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PROMOTING ASTRONOMY IN CANADA

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Antares Palette

The Best of Monochrome.

Drawings, images in black and white, or narrow-band photography.

For the last several months, Ron Brecher has been shooting faint objects from the Sharpless Catalog. This Hα image shows the very interesting Sh2-86 (aka NGC 6820), a large emission nebula in Vulpecula. The roundish central nebula is about the size of the full Moon on the sky. The long, dark finger in the middle of the nebula is similar to that in the Eagle Nebula, which is sometimes called "The Pillars of Creation." Ron acquired this image under full Moon conditions using an SBIG STL-11000 camera on a 10-inch ASA Newtonian reflector at ƒ/6.8. Exposure was 42×10m + 3×20m Hα (a total of 8 hr).

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Front Cover —"Antares Palette" Steve Holmes captured this deep-sky image of the region surrounding Antares using an unmodified Canon 5D Mark II and a 200-mm f/2.8 lens. Exposure was 32×5 minutes at ISO 1250 from the Kitchener-Waterloo Centre's observing site near Listowel, Ontario. To the right of the red emission nebula surrounding Antares is the globular cluster Messier 4. Several blue reflection nebulae and dark dust lanes complete the scene.

Rising Stars

What Drove Ron Brecher Out of the House and Onto the Pages of the JRASC, *SkyNews*, and *Astronomy* Magazine?

by John Crossen
(johnstargazer@xplornet.com.)

When Ron Brecher's daughter was born, she brought, with her cute smiles, giggles, and coos, a trait shared by many newborns—night crying. Those tearful nights frequently found Ron walking up and down his driveway with his daughter, Chelsea, in his arms, looking up at the stars.

Ron had always been interested in astronomy, and these midnight treks rekindled his interest in the hobby, so much so that he eventually purchased a telescope using reward-club points. The idea was that he and his son, Todd, could see the Moon and planets up close while sharing some time together. Despite the telescope's myopic eyepieces, a tripod that swayed whenever a nearby sparrow broke wind, and a plastic finder best suited to stirring paint, Ron and his son persevered.

One night they stumbled upon Saturn. All it took was a first look at the ringed thing and Ron was mesmerized. Shortly thereafter, a friend gave him a copy of *NightWatch*, and Ron has never been the same since.

The first thing he discovered was that the telescope shown in *NightWatch* as a "Junk Scope" bore an amazing resemblance to the one he had purchased with those reward points. From that point on, Ron's adventures in astronomy followed a path familiar to many of us.

First came a better telescope, a Celestron Ultima 2000, followed in short order by better eyepieces, more books on astronomy, and if there was any money left, some camp gear for the inevitable summer star parties.

The Huronia Star Party and Starfest were Ron's launch pads. Those events provided him with the initial contacts and background to improve his observing skills. They also gave him an outlet for singing and guitar playing during the rare afternoon when he wasn't roaming the retail venues or taking in one of the talks.

Perhaps it was this artistic side that eventually pulled Ron into the astro-imaging camp. After all, words can only communicate a small portion of the night sky's wonders, but a picture can capture the sky's full magnificence and with it, the viewer's imagination. Ron started with the most basic equipment and technique available—a point-and-shoot camera held over an eyepiece that was trained on the Moon. Since those first Moon shots, Ron's skills as an astronomer and as an imager have risen as though propelled by an Atlas V rocket. In the span of a few years, Ron has become a seasoned deep-sky astro-imager and a valuable resource for others like him.

Figure 1 — Ron at his telescope.

He has used numerous imaging systems and programs. And he has done so successfully from his home just outside Guelph, Ontario. Rather than an inky-black sky that we all dream of, Ron's night sky glows with car dealership lights and the usual light pollution brought on by a next-door neighbour that is a major city.

Nonetheless, Ron learned to circumvent the city lights using filters and processing to produce images that appear to have been shot somewhere on the sands of the Atacama. For the past two years, Ron has delivered seminars at Canada's AstroCATS festival in Hamilton. This year he returned to his old stomping grounds, Starfest, but this time he wasn't just another face in the crowd: he was one of the speakers. Rumour has it that he will be appearing at some major North American star parties in 2015.

Ron regularly gives talks on astronomy and astro-imaging to local astronomy clubs as well as at astronomy retailers. He has a following of fellow astro-imagers and admirers online who drool over his latest images. Ron's deep-sky images are now available for purchase from anywhere in the world via his Web site. Plus, he also offers one-on-one lessons on astro-imaging and image processing. Even so, Ron hasn't lost sight of the science behind the target he has imaged.

Every image he sends out to his online entourage is accompanied by a background summary of the science behind the object

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itself. In addition to this celestial rap sheet, he includes the technical data involved in shooting and processing the object. His "techies," as he calls them, are also a valuable resource to others.

Ron invites anyone wishing to join his mailing list to contact him at www.astrodoc.ca and sign on. I've been on it for a couple of years and it is always a treat to view his work. Ron is now concentrating on imaging some less-familiar and very faint, deep-sky objects. With some 5000 objects in the NGC catalogue and 313 HII objects in the Sharpless Catalog, he has plenty of new targets to keep him busy for many years to come. But Ron still keeps his eye to the eyepiece from the stepladder next to his 20-inch Dob, which is always set up in his garage. And, for night-sky quickies, he has the new (and greatly improved) six-inch scope that his son now lets him borrow—occasionally.

The journey that began in Ron's driveway has taken him quite literally to the stars. Along the way, he began to dream about doing astro-imaging for a living. Today he is beginning to see that dream has come true (though he is still working on the "for a living" part). ✶

John Crossen has been interested in astronomy since growing up with a telescope in a small town. He owns a public outreach facility, www.buckhornobservatory.com, just north of Buckhorn, Ontario.

Summary of the Visual Acuity Theory on the Origin of Aristarchos's 87 Degrees

by Alberto Gomez Gomez
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The Greek astronomer and mathematician Aristarchos (~310-230 BC) revolutionized our understanding of the cosmos. His half-moon experiment was designed to prove that the Sun is many times farther away than the Moon, and it put a lower bound for the Sun's distance. His ultimate take on the latter (as reported by Archimedes in the *Sandreckoner* 2.1) was "less than ten thousand Earth radii." The book he wrote explaining his figures is now lost, but the famous angle on which these are based has survived. The visual acuity (VA) theory on how he got this angle is summarized here.

According to Aristarchos, "When the Moon appears to us halved, its distance from the Sun is then less than a quadrant by one-thirtieth of a quadrant." Heath (1913:353) interpreted these words as meaning that the angular distance between what looks like a half moon to us and the Sun "is less than 90° by 1/30 of 90° [or by 3°] and is therefore equal to 87°."

This interpretation is correct, since this is the angle whose secant gives a solar distance that matches that ascribed to Aristarchos in *On Sizes* (Heath 1913:376) and in the *Sandreckoner* (1.9). (According to these sources, Aristarchos put the Sun somewhere between 18 and 20 times as far away as the Moon, and indeed $18 < \sec 87° < 20$, so this angle does the job.)

Heath applied his interpretation to the bright quadrant of the Moon. The original Greek text, however, does not exclude the other quadrant (that is, the dark one), so a Moon that is 93° from the Sun also appears to us halved. A wider interpretation is therefore that "the Moon appears to us halved when its distance from the Sun is either 87° or 93° [and of course anywhere in between]." So, according to Aristarchos, the Moon looks to us halved when its elongation from the Sun lies in the interval [87°, 93°]. Alternatively, it can also be said that the Moon looks to us halved when its phase angle is 90° ± 3°, spanning a total of 6°.

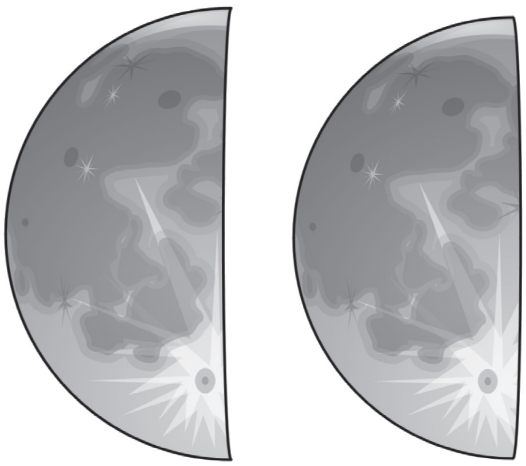

Figure 1 — These schematic drawings of the Moon at about dichotomy illustrate the limits of the human eye in determining the moment when the Moon is exactly at half phase.

Why this angle should be chosen becomes apparent when noticing the connection between the typical resolution of the human eye—which is about *one* arcminute, the suggestive expression "*one-thirtieth* of a quadrant," and the width of the Aristarchan lunar disc—which is *thirty* arcminutes (or, as the *Sandreckoner* 1.10 put it, "one of seven hundred and twenty equal parts of the circle of the zodiac").

Could Aristarchos really have been using arcminutes this early in history? In July of 2010, the author (Gomez 2013:10,13,16) discovered that Archimedes's bounds for the Sun's width (in