

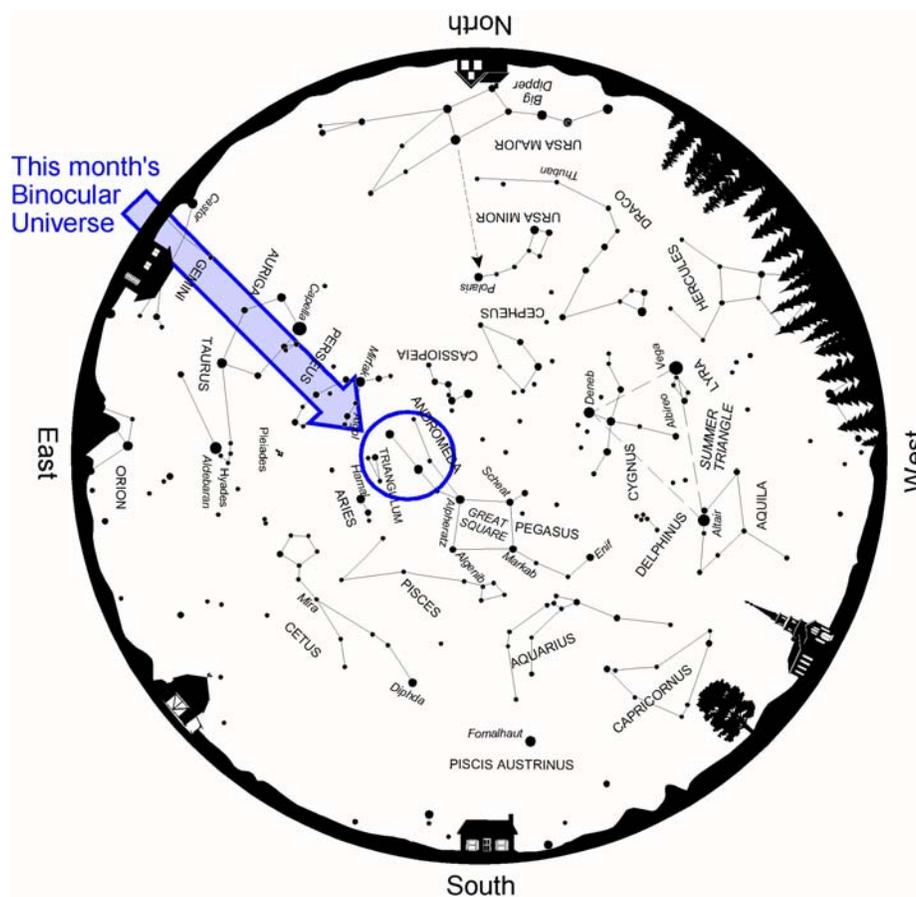
Binocular Universe: Next Stop: Andromeda

November 2012

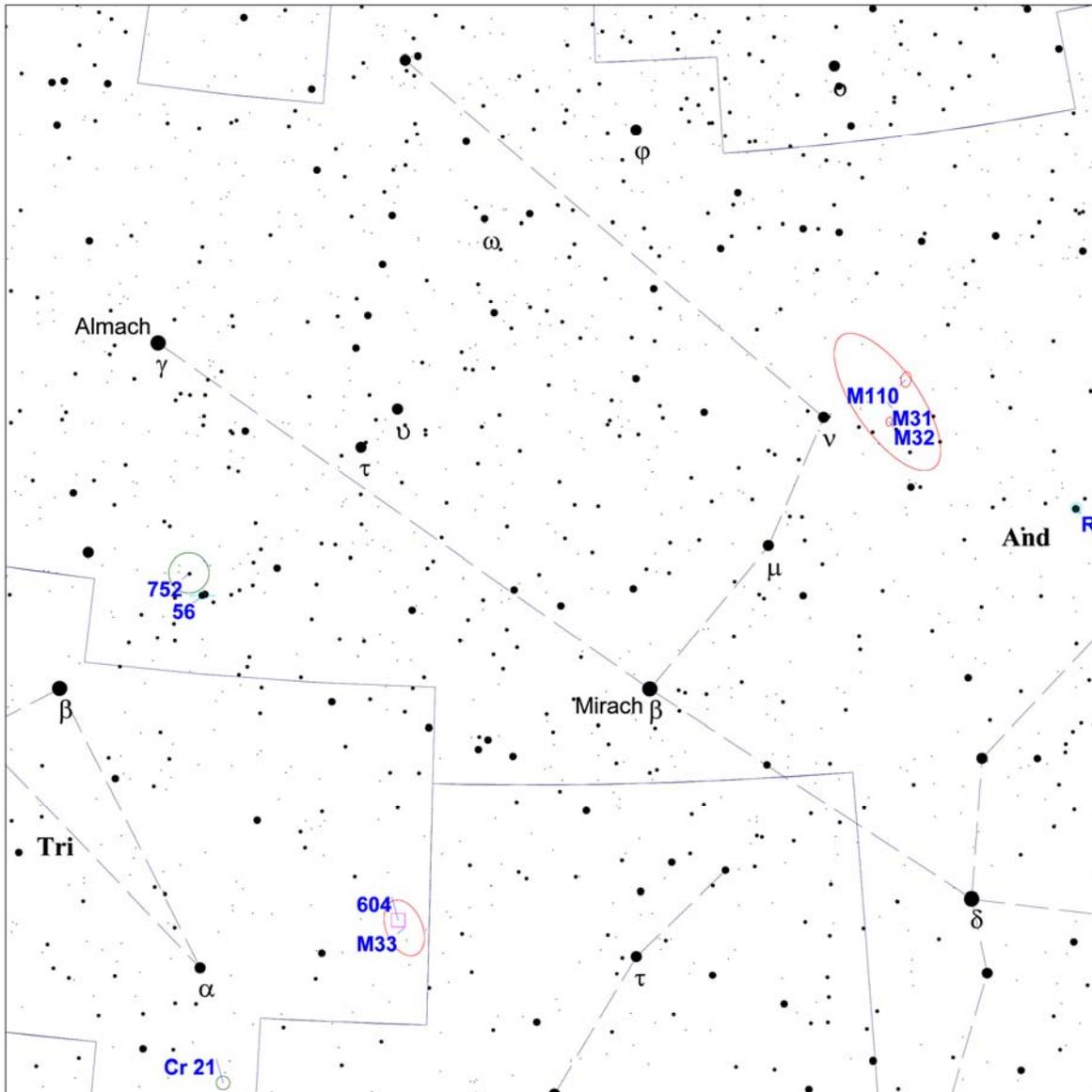
Phil Harrington



Like many of you reading this, I am a long-time fan of the original Star Trek television series. One of the more unusual episodes to come out of season 2 was entitled "By Any Other Name." In this installment, the Enterprise was commandeered by the Kelvans, an advanced race who recently assumed human form for their devious purpose. After the rest of the crew had been reduced



Above: Autumn star map from Star Watch by Phil Harrington.



Touring the Universe Through Binoculars Atlas
RA: 1h 19m, Dec: 38d 31m, FOV: 21d, Mag: 7.5

● ≤ 1.2	○ Galaxy	♿ Mercury	♇ Pluto
● 1.2 - 2.4	⊙ Open Cluster	♁ Venus	☉ Sun
● 2.4 - 3.6	⊕ Globular Cluster	♂ Mars	☾ Moon
● 3.6 - 4.9	□ Diffuse Nebula	♃ Jupiter	♁ Asteroid
● 4.9 - 6.1	◻ Planetary Nebula	♄ Saturn	☄ Comet
● 6.1 - 7.3	⊙ Variable Star	♅ Uranus	⊙ Unknown
● > 7.3	⊙ Double Star	♆ Neptune	

Above: Finder chart for this month's *Binocular Universe*.
 Chart adapted from *Touring the Universe through Binoculars Atlas (TUBA)*,
www.philharrington.net/tuba.htm

to small cubes of chemicals, Kirk, Spock, McCoy, and Scotty were forced to pilot the Enterprise toward the Kelvans' home in the **Andromeda Galaxy**. Even with modifications, the Enterprise would take 300 years to make the trip.

That episode probably introduced more people to the Andromeda Galaxy (also known as M31) and its vast distance away from the Milky Way than all of the astronomy books and articles ever written about it. The idea that it would take a super-charged Enterprise three centuries to get there points to the enormity of intergalactic space. Yet, with pristine conditions, we can see this galaxy tonight with just our two eyes as it approaches the sky's zenith. Light-polluted suburban and urban skies might hide M31 from naked-eye view, but it can still be spotted through carefully aimed binoculars.

To find M31 for yourself, first find its home constellation, Andromeda the princess. Andromeda is often portrayed as sharing the star Alpheratz with Pegasus, where it marks the northeastern corner of the Great Square. From Alpheratz, slide about one binocular field northeast, to the faint star Delta Andromedae, and then another field further northeast to Mirach. Take a sharp right turn northwestward, first stopping at Mu Andromedae and then onward to Nu Andromedae. Finally, look just northwest of Nu for an elongated blur of dim light. It may not look like much at first, but that's the combined light of several hundred billion suns. And that starlight has been traveling for more than 2.5 million years just to reach your eyes tonight!



Left: M31, the Andromeda Galaxy, along with M32 (below) and M110 (above), as sketched through the author's 10x50 binoculars. North is up.

The Andromeda Galaxy is the closest major galaxy to our Milky Way and the brightest visible from the Northern Hemisphere. Binoculars show it as a broad, oval smudge of grayish light highlighted by a prominent core. How much of the galaxy your binoculars will show depends on sky clarity and darkness. Only the central nucleus is bright enough to pierce severe light pollution, but from a dark, rural location, the full span of the extensive spiral-arm disk is also visible. M31 reaches out as far as 5° -- that's as wide as ten Full Moons stacked end to end!

And it's only going to look larger over time, as studies show it is getting closer to us. Unlike most galaxies, which are moving away from us as the universe continues to expand, Andromeda and the Milky Way are locked in a gravitational tug-of-war that both sides will eventually lose. In three to five billion years, their mutual gravitational attraction will cause the galaxies to collide. Over the ensuing billion or so years, these two majestic spirals will pirouette around each other, eventually merging into a single, massive elliptical galaxy.

Had Kirk and company continued on their intergalactic trek, they would have noticed that Andromeda has several galactic groupies. M31's two largest satellite galaxies can be spotted through binoculars, although again each will push your limits. The smaller and brighter of the pair, M32, can be spotted as a small, almost star-like patch of light due south of M31's central core. The second companion, M110, is larger and fainter, and therefore more difficult to observe. Look for it to the north of M31's core, about twice as far as M32. Both are classic examples of dwarf elliptical galaxies. M32 looks almost perfectly circular, while M110 is more oblate.

M31 is a real treat through binoculars, but consider this as you enjoy the view. As we gaze contemplatively toward this distant island universe, it's interesting to think that a civilization like the Kelvans just might be staring back at us through their own alien binoculars, wondering if you and I exist. A thought to ponder as we gaze skyward this month.

The Andromeda Galaxy may be the brightest, but it is certainly not the only galaxy visible in tonight's sky. In fact, there's another "nearby" galaxy right nearby. Hop the border from Andromeda to the tiny constellation Triangulum. Aim toward Triangulum's apex star, Mothallah, or Alpha Trianguli. Alpha is a great starting point for finding the spiral galaxy M33. Center Alpha in your binoculars and then look for a faint star about half a field of view to the west. Center on this star, and then look for a very faint glow near the western edge of the field. That's **M33**.

What's that? You don't see it? I'm not surprised. Even though, at 3 million light years, it's the second closest major galaxy to our own, M33 can be far more difficult to find than others many times farther away. The problem is its very low surface brightness. When observers talk about surface brightness, they are referring to the level of contrast an object has against the background sky. M33's contrast is so low that you might pass right over it the first time without even noticing it. But with patience, you'll spot it.

To find our final two targets this month, head northwest from Delta to Beta Trianguli, and continue across the border back into Andromeda. About a binocular field beyond Beta, you'll bump into a slim triangle of stars. The brightest star of

the three, known as 56 Andromedae, is also a yellow star like our Sun, but much bigger: a yellow giant. The second brightest point in the triangle is a cooler, orange giant star. Defocus your binoculars slightly to amplify their colors.

John Davis, a veteran binocularist from Amherst, MA, sees a **golf putter** when he looks here. He suggests that the triangle itself marks the head of the putter, while a line of four other suns tilting northward make up the club's shaft. Because of the stark surroundings, the putter asterism stands out nicely.

You'll even find a golf ball just to the east of Davis' putter. That's actually the open cluster **NGC 752**. Look for a round, grayish smudge measuring about as large as the Full Moon. While most binoculars resolve only the group's brightest sun, a 9th-magnitude orb just to the south of the cluster's center, 70-mm and larger binoculars add several fainter points strung across the core.

Back to the Kelvans. The episode ended with our fearless foursome overpowering the highjackers by using the Kelvans's newly discovered human senses and emotions against them. It's tough to be a human, but once again, the United Federation of Planets was saved!

There's more to this month's Binocular Universe, as you can see from the list below.

Object	Con	Type	R.A. (2000)	Dec	Mag	Size/Sep/ Period	Notes
R	And	Vr	0 24	+38 35	5.8-14.9	409.33 days	Long Period Variable
M110	And	Gx	0 40.4	+41 41	8.0	17'	*TUB page 87* E6 NGC 205 M31 companion
M32	And	Gx	0 42.7	+40 52	8.2	8'x6'	*TUB page 86-87* E2 NGC 221 M31 compani
M31	And	Gx	0 42.7	+41 16	3.5	160'x40'	*TUB page 86* Sb NGC 224 Andromeda Gal
56	And	**	1 56.2	+37 15	5.7, 6.0	190"	300°(1928);1534
752	And	OC	1 57.8	+37 41	5.7	50'	*TUB page 87*
M33	Tri	Gx	1 33.9	+30 39	6.3	60'x35'	*TUB page 240-241* NGC 598 Sc
604	Tri	DN	1 34.5	+30 48			*TUB page 242* In M33
Cr 21	Tri	OC	1 50.1	+27 15	8.2p	6'	*TUB page 242* Putter Cluster

Live long and prosper. And remember that, whether Kelvan or human, two eyes are better than one.



About the Author:

Phil Harrington has written 9 books for amateur astronomers, including his latest, Cosmic Challenge. Be sure to visit his web site at www.philharrington.net for more information.

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