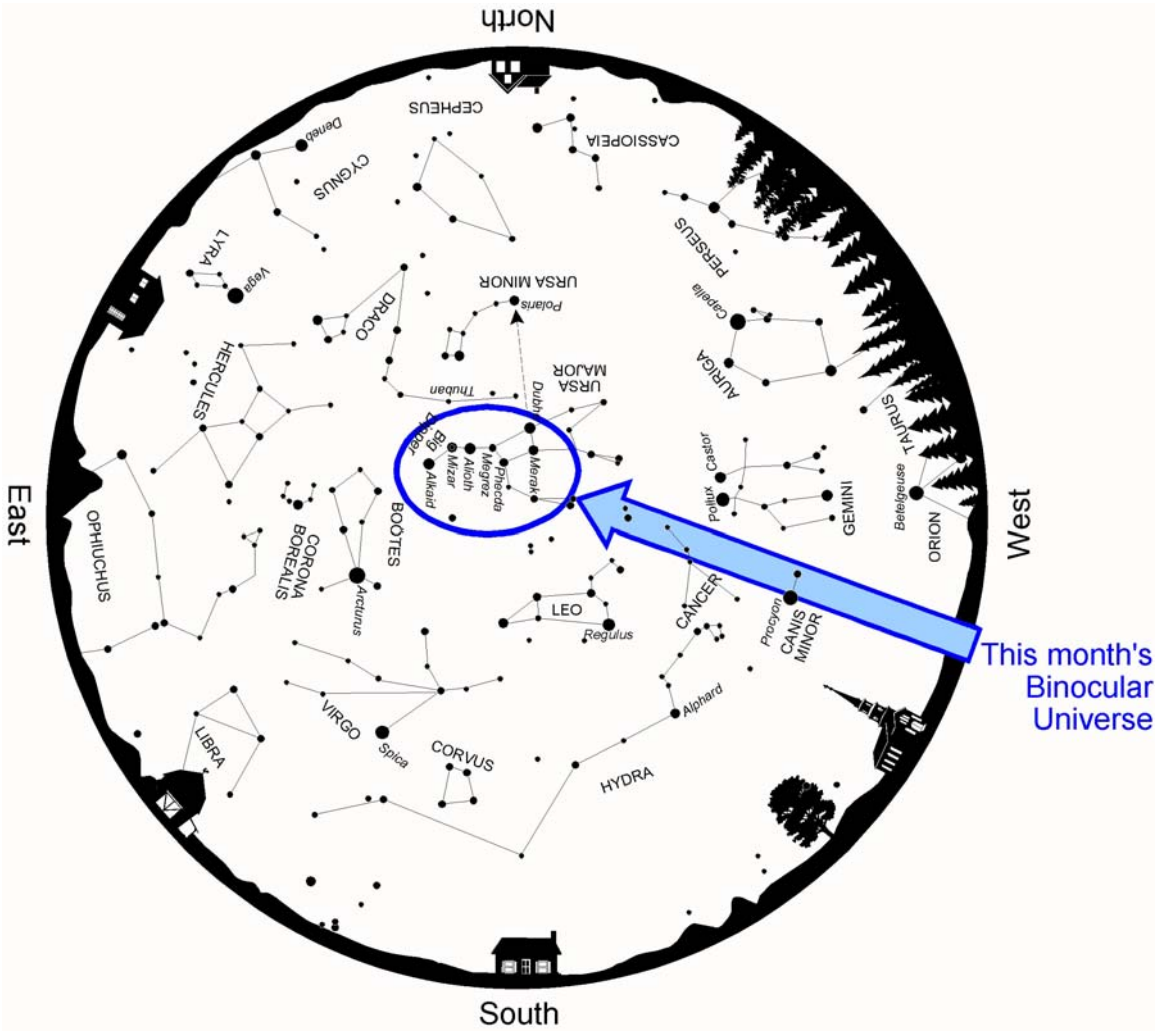
Binocular Universe: Bear Facts and Dog Duty

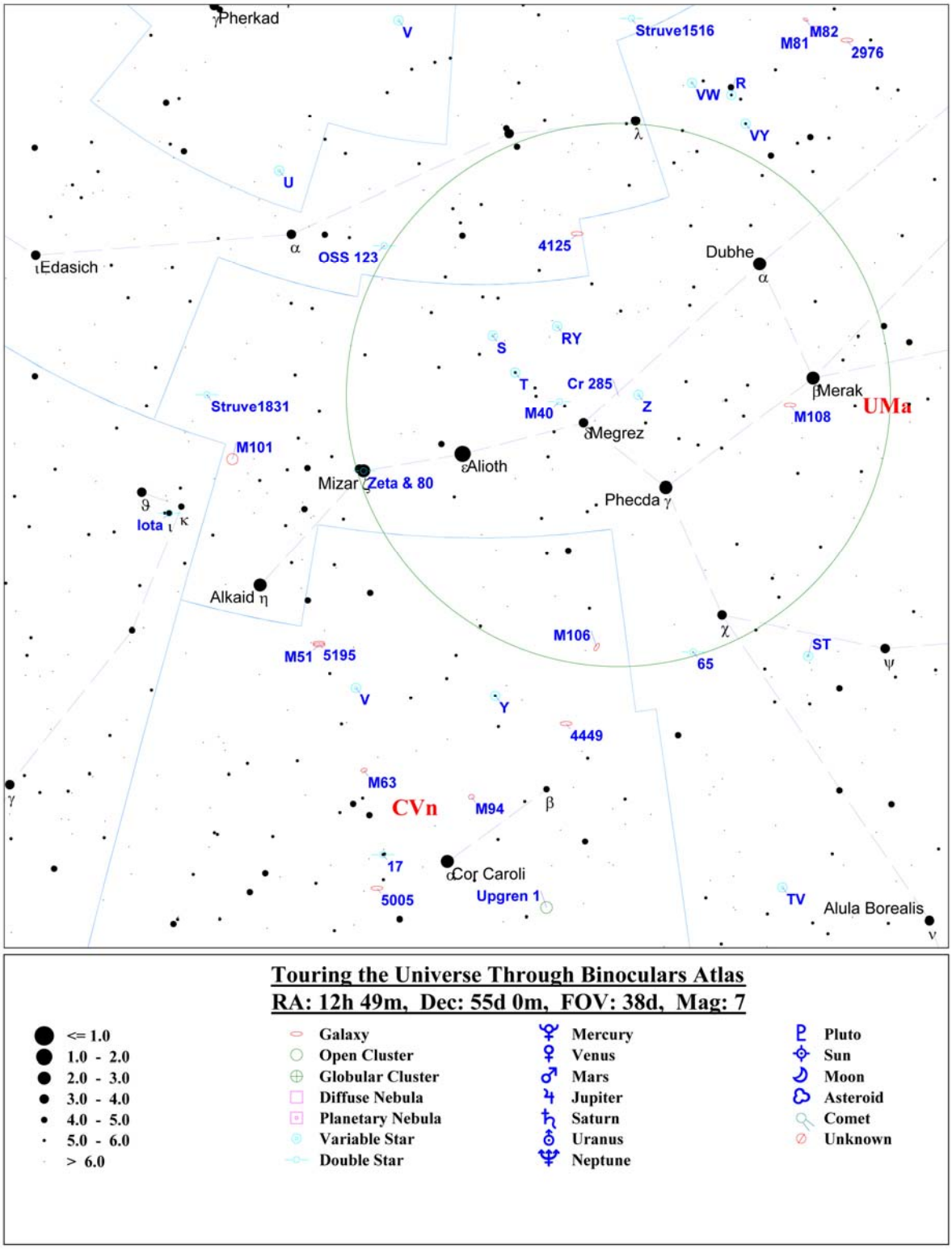
May 2012

Phil Harrington

If you grew up north of the equator, chances are good that one of the first patterns of stars that you learned was the Big Dipper. Those seven stars are visible throughout the year for most of us, being in the circumpolar zone for midnorthern latitudes, and stand highest in the sky on spring evenings.



Above: Spring star map adapted from the author's book, Star Watch.



Touring the Universe Through Binoculars Atlas
RA: 12h 49m, Dec: 55d 0m, FOV: 38d, Mag: 7

<= 1.0	Galaxy	Mercury	Pluto
1.0 - 2.0	Open Cluster	Venus	Sun
2.0 - 3.0	Globular Cluster	Mars	Moon
3.0 - 4.0	Diffuse Nebula	Jupiter	Asteroid
4.0 - 5.0	Planetary Nebula	Saturn	Comet
5.0 - 6.0	Variable Star	Uranus	Unknown
> 6.0	Double Star	Neptune	

Above: Finder chart for this month's Binocular Universe from TUBA, www.philharrington.net/tuba.htm.

The Big Dipper is not an official constellation by itself, of course, but rather is part of Ursa Major, the Great Bear. The bowl of the Dipper forms the Bear's back and belly, while artists often portray the three stars in the Dipper's handle - Alioth, Mizar, and Alkaid - as its long tail. But bears don't have long tails! A better explanation comes from a Native American legend that depicts the tail stars as three hunters chasing the bear. In fact, if you look carefully, you can even see that the hunter in the middle is carrying a pot to cook the bear in afterward.

The "pot" is actually the star **Alcor**. Together with **Mizar**, they form one of the sky's best known double-star teams. They make a fun naked-eye test, and are an easy target for even the smallest binoculars. Mizar shines at 2nd magnitude, while Alcor is dimmer at magnitude 4.

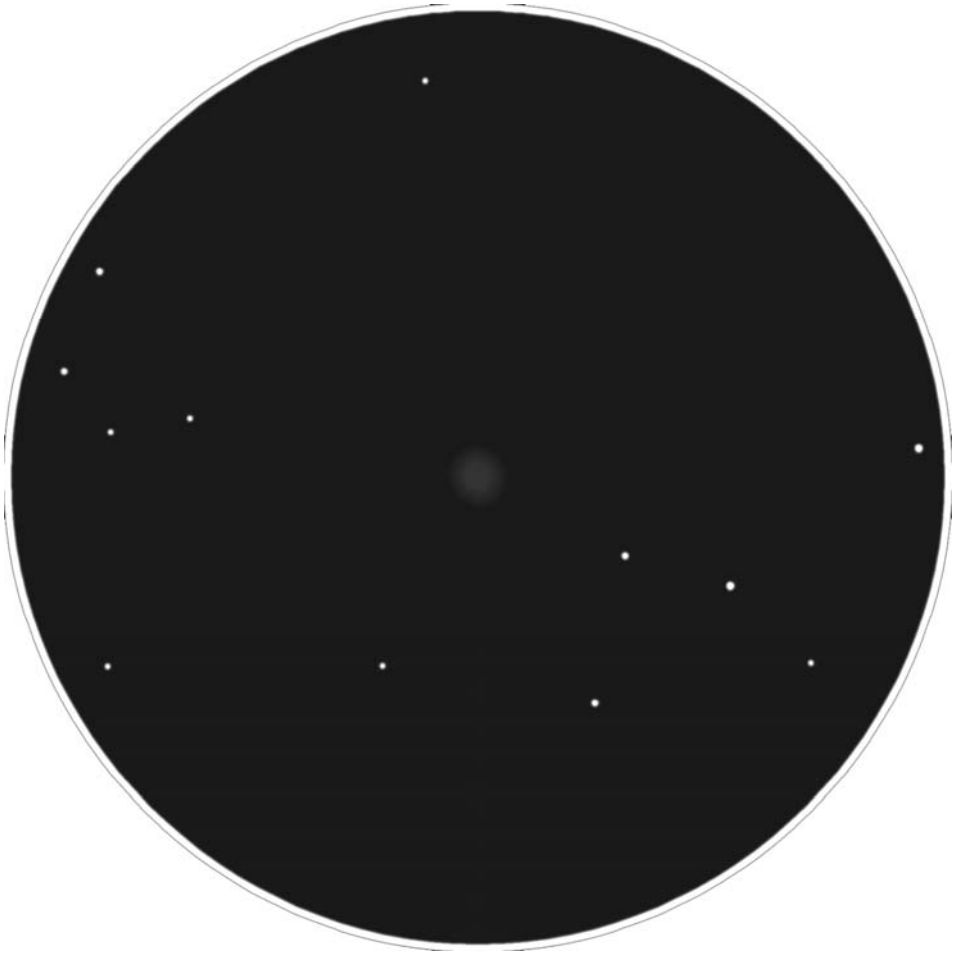
They may look like a physical pair, but Alcor and Mizar are celestial frauds! In reality Mizar lies 78 light years away from us, while Alcor is 81 light years. Mizar turns out to be a true, close-set binary star, but you'll need a telescope to see its companion.

Don't confuse that for a third, fainter star that forms a tiny triangle with Alcor and Mizar. Although it is not physically related to either, that star holds an interesting footnote in astronomical history. In 1722, German mathematician Johann Liebknecht thought he saw that star move against the background from one night to the next. He concluded that it was not a star at all, but rather, a new planet. In his excitement, he christened it **Sidus Ludoviciana** ("Ludwig's Star") after Ludwig V, then king of Germany. It quickly became apparent that Liebknecht was mistaken, but the star is still called Sidus Ludoviciana to this day.

Now, let's go hunting for even bigger game. From Mizar, trace a zigzag line of four faint stars eastward, away from the curving handle. At the fourth star, hook a little to the northeast, toward a diamond of four fainter stars. Can you see a very faint smudge next to the diamond's eastern point? That's the famous spiral galaxy **M101**. M101 is tough enough to see through small telescopes, let alone binoculars, but it is possible. Be sure to use averted vision. Even then, M101 will probably impress you as little more than a very dim glow, but think about what you are seeing. Your binoculars are showing you a system of billions of stars. The light from those stars left there 27 million years ago, long before our earliest ancestors evolved on the grassy savannahs of eastern Africa.

If M101 was a little too tough, try your luck with a slightly brighter galaxy. Aim toward Alkaid, the star at the end of the Dipper's handle. Look half a field to Alkaid's west-southwest for a 4th-magnitude star, and then from there, a pentagon of five dimmer suns an equal distance farther south still. If you look carefully just inside the pentagon's eastern corner, you might spot a dim glow. That's **M51**, the beautiful Whirlpool Galaxy.

Through 70-mm and larger binoculars, you might also notice that M51 is a little lopsided. That's because you aren't just looking at one galaxy, but two. Messier missed M51's companion, so you won't find it in his catalog. We know it today as **NGC 5195**, its listing in the New General Catalog. NGC 5195 glows modestly at about 10th magnitude.



Left. M101 in Ursa Major, as sketched through the author's 10x50 binoculars.

Reprinted from the author's book Cosmic Challenge (Cambridge University Press, 2007).

Despite its close proximity to the Dipper's handle, M51 lies across an invisible border in the obscure constellation Canes Venatici, two dogs owned by nearby Boötes the Herdsman. Only two stars are bright enough to be seen readily by eye alone: Cor Caroli and Chara, to its northwest. Personally, I can't see two dogs using just two stars. The best I can do is imagine a hot dog! But while the dogs themselves may not be much to look at, they hold a few other binocular treats that are definitely worth tracking down.

Let's pause first at the constellation's brightest star, **Cor Caroli**. The unusual name, which translates as "the heart of Charles," was bestowed by Edmund Halley in honor of England's King Charles II. Digging a little deeper, however, uncovers records dating farther back that show the name was actually meant to honor King Charles I, who was executed in 1649 for high treason after he defied Parliament and provoked the English Civil War. After his son restored a constitutional monarchy and was coronated Charles II in 1660, Halley likely promoted the name in honor of the current monarch. We now know that Cor Caroli is actually a binary star, so perhaps we can say it is named for both.

In fact, Cor Caroli is one of spring's showpiece binaries, although the two suns are very difficult to distinguish through most binoculars. Even though they are separated by 19 arc-seconds, their widely disparate magnitudes of 3 and 6 make them tough to resolve at low powers. I've never had much luck through my 10x50

binoculars, although I have glimpsed both in my 16x70s. Give it a try and let me know how you make out.

What Canes Venatici lacks in naked-eye appeal, it makes up for in fascinating binocular and telescopic targets. Aim your binoculars toward Cor Caroli and Chara, and then look exactly in between. Shift your attention just to the northeast of that center point and take a careful look for a small, grayish smudge of light. That's the spiral galaxy **M94**. M94 is rated at 8th magnitude, so it can be tough to pick out at first if you are using typical 7x and 10x binoculars. Look carefully, and you should see its small, round disk to the lower left of small diamond asterism.

Another siral galaxy, **M106**, can be found about a binocular field northwest of Chara. It also shines at 8th magnitude, but its larger dimensions lower its surface brightness even further. Look for a relatively large, oval glow less than a degree west of a 6th-magnitude foreground star.

Return to Cor Caroli and let you attention drift a little less than half a field (2.7 degrees to be exact) to the northeast, and you should come to an attractive double star formed by 6th-magnitude **15 and 17 Canum Venaticorum**. Striking as they are through binoculars, 15 and 17 only form a chance alliance from our earthly perspective. It turns out that 17, the easternmost of the two, lies just over 200 light years away, while 15 is another 900 light years further still.

About a binocular field further northeast lies an interesting asterism of four stars that looks like a backwards number 7. Although the stars -- 19, 20, and 23 Canum Venaticorum and SAO 44519 -- are not physically related to one another, they do create a unique pointer to help us find the galaxy **M63**. This challenging spiral lies just 1 degree, or two Full-Moon diameters, north of the 7. Through my 10x50s, it looks like a tiny blur close to very faint star. If you can support your binoculars steadily, you should be able to make out that M63 is cigar-shaped, indicating that we are viewing it from the side. Compare that to M94, which is seen from almost exactly face-on.

Finally, we have **Upgren 1**, a rogue open star cluster 5 degrees southwest of Cor Caroli. Discovered in 1963 by Arthur Upgren, an astronomer at Wesleyan University in CT, Upgren 1 looks like a tiny triangle of faint stars through binoculars. Upgren originally believed the group was the remnant of an ancient open star cluster that subsequently scattered. But recent studies of the stars' motion through the galaxy show that they are going in very different directions. This means that they are not a true cluster at all, but instead, just a chance asterism. Either way, Upgren 1 is a fun sight through binoculars.

There is plenty more to enjoy within this month's Binocular Universe, as you can see from the list below. Give each a try and post your observations in this column's CN forum.

Object	Con	Type	R.A. (2000)	Dec	Mag	Size/Sep/ Period	Notes
Iota	Boo	**	14 16.2	+51 22	4.9,7.5	39"	*TUB page 98* 33°(1942);9198
M106	CVn	Gx	12 19	+47 18	8.3	18'x8'	*TUB page 102* Sb+p NGC 4258
4449	CVn	Gx	12 28.2	+44 6	9.4	5'x4'	Ir+
Upgren 1	CVn	OC	12 35	+36 18		15'	*TUB page 102-103*
Y	CVn	Vr	12 45.1	+45 26	7.4-10.0p	157 days	Semi-Regular
M94	CVn	Gx	12 50.9	+41 7	8.2	11'x9'	*TUB page 103* Sb-p NGC 4736
17	CVn	**	13 10.1	+38 30	6.0,6.2	84"	297°(1922);8805
5005	CVn	Gx	13 10.9	+37 3	9.8	5'x3'	Sb-
M63	CVn	Gx	13 15.8	+42 2	8.6	12'x7'	*TUB page 103* Sb+ NGC 5055
V	CVn	Vr	13 19.5	+45 32	6.5-8.6	191.9 days	Semi-Regular
M51	CVn	Gx	13 29.9	+47 12	8.4	11'x8'	*TUB page 103* Sc NGC 5194 Whirlpool Gal
5195	CVn	Gx	13 30	+47 16	9.6	5'x4'	*TUB page 103* P M51 companion
Struve1516	Dra	**	11 15.4	+73 28	7.6,8.1	36.2"	102°(1940);8100
4125	Dra	Gx	12 8.1	+65 11	9.8	5'x3'	E5p
OSS 123	Dra	**	13 27.1	+64 44	6.7,7.0	69"	147°(1924)
2976	UMa	Gx	9 47.3	+67 55	10.2	5'x3'	*TUB page 247* Scp
M81	UMa	Gx	9 55.6	+69 4	7.0	26'x14'	*TUB page 246-247* NGC 3031 Sb
M82	UMa	Gx	9 55.8	+69 41	8.4	11'x5'	*TUB page 246-247* NGC 3034 P
R	UMa	Vr	10 44.6	+68 47	6.7-13.4	301.68 days	Long Period Variable
VY	UMa	Vr	10 45.1	+67 25	5.9-6.5		Irregular
VW	UMa	Vr	10 59	+69 59	6.9-7.7	125 days	Semi-Regular
M108	UMa	Gx	11 11.5	+55 40	10.1	8'x3'	*TUB page 247* NGC 3556 Sc
ST	UMa	Vr	11 27.8	+45 11	7.7-9.5	81 days	Semi-Regular
TV	UMa	Vr	11 45.6	+35 54	8.3-9.2p	50.4 days	Semi-Regular
65	UMa	**	11 55.1	+46 29	6.7,6.5	63"	114°(1969);8347
Z	UMa	Vr	11 56.5	+57 52	7.9-10.8p	196 days	Semi-Regular
Cr 285	UMa	OC	12 3	+58 0	0.4	1400'	*TUB page 247-248* OC UMa Moving Cluster
RY	UMa	Vr	12 20.5	+61 19	6.7-8.5	311 days	Semi-Regular
M40	UMa	**	12 22.4	+58 5	9.0,9.3	50"	*TUB page 248-249* Winnecki 4
T	UMa	Vr	12 36.4	+59 29	6.6-13.4	256.24 days	Long Period Variable
S	UMa	Vr	12 43.9	+61 6	7.0-12.4	226.02 days	Long Period Variable
Zeta & 80	UMa	**	13 23.9	+54 56	2.3,4.0	709"	*TUB page 249* 71°(1966);8891;Alcor/Mizar
M101	UMa	Gx	14 3.2	+54 21	7.7	27'x26'	*TUB page 249* NGC 5457 Sc Pinwheel Gal
Struve1831	UMa	**	14 16.2	+56 43	7.1,6.6	108"	222°(1956);9197;Optical
V	UMi	Vr	13 38.7	+74 19	8.8-9.9p	72 days	Semi-Regular
U	UMi	Vr	14 17.3	+66 48	7.4-12.7	326.51 days	*TUB page 250* Long Period Variable

Next month's late sunsets make June the perfect time to visit our nearest neighbor, the Moon. So, until then, remember that for spring stargazing, two eyes are better than one.

About the Author:

Phil Harrington is a contributing editor for Astronomy magazine. His latest article, *10 Great Spring Binocular Sights*, appears in the May 2012 issue. You can also visit his web site at www.philharrington.net.