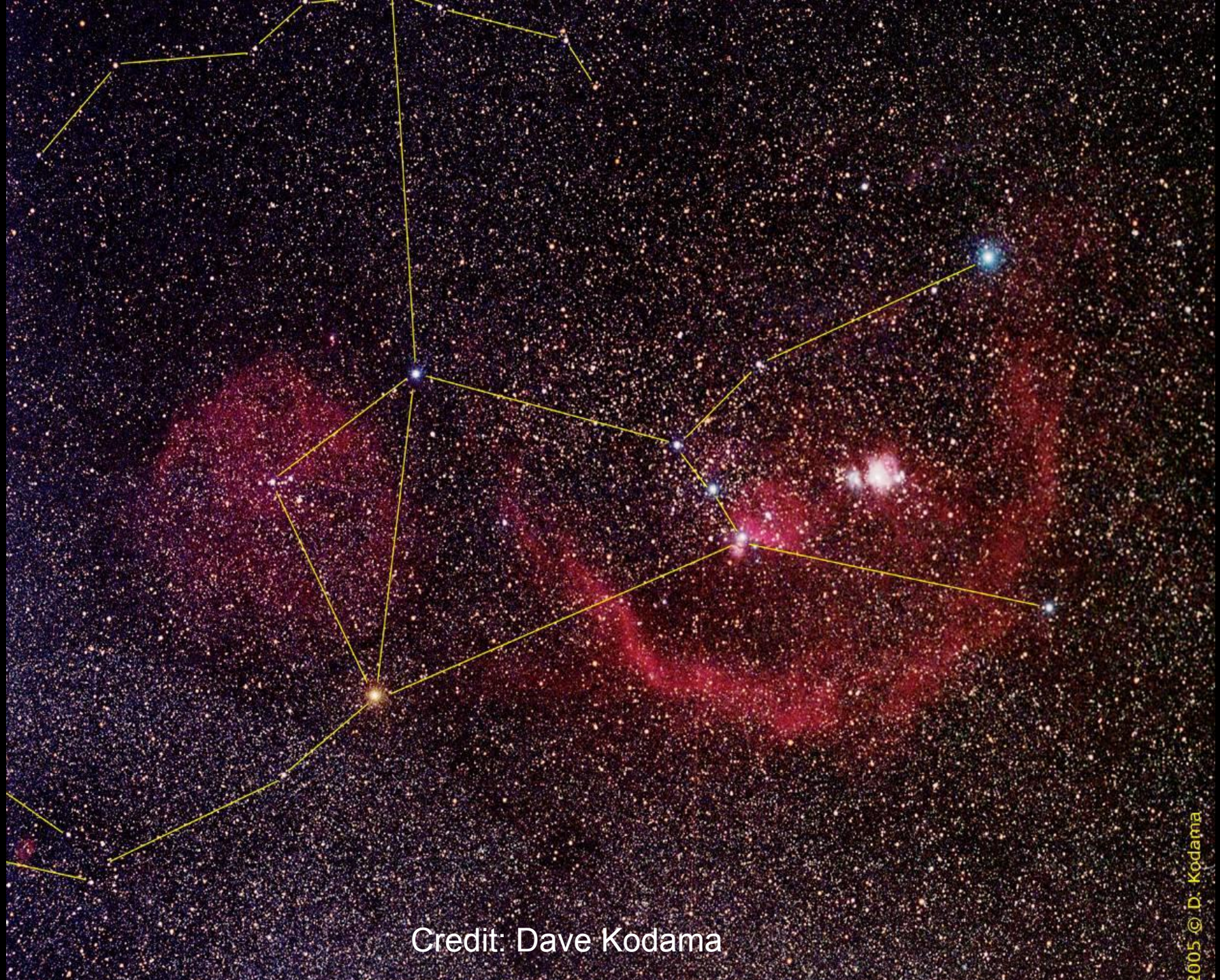
What's Up for Imagers

The Orion Region

November 2008



Credit: Dave Kodama

Whazzup Here?

- Huge molecular cloud in the Orion-Monoceros region
- A large swarm of very hot O and B stars – an “OB” association
- Numerous famous emission and reflection nebulae

Credit: John Gleason

Orion Molecular Cloud

- The overall cloud contains something like $2x10^5$ solar masses
  - Not just molecular hydrogen…
  - Spectroscopic signatures of nearly 150 molecules observed in these clouds
  - “Exotics” include benzene, acetic acid, and formaldehyde

Orion Molecular Cloud

- The portion within Orion is about ½ that, separated into ‘A’ and ‘B’ regions
  - Roughly associated with M42 and the Flame nebula, respectively
  - Areas of intense star formation
- Eastern edge roughly marked by Barnard’s loop


redit: Rob Gendler

Credit: J. Thibert, SSRO

Credit: Steve Mazlin, SSRO

Orion OB1 Association

- OB Associations
  - Loose, co-moving stellar groups of Type O and early B-type stars
  - Typical lifetimes of < 30M years
  - Often found along the edge of a spiral arm as part of a density gradient
  - Internal age differences suggest successive “triggering” events

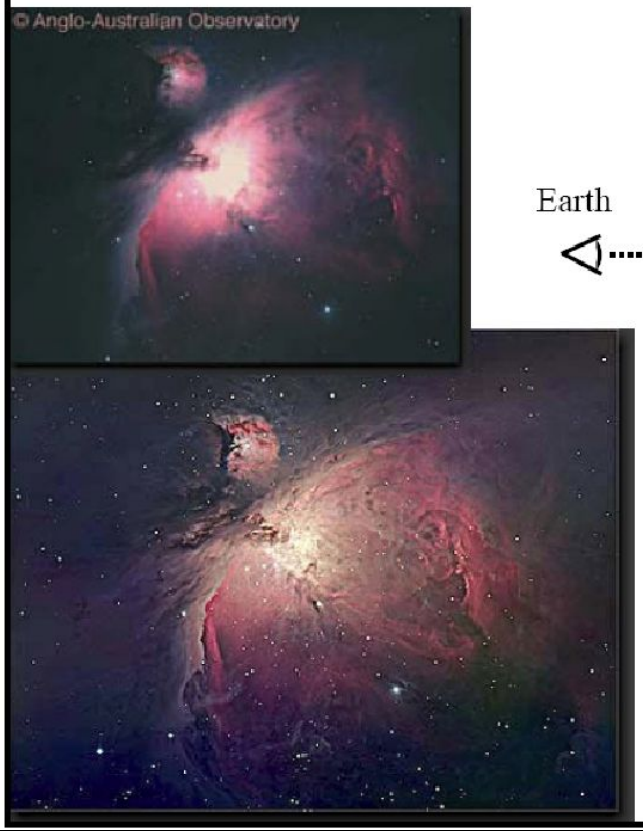
Orion OB1 Association

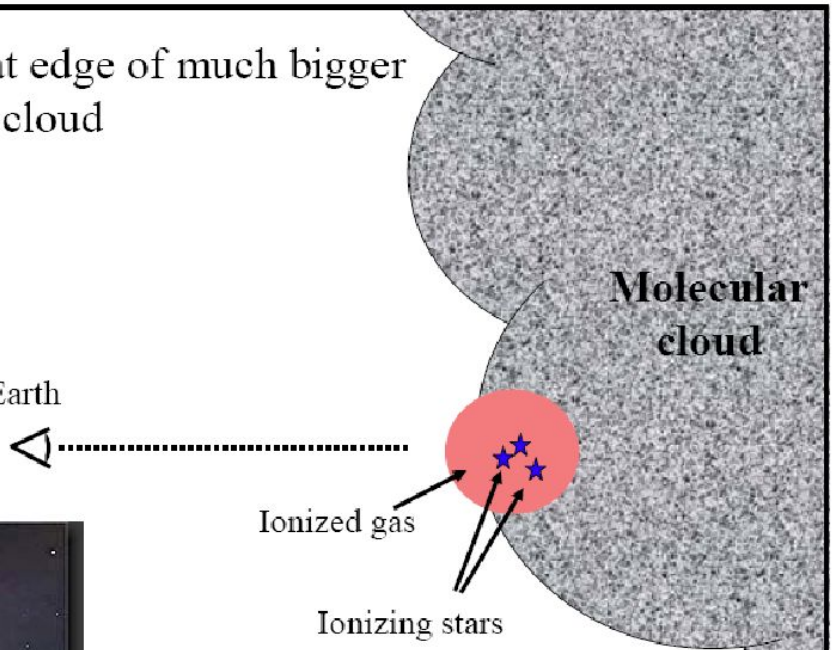
- Brightest stars in Orion are very young type O and B stars
  - 1a, 1b (Belt region), 10-12 million years old
  - 1c (Sword region), 3-6 million years old
  - 1d (Orion Nebula and Trapezium cluster), 1-4 million years old

Credit: HST

Where Does M42 Fit In?

HII region is small cavity at edge of much bigger molecular cloud

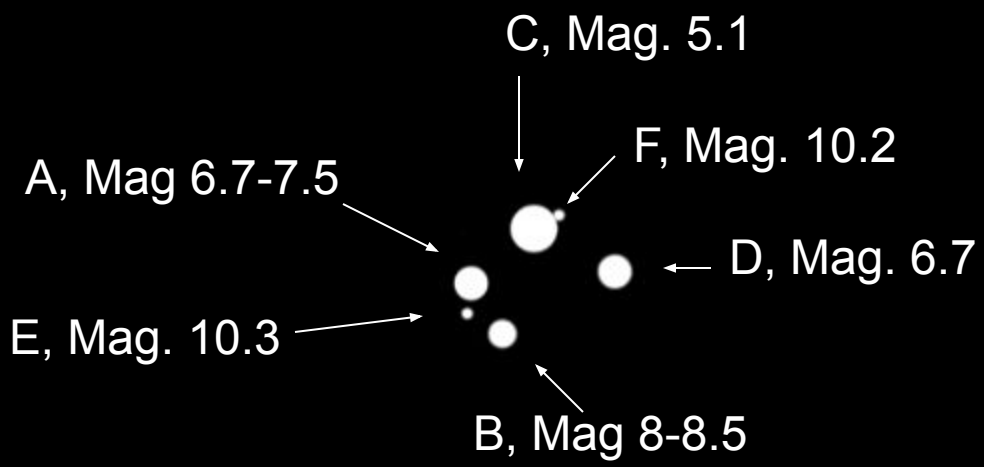




- Ionized region has "blown out" of near side of dense cloud.
  - "Blister" HII Region
- Many more similar star-formation regions buried deep inside cloud.

Credit: HST

The Trapezium



The ‘F’ and ‘E’ components can be resolved with amateur scopes

The Trapezium is “in front of” the huge molecular cloud


Credit: HST

Credit: HST

Protoplanetary Disks

- Rotating disk of dense gas around a new star
- Flattened because of rotation in the collapsing gas
- Initial collapse takes about 10^5 years; ongoing accretion for about 10^7 years
- Often “shredded” by radiation from bright stars – this creates the “coma” shape

Computer-simulated proto-planetary disk, San Diego Super-computer Center


Credit: J. C. Casado, APOD 12/1/97