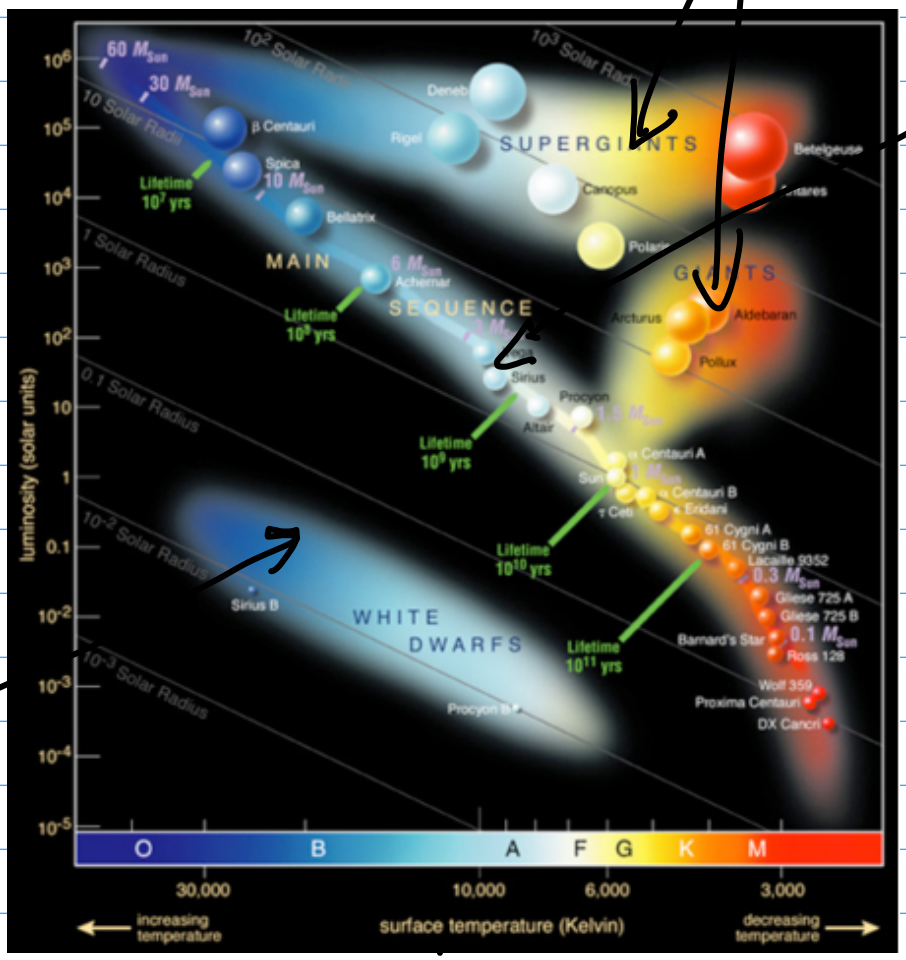
STELLAR FORMATION & EVOLUTION (CH. 14)

TO FIND OUT ABOUT THE STAR FORMATION WE NEED TO LOOK AT THE NEIGBORHOODS OF YOUNG STARS. WHERE TO FIND THE YOUNGEST STARS? RECALL THE H-R DIAGRAM

RED GIANTS

MAIN SEQUENCE STARS (OVER 90% OF ALL STARS ARE IN THIS GROUP)

L ↑



WHITE DWARFS

← T (SPECTRAL CLASS)

$$\text{LIFETIME OF A STAR} = \frac{\text{FUEL AVAILABLE } (M)}{\text{ENERGY OUTPUT } (L)} = \frac{M}{L}$$

(M: MASS; L: LUMINOSITY)

$$= \frac{M}{M^{3.5}} = \frac{1}{M^{2.5}}$$

FOR MAIN SEQUENCE STARS $L = M^{3.5}$

HENCE, THE LARGER THE MASS, THE SHORTER IS THE LIFETIME. THUS, THE YOUNGEST STARS ARE AT THE UPPER LEFT CORNER OF THE MAIN SEQUENCE: VERY LUMINOUS AND VERY HOT (O- AND B- SPECTRAL CLASS). WHEN WE VIEW THEM WE FIND THAT THEY ARE SURROUNDED BY CLOUDS OF GAS (BY MASS: 75% H, 25% He) AND DUST (SMALL SOLID PARTICLES)

WHEN WE CAN OBSERVE THEM AT VISIBLE WAVELENGTHS (FROM 400 nm TO 700 nm, ($nm = 10^{-9} m$) WE CALL THEM NEBULAE