- Does the sun have a finite life or does it last forever?
- Clues
 - H-R diagram
 - Luminosity depends on mass
 - Fuel consumption rate



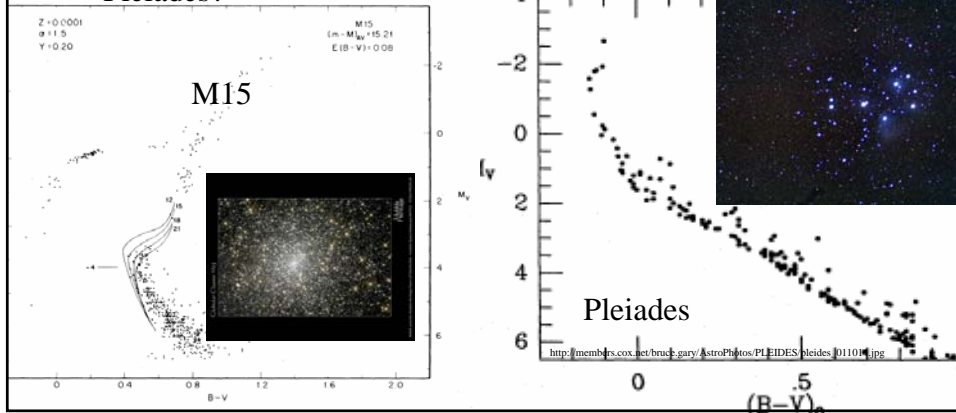
Pleiades & M15

- Stars in a cluster were born at the same time. They are at the same distance.
 - Study a cohort of thousand-tuplets. How are they different? What is their lifetime?
- What are differences between the Hertzsprung-Russell diagrams of M15 and the Pleiades? (Vertical axes are aligned.)



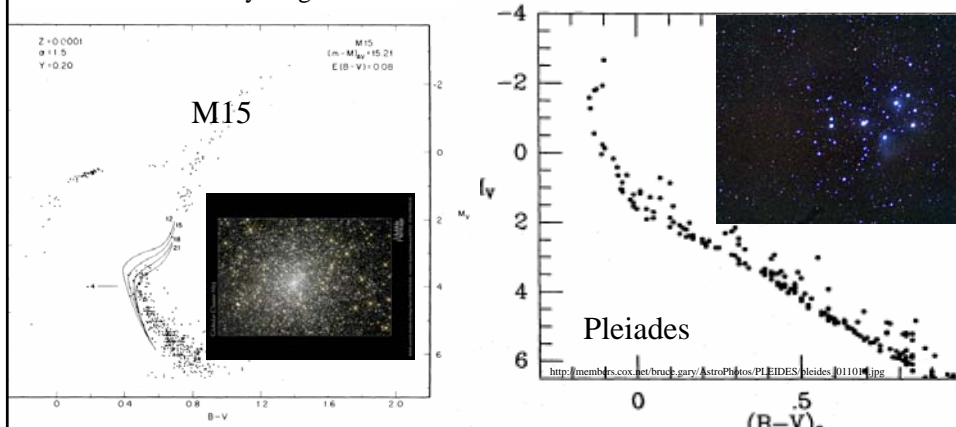
Pleiades & M15

- What are differences between the Hertzsprung-Russell diagrams of M15 and the Pleiades? (Vertical axes are aligned.)
1. Are there any MS stars with abs mag $M_V=6$ in M15 & Pleiades? A. YY. B. YN. C. NY. D NN.
 2. Are there any MS stars with abs mag $M_V=2$ in M15 & Pleiades?



Pleiades & M15

1. Are there any MS stars with abs mag $M_V=6$ in M15 & Pleiades? A. YY. B. YN. C. NY. D NN.
2. Are there any MS stars with abs mag $M_V=2$ in M15 & Pleiades?
 - Very hot stars were born in both clusters.
 - Hotter stars died and disappeared.
3. Which is the younger cluster? A: Pleiades. B: M15.



Lifetime of Stars

- Lifetime = Amount of fuel/Rate of consumption
 - Lifetime of a tank of gas for a car
 - For a star
 - Amount of fuel = mass
 - Rate of consumption = luminosity
- Lifetime = mass / luminosity
- Stars have a finite life. The sun will not live forever!

Spectral Class	Abs Mag	Luminosity [Lsun]	Mass [Msun]	Lifetime [Tsun]
O3	-6	25000	40	1/600
G2 (sun)	5	1	1	1
M0	10	1/100	0.3	30

Lifetime of Stars

- Lifetime = mass / luminosity
- Stars have a finite life.
- The sun will not live forever!
 - Life of sun is 10Byr
- O3 stars
 - Lifetime is 1/600 of sun's
 - O stars have a lot more mass than the sun. Why is their life so short?
- M0 stars have a long life.

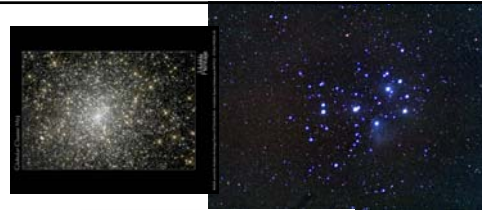
Spectral Class	Abs Mag	Luminosity [Lsun]	Mass [Msun]	Lifetime [Tsun]
O3	-6	25000	40	1/600
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Cluster of Stars

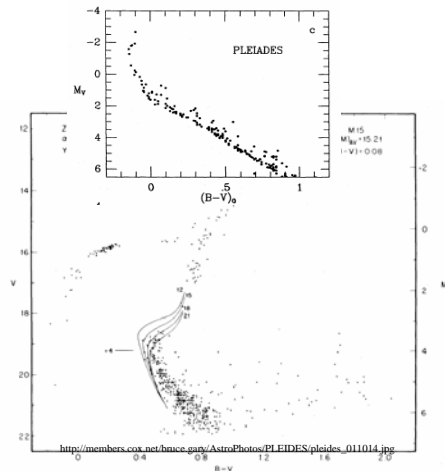
- In a cluster of stars
 - All stars were born at the same time.
 - Some are massive and live a short life.
 - On a human scale: 20T if the sun scales to 100lb.
 - On a human scale: 5 wk if the sun scales to 70yr.
 - Some have little mass.

Spectral Class	Abs Mag	Luminosity [Lsun]	Mass [Msun]	Mass	Lifetime [Tsun]	Lifetime
O3	-6	25000	40	20T	1/600	5wk
G2 (sun)	5	1	1	100lb	1	70yr
M0	10	1/100	0.3	30lb	30	2000yr

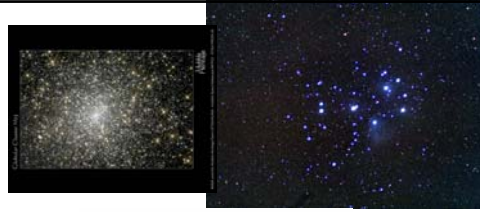
Pleiades & M15



3. Why does M15 not have any main sequence stars with $B-V=0.2$?
- A. They were not born in M15.
 - B. They died already.
 - C. They became redder main-sequence stars.



Pleiades & M15



3. Why does M15 not have any main sequence stars with $B-V=0.2$?
 - A. They were not born in M15.
 - B. They died already.
 - C. They became redder main-sequence stars.
4. Why are there so few giants in the Pleiades?
5. How are giants related to main sequence stars?

