

A DEEP-SKY TOUR FOR A BEGINNER
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One of the most enjoyable things an amateur astronomer can do is introduce the hobby to someone special, like a family member, a friend, or a significant other. Yet deep-sky fans have it tough. How do we demonstrate the pleasures of viewing things that experienced observers find hard to see, to someone who may never have used an astronomical telescope before?

It is often late spring or early summer when I tackle that problem -- a good time to make newcomers comfortable outside at night. There is a particular tour of celestial objects that I use frequently, that introduces some real astronomy as well as basic deep-sky observing techniques.

Before starting the tour, I deal with equipment and circumstances. I remind the newcomer to dress properly, demonstrate what the telescope looks like and how it works in daylight, and explain about dark adaptation and star-party etiquette. If I plan to use light pollution filters, I show how they work in bright conditions.

I pick a telescope with convenient eyepiece position, and show how to adjust my fancy observing chair. I choose eyepieces with long eye relief, particularly if my companion wears glasses to observe. Large aperture makes celestial sights more spectacular, but I don't use a big telescope at the expense of ease of use by a beginner.

Some people are timid about equipment. I have to keep saying that telescopes are hard to hurt. That's true, but even so, I don't use one I treasure so much that a newbie handling it makes me nervous. That way, I can freely encourage newcomers to use the focuser and to move the telescope around. I might not take such a hands-on approach with a long line at a star party, but for one-on-one, it's okay.

The Moon and bright planets are useful beginner targets, if only to teach focusing and to demonstrate the effects of poor seeing and of changing magnification. Yet for deep-sky maniacs, they just get in the way, and furthermore, sometimes there aren't any up. So I will not mention them further here.

My tour starts with a prominent star. Arcturus is often well placed in this season. Experienced observers forget how beautiful a bright star can be. Besides, it lights up the eyepiece enough to see the edges of the field, which makes it obvious what is happening when the newcomer uses slow motions or hand pressure to adjust telescope position. I take

the opportunity to talk about focusing and seeing, and to mention that nighttime stars are much the Sun, only so far away that we see them as points.

One star leads to many. I move on to easy or colorful doubles like Mizar, Albireo, Polaris (particularly good for non-driven telescopes), Izar, and epsilon Lyra. These let me mention that stars are sometimes physically associated, and orbit one another like planets and satellites in our solar system.

Stars come in larger bunches, so my next tour stops are easy open clusters. Good candidates include the Coma Berenices star cluster -- a fine object even in a finder -- M11, and perhaps two large open clusters in northern Ophiuchus, NGC 6633 and IC 4665. I remark that these stars are physically grouped because they formed in one place and time, and have stayed together since.

Globular clusters provide a different and perhaps more dramatic kind of stellar grouping. I describe them as star-swarms, like bees. When M13 is behind a tree, M3 and M5 are just about as good. If seeing, telescope operation, and perhaps my companion's manual skills permit, I increase magnification in pursuit of resolution. I point out the effects of seeing, the darker sky background, the increased noticeability of mechanical vibration, and the difficulty of finding an object and keeping it centered at high magnification. I inform the viewer that these clusters contain hundreds of thousands of stars, and formed long ago, outside our own galaxy, where they orbit it slowly.

By this time I have talked enough about stellar creation that people are pleased to see some evidence of the process. M8 is a natural, a bright cluster embedded in the remains of the dust and gas from which it formed. M16 is a subtler example, perhaps too subtle in bright sky, and M17 shows its stars less obviously. I refer to such sights as "stars in swaddling clothes". Prominent swirls and brightness variations in the nebulae introduce observation of diffuse objects. I may use a narrow-band light-pollution filter to improve visibility of nebulosity.

Sometimes I paraphrase a remark by astrophysicist Martin Harwit, that although we think stars condense from dust and gas, it might alternatively be that they form out of nothing and a lot of dust gets kicked up in the process. That comment is not all humor; it helps remind the newcomer -- and occasionally me, too -- that there are a lot of things about the cosmos that we have not begun to understand.

Planetary nebulae illustrate the latter stages of stellar evolution. M57 and M27 are well-placed bright examples, though their central stars

may be excessively challenging. I steer my companion clear of the common mistake of thinking that planetary nebula formation is as violent as a stellar explosion. Some people liken these objects to supernova remnants, but they are more like the cloud of steam above a pot of boiling water.

Galaxies are last on my tour. M51 is a fine example for this time of year. It doesn't take huge aperture for even a beginner to sense its spiral structure. Even many finders will show its companion, NGC 5195, and thus begin to reveal that even objects as enormous and star-filled as galaxies, themselves come in groups. NGC 6207, near M13, is another useful example, even though much less prominent. It provides an illuminating contrast in viewing difficulty when compared to the giant globular nearby. M104 might also be high enough in the southwest to observe easily.

Yet my favorite external galaxy for this tour is NGC 4565 in Coma Bernices. This dramatic edge-on spiral provides the bright feature of a prominent lens centered in its long streak, and shows a reasonably easy dark dust lane nearly bisecting it lengthwise. Perhaps we can also see a star-like nucleus peeping over the band of dust, and in a sufficiently large telescope, hints of shape at the dark lane's edge. I talk about the form and structure of spiral galaxies, and explain the side view that we have of this one.

The beginner has no way to guess that I am being sneaky. My words describing NGC 4565 are a setup! For as the final stop on the celestial tour, I gently turn the newcomer around to face the southeast. There the bright heart of our own Milky Way is rising, and its own vast long streak and richly detailed dark band stretch clear across the heavens, from horizon to horizon. "There's another one," I say, gesturing grandly. And usually, neither my companion nor I want to say anything else for quite a while.