

## OBSERVING THE LATE WINTER (EARLY SPRING) SKY

### Purpose

To become oriented to the night sky and become familiar with three late winter constellations. The emphasis will be on careful observation. Observation, after all, is *the* stuff of astronomy.

### Introduction

The night sky is beautiful, and it only becomes more so when you learn your way around it. There are some sentimental people who think that the more you know about nature, the less wonderful and mysterious it is. These people are wrong. Trust me. If you really love this, skygaze on your own; Berry is a great place for it. After some work, you will be able to look up and identify stars, constellations, clusters, galaxies, and other cosmic doodads with ease. It will make you feel at home wherever you travel! So let's learn about the sky.

### Procedure

*Step 1: So Which Way is North, Anyway?*

Finding the direction north is a breeze. Using the Alaska flag below, locate the Big Dipper, then use this asterism (not constellation!) to point you to the North Star, Polaris. This may take a little work at first, but after a while this prominent pattern will pop out at you.



The earth's axis of rotation meets the celestial sphere very near Polaris at the North Celestial Pole; the altitude and azimuth of Polaris therefore does not change appreciably as the earth rotates. There is no particular reason why we should have a North Star; there is no equivalent South Star. In fact, due to precession, in a thousand years we will have no North Star either! Once you know where north ( $0^\circ$  azimuth) is, you can find east ( $90^\circ$  azimuth), south ( $180^\circ$  azimuth) and west ( $270^\circ$  azimuth). Look around the horizon and locate these points. Now picture the *meridian*; the meridian is the arc that meets the horizon at  $0^\circ$  azimuth (exactly north) and  $180^\circ$  azimuth (directly south) and which passes through your zenith.

*Step 2: How About that Celestial Equator?*

Look at the eastern and western points of the horizon and picture a sweeping curve that passes from one point to the other and that crosses the meridian about two-thirds the way from the southern horizon to the zenith. This is the *celestial equator* and is the projection of the earth's equator on the celestial sphere. All stars below this line have negative declinations; all stars above it have positive declinations. In the winter, it is easy to imagine the celestial equator because it runs right across Orion's belt (through Mintaka, to top right star in the belt).

*Step 2: What About the Ecliptic?*

The ecliptic can be harder to find because its path across the sky depends upon the time of year. The best way to get some sense of the ecliptic is to identify zodiacal constellations. The ecliptic runs right through the middle of these constellations, so you can get some sense of its path by figuring out just a few zodiacal constellations. Early in the late winter night we can see (from West to East) Pisces, Aries, Taurus, Gemini, Cancer, and Leo. Another good way to locate the ecliptic is to identify planets (which are always near the ecliptic). Venus and Saturn will both be visible during our observing trip.

*Step 3: Find and Draw Your Favorite Constellations*

Now that you have some sense of orientation, you can use your handy star chart to locate and carefully draw five constellations. Ursa Major is mandatory. When you finish Ursa Major, let the instructor see your drawing to make sure that you have the right idea. Choose your other two constellations from the list below:

- Perseus (the Hero)
- Auriga (the Charioteer)
- Aries (the Ram)
- Taurus (the Bull)
- Orion (the Hunter)
- Gemini (the Twins)
- Cancer (the Crab)
- Leo (the Lion)
- Cassiopeia (the Queen)
- Canis Major (the Big Dog)
- Hydra (the Water Snake)

For each drawing, please include:

1. The name of the constellation.
2. All major stars; make bright ones larger than the dim ones. Also, if you can discern a color other than white, write it down.
3. Names of the brightest stars (just one or two). For names, ask your instructor or search on the web (Wikipedia has good info on each constellation).
4. The date and time.
5. The approximate altitude and azimuth of the brightest star in the constellation (note: a fist held at arms length subtends about  $7^\circ$ .)
6. The approximate angular distance between three pairs of stars in the constellation.
7. The correct orientation of the constellation; indicate the direction to the zenith with an arrow and the letter *z*.

Your drawings are due on Monday March 2 at class time.