Introduction

In Praise of Bulky Books

Vasta mole superbus

I don't make a habit of invoking Latin epigraphs, but sometimes they are apropos, particularly the little aphorism you see above. Loosely translated, the phrase means "proud in its great bulk," and it appeared in the preface of Samuel Johnson's *Dictionary of the English Language*, probably one of the most influential dictionaries in history. First published in 1755, when William Herschel was just 17 years old and still a member of the Hanoverian Guards, Johnson took seven years to complete the first two-volume edition — singlehandedly, I might add — with only a little clerical assistance. He would go on to produce several revised editions in his lifetime.

Coincidentally, seven years is about the same amount of time it took us to develop and publish volumes 1 and 2 of *Annals of the Deep Sky*. Not so coincidental is the pride we have in our work, which, among ourselves, we refer to as the Magnum Opus. We also like to say *Annals* has a lot of moving parts, which is why we have several referees and copy editors who act as "filters" to hopefully catch what we don't. That, too, can be a daunting task. As one referee remarked in his review of volume 7, "There's a huge amount of detailed stuff in there that would be very difficult to verify. So, I think we're just going to have to rely on you to have done the job right!"

Sobering words, especially for this science scribbler who has had to live with more than his fair share of typos and editorial faux pas. But returning to Samuel Johnson, who certainly had his detractors, I take some comfort in the words he directed more toward himself than those who might criticize: "It is . . . reasonable to have perfection in our eye; that we may always advance towards it, though we know it never can be reached." So true, but especially for a work that, like an encyclopedia or dictionary, needs to be as infallible as possible across its many pages and volumes. Johnson knew this, but he

also knew that, no matter our aspirations, at the end of the day we are all only human. Working toward perfection is an ideal worth striving for as long as you know it's impossible.

Nevertheless, here we go with another stab at it, this time with volume 7 in all its great bulk. Every volume is a journey for us, and this one has been no exception. When you dig into the history of a celestial object and the science behind it, you sometimes find fascinating treasures that would have otherwise remained hidden, as you will discover in the pages ahead. In addition to profiling some of the more interesting stars and deep-sky objects in the diminutive constellations of Corona Borealis, Corvus, Crater, and Crux, you will also find short biographies of William and Caroline Herschel, George Abell, and Vera Rubin, an overview of the Great Attractor and the Shapley Supercluster (see Crux), as well as numerous other resources to aid in your observing endeavors.

We begin in Corona Borealis, the Northern Crown. There are several unusual stars in this constellation, but one of the more mystifying jewels in its crown is R Coronae Borealis, the prototype for the R CrB variable stars. Its most intriguing characteristic is its penchant for plummeting in visual magnitude after spending years at peak brightness, usually around magnitude 6 or so. Astrophysicists aren't exactly sure why it does this, but we offer the usual and not so usual explanations. Spoiler alert: it may just be a dirty old star.

Another attraction is the Corona Borealis Supercluster: the most prominent supercluster in the northern sky, comprised of seven Abell clusters, the heart being Abell 2065. It's an extremely massive supercluster, so massive, in fact, that models indicate the whole thing is collapsing, something we explore in some detail.

Corvus may be one of the smaller constellations out there, but it harbors many enthralling stars and galaxies. I'll mention two here. First, R Corvi, a pulsating Mira variable with a magnitude spread of 6.7 to 14.4 over a period of 317 days. R Corvi has appeared in a number of broad surveys and has long been monitored by the AAVSO, but there is no specific

research to speak of. Variable star enthusiasts will certainly want to check it out.

And then there's NGC 4038 and NGC 4039, collectively known as the Antennae Galaxies. When astronomers first came across this pair, they were truly bewitched, bothered, and bewildered. They now know that the Antennae represents a spectacular collision of galaxies in its early stages. Telescopes with 12- to 15-inch apertures bring out the system's double core, which is somewhat horseshoe-shaped (some describe it as looking like a shrimp or even a partially open clam shell); deep images bring out the two tidal tails that give the galaxies their shared name. The merger has sparked a spate of collision-induced hot young clusters that will survive, at best, only about 10 million years or so. Perhaps a hundred of the more massive clusters may eventually condense into globular clusters, similar to those in our galaxy and the Magellanic Clouds. The ultimate fate of the system is to morph into an elliptical galaxy.

What can possibly be worth observing in Crater? More than you think. For starters, it includes the double/multiple stars Gamma Crateris and JC 16AB, the latter discovered by William Jacob in 1847. Both are fine for small telescopes. For observers with large telescopes, or ambitious imagers, we offer the Crater Cluster. Discussion as to whether it's a globular cluster or a dwarf galaxy is ongoing, but consensus seems to favor it being the former. The cluster possesses a simple stellar population with an age of 7.5 billion years, far younger than most globular clusters in the Milky Way; its mass is consistent with its forming at a single age and metallicity.

Crater is clear of the Milky Way, so it's no wonder there are a large number of galaxies available for medium to large telescopes. A close pair of interacting galaxies, NGC 3511 and NGC 3513, lie only 10.8 arcminutes apart on the sky, so they can easily fit into the field of view of medium-power eyepieces. Located near the Hydra border, about 2° WSW of Beta Crateris, NGC 3511 is the brighter and more northerly of the two, but NGC 3513's most striking feature is its narrow, straight, high surface brightness bar.

One of the brighter galaxies in Crater is NGC 3887, a barred spiral 2.2° west of Eta Crateris in the constellation's eastern quadrant. It has a smooth oval outer disk some 3.5 arcminutes long oriented roughly NNE to SSW with a slightly brighter central region. Images reveal a multi-armed formation with inner arms punctuated by star-forming regions.

Another lovely spiral specimen may be found in NGC 3672, an emission-line galaxy with a bright, broad inner region set amid a multi-armed disk of the grand-design type. Processed images reveal thin multiple spiral arms spangled with knots of star-forming regions.

Finally, we venture into southern skies for a look at Crux, the Southern Cross. This iconic constellation, which appears on the flags of Australia, New Zealand, Brazil, Papua New Guinea, and Samoa, peeks above the southernmost latitudes in the Northern Hemisphere, so it's not totally exclusive to observers south of the equator. It really shines as a binocular object, with the glittering Jewel Box (NGC 4755) just SW of Mimosa (β Cru) and, south of that, the deep void of the Coalsack Nebula. Both objects share a fascinating history that we hope you find enlightening. Crux is also rich in open clusters for which we provide several profiles. If you've never seen the Southern Cross, you're in for a treat.

Yes, we are proud of *Annals*' great bulk, because sometimes more is better than less and the more can be a marvel unto itself. Did you know that the word "take" in Johnson's dictionary had 134 definitions, running 8,000 words over five pages? Good on ya, Sam, we're with you!

Personal Notice from the *Annals* Team

They say that change is inevitable, that it will always happen. Sometimes change is small, and sometimes it's not. In either case, the important thing is to manage change so that it leads to something better, a place where greater achievement or happiness is possible. Or, to paraphrase C. S. Lewis, "You cannot go on indefinitely being just an ordinary egg. We must be hatched or go bad."

For some time, Dennis Webb, my longtime partner and friend in astronomy publishing, recognized that he could not maintain the *Annals* production pace into our second decade to his satisfaction. Therefore, last year he decided to relinquish his role as art director. Toward that end, and with Dennis' help, we have developed a different approach to illustrating the series henceforth, one that still relies a great deal on Dennis's style, but that spreads the duties around to other resources. Fortunately for us, Dennis will continue to provide his services as an art consultant.

Working with Dennis has been a genuine pleasure, one that began some 17 years ago when we first collaborated on our book *The Arp Atlas of Peculiar Galaxies: A Chronicle and Observer's Guide*. That project was a labor of love for both of us and set us on a path of working together on other projects. As with the *Arp Atlas*, Dennis has established a unique visual style for *Annals*, as well as unsurpassed information-rich graphics, that we will strive to maintain through the rest of this series. We are grateful for Dennis' innovative design approach, which has served *Annals* well through six successful volumes.

Dennis is most definitely *not* an ordinary egg, and we see this change as being right and good for him, as well as for ourselves. We all must hatch eventually. Hail to, my friend!