extending out in two directions from the enlarged hub formed around Sagittarius. Armed only with 10×50 binoculars, I drank in all of the beauty, and made additional magnitude estimates for a few bright variable stars (including the foreboding Eta Carinae). Ayer's Rock is truly a wonderful location to contemplate the universe! From there it was on to Alice Springs, where Lois and I rented a four-wheel drive vehicle and spent one day gem hunting in rugged country 150 km to the north. The following day found the two of us 150 km to the southwest, exploring the Henbury meteor crater field in equally desolate terrain. Nearly 5,000 years ago a large meteor exploded here in mid air and rained down debris that created a dozen craters, five of which are quite large. We spent an entire day playing astrogeologists, crawling up and down the impact relics, contemplating the enormous explosion that once occurred here, and taking many photos.

All too soon the month was up and we arrived in Sydney to board a plane back to Chicago, bringing our event-packed adventure to an end. Lois and I returned with a ton of notes, photos, and memories of our trip. Last but not least, we made a lot of new friends with whom we will keep in contact and hopefully will see again in the future.

Road hazard ahead — New South Wales, Australia.

Australian natives.

Ray Berg is an active amateur astronomer and a "remote member" of the RASC, attached to the Kingston Centre. A retired metallurgical engineer, he observes from his rural home in Crown Point, Indiana, and currently collects data for the AAVSO on dwarf novae, long period pulsating variable stars, and eclipsing binaries.

Reflections

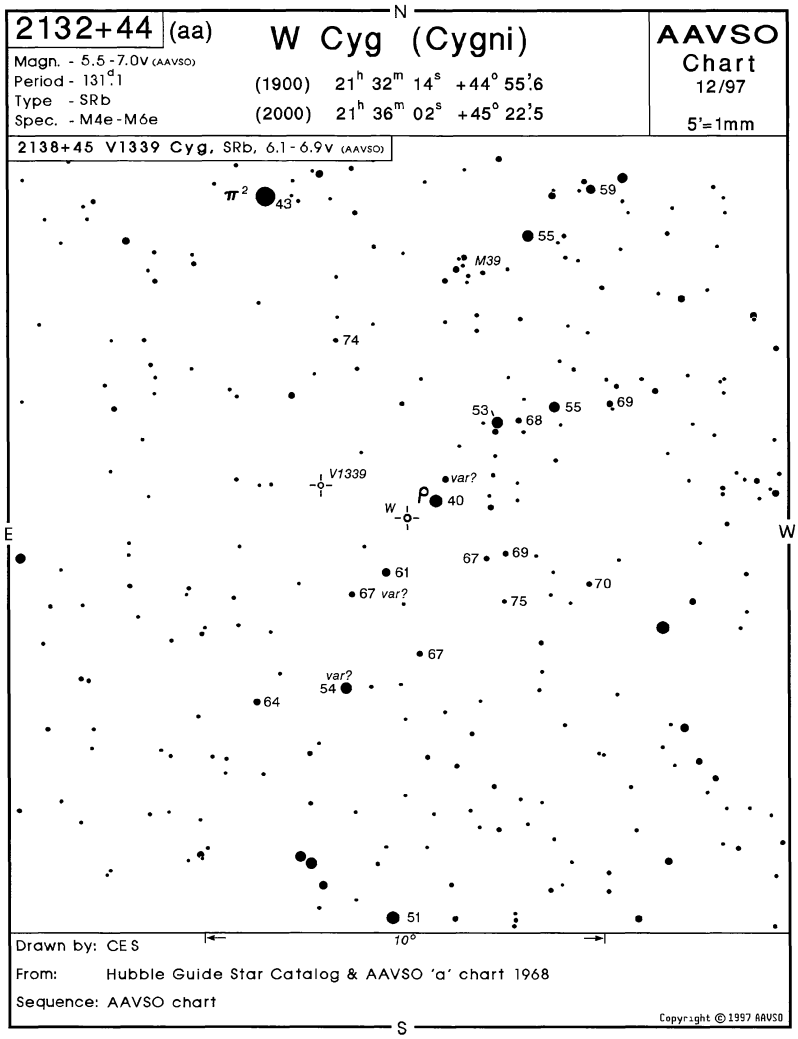
F. W. A. Argelander—*Star Charts and Variable Stars*

by David M. F. Chapman (dave.chapman@ns.sympatico.ca)

This year marks the 200th anniversary of the birth of Friedrich Wilhelm August Argelander (1799–1875), a German astronomer who is noted for his work in celestial cartography and for founding the science of variable star astronomy. Argelander was born in the Baltic port city of Memel in East Prussia (now the Lithuanian city of Klaipeda) on March 22, 1799. His father was a wealthy Finn, his mother, German. When the Prussian royal family fled before Napoleon's advance, two princes took refuge in the Argelander home; the elder prince eventually succeeded to the throne in 1840 as King Frederick IV. The event proved to be a critical encounter for Argelander in later life.

Argelander studied at Königsberg under F. W. Bessel, obtaining his Ph.D. in 1822. He was head of the Finnish observatories at Turku and Helsinki before returning to Germany in 1836. Here, as the new Director of Bonn University, he was able to parlay his personal friendship with the king into funds to build a new observatory, a project the previous director was unable to launch. In his new observatory, Argelander devoted himself to the visual survey of stars and celestial cartography. Between 1859 and 1862 he published the four-volume star atlas *Bonner Durchmusterung*, containing the positions of 324,198 stars in the northern heavens down to the ninth magnitude. The atlas was an extension of a survey conducted at the University of Königsberg by his professor, F. W. Bessel, who had accurately catalogued the positions of 50,000 stars. Argelander's atlas was the result of a survey of stars between the North Celestial Pole and the Celestial Equator (actually, between +89 degrees and −2 degrees) carried out in the years 1852–1861. It was the last principal star chart to be compiled before photographic techniques were introduced, and remained popular until 1950, its last reprinting.

Argelander and his assistants used the survey technique known as the "drift method," in which the telescope is fixed



The binocular field of W Cygni, the *Observer's Handbook* "Variable Star of the Year" for 1999. The star was named according to the convention introduced by Argelande (Reproduced courtesy of the AAVSO).

in declination and the star field is allowed to drift across the field of view while the Earth rotates. As each star passes a vertical line inscribed in the eyepiece focal plane, the time and vertical position of the transit is recorded, along with a magnitude estimate. In that way — and with some calculation — the position and estimated visual magnitude for every star visible with the 78-mm Bonn telescope was catalogued. (Positional accuracy was 0.1 sec in right ascension and 0.1 arcmin in declination; magnitude accuracy was 0.1 mag down to 9.5 mag, with fainter stars being arbitrarily assigned to 9.5 mag.)

The astronomer E. Schönfeld (1828–1891) extended Argelander's atlas down to declination –22 degrees, adding 133,659 stars in 1886. The Scottish astronomer Sir David Gill (1843–1914) also extended Argelander's work to the southern sky, working from South Africa. Using photographic survey methods, he and J. C. Kapteyn produced *The Cape Photographic Durchmusterung* for the Equinox 1875.0, containing more than 500,000 stars.

Argelander was the first astronomer to study variable stars in detail. When he began his study, only a handful of stars were known to vary in brightness. He introduced the naming convention that applies capital Roman letters (R, S, T,...) for the variable stars not already named in a constellation, as distinct from Bayer's system of Greek letters (α, β, γ,...) used for the "ordinary" stars. The sequence begins with the letter "R," standing for the German word "rot", or "red," recognizing that a large fraction of variable stars are coloured red.

The first star recognized to be variable was Mira, or Omicron Ceti, in the constellation Cetus, the Whale. The German astronomer David Fabricius (1564–1617) observed the star in August 1596, while searching for Mercury, but it had disappeared when he looked for it several months later. Bayer also recorded the star in 1603, but did not notice its fluctuations. It was not until 1638 that Johann Holwarda discovered that Mira is a star that varies between magnitude 1.7 and magnitude 10.1 with an irregular period of about 11 months. (One can see why Fabricius thought that Mira had disappeared!) Another variable star well-known at the time was Algol, or Beta Persei, discovered to be variable in 1669. Algol is an eclipsing binary, or "false" variable star, whose brightness varies as a result of one component of a double star passing in front of the other. Algol varies between magnitude 2.2 and magnitude 3.3 with a precise period of 2.867 days, owing to the cyclical eclipsing of its orbiting components.

Observing and reporting the brightness of variable stars is one field of astronomy in which the amateur can actually make a useful contribution with modest equipment. The co-operative measurements of many observers can be combined to produce accurate light curves of variable stars, whose study by professional means would be prohibitively expensive. For more information, consult the article "Variable Stars" on page 242 of the *1999 Observer's Handbook* or surf to `www.aavso.org`, the Internet home page of the American Association of Variable Star Observers.

David Chapman is a Life Member of the RASC and a past President of the Halifax Centre. In addition to writing "Reflections," he has written for SkyNews *and the U.S. National Public Radio program* StarDate, *mostly on historical and calendrical aspects of astronomy. In his other life, he is Head of the Naval Sonar Section of the Defence Research Establishment Atlantic.*