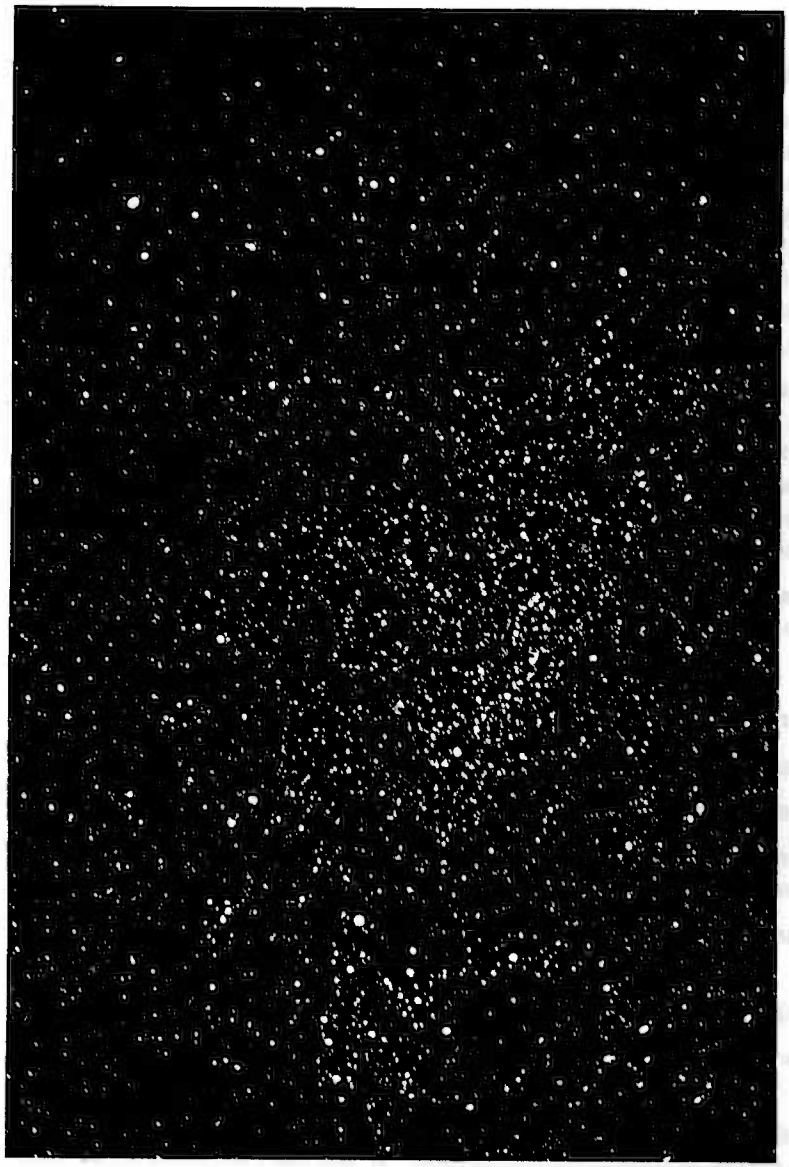


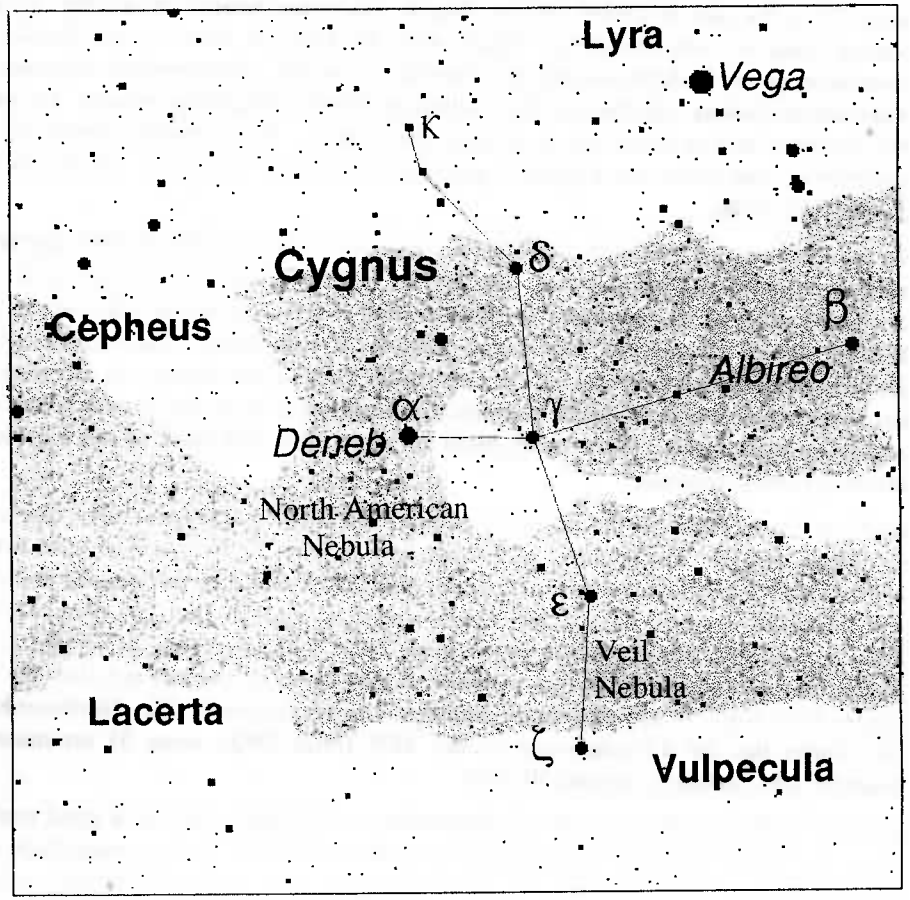
Turn this photograph 90° clockwise to compare it with the map on page 1. Vega is then the bright star at top right and Deneb is at the left. The Milky Way and the North American Nebula are visible. The exposure was 40 minutes on Kodak Gold 200 ASA colour film, with an Olympus OM1 camera fitted with a 50mm lens, and piggybacked on the 14-inch Celestron telescope.

Photograph by David Le Conte on 12 August 1993

Cygnus - The Northern Cross

by Mark Humphrys

Mark shows how to find the many interesting objects in Cygnus, the Swan. In the general constellation map shown below, the shaded area is the Milky Way. Cygnus is directly overhead in summer evenings, and can easily be located by the nearby star Vega in the constellation Lyra, the brightest star in that part of the sky. Mark's article is illustrated with his two detailed finder maps and a photograph by David Le Conte.



During the summer months the sky is dominated by the outspread wings of the Swan, Cygnus, also known as the Northern Cross. Straddling the Milky Way, it contains very rich star fields filled with extensive patches of nebulosity. Scattered amongst these are star clusters and planetary nebulae.

The brightest star in the constellation, and the starting point of this survey is **Deneb**. it is one of the largest white supergiants known, belonging to the spectral class A2. At an absolute magnitude of -7.1 it is some 60,000 times more luminous than the Sun, and some 25 times more massive. But given its distance of some 1600 light-years from us, its apparent magnitude is 1.3, the 19th brightest star in the sky. The area around the star is filled with many different objects, as Figure 1 shows, in particular the giant nebulae.

Some 3° to the east of Deneb lies the **North American Nebula, NGC7000**, its name coming from its very distinctive shape, with the Gulf of Mexico and Florida very prominent, as are both the western and eastern seaboards. Apparently, it is possible to make out the Nebula with the naked eye, although I have not had any success. Try using a nebular filter held up to the eye to increase the contrast. It is certainly visible in 7 x 50 binoculars; I can make out a slight brightening of the sky. Also look out for the **open cluster NGC6996**.

To the southwest of NGC7000, lying in the 'Atlantic', is **IC5067/70, the Pelican Nebula**, another vast cloud of gas and dust. Its 'Pelican' features are difficult to see visually, and can really only be distinguished in photographs. Further south lies the nebula group **IC5068**, which appears as four fuzzy patches of nebulosity. *Burnham's Celestial Handbook* describes this area as "a remarkable field where numerous streamers and filaments intersect at right angles to produce an intricate cross-weave pattern which surely challenges explanation." How much detail are you able to make out, or can they only be detected photographically?

Northeast from Deneb is the planetary nebula **NGC7026**, magnitude 10.9. The central star shines at 14.8. The diameter of the planetary is about 21 arc-seconds. East from the North American Nebula lies the open cluster **NGC7039**, about 16 arc-minutes in diameter and containing some 50 stars giving it an overall magnitude of 7.6. Travelling eastwards again is the small 8th magnitude open cluster **NGC7062**, consisting of around 30 stars within its 6 arc-minute diameter. Another degree or so north-eastwards lies the larger cluster **NGC7082**, 14 arc-minutes in diameter, at a magnitude of 7.2. Northwards from this cluster lies the 4.6 magnitude cluster **M39 (NGC7092)**, some 31 arc-minutes in diameter, and containing around 30 stars.

About 4° ENE from M39 is the 4.2 magnitude star π2 (**Pi2**), which is a good marker to use in the search for the next object, the open cluster **IC5146**. It has a magnitude of 7.2, and a diameter of 9 arc-minutes. It is surrounded by a large patch of nebulosity called the **Cocoon Nebula**, which forms the eastern end of the large elongated dark nebula **B168**.

Moving back to our starting point, Deneb, and then moving southeast about 6°, find the small planetary nebula **NGC7027**, 15 arc-seconds across with a brightness of 8.5.

The next brightest star in the constellation is the 2.2 magnitude γ (**Gamma**) **Cygni**, also known as **Sadr**. Surrounding this star is a complex mass of gas and dust clouds. Most of the nebulae are given the number **IC1318**. The whole area is particularly faint, and is probably a purely photographic object. In amongst the clouds there are several clusters, the brightest of which are: **NGC6910** to the north of γ Cygni, about 7 arc-minutes in diameter with about 50 stars contained within it, overall magnitude of 7.4; and **NGC6913**, better known as **M29**, lying about 2° south of γ Cygni, 50 stars within a diameter of 6 arc-minutes, overall brightness of 6.6.

The final object to look at in this short tour of Cygnus is the supernova remnant, the **Veil Nebula**. Lying to the southeast of ε (**Epsilon**) **Cygni**, it is formed of several fragments, each with different NGC numbers (Figure 2), the brightest of which is **NGC6992**, forming the eastern-most part. It can be detected with 7 x 50 binoculars on good nights. The other bright part of the nebula is **NGC6960**, which has the star **52 Cygni** on its western edge. To see the entire nebula it is necessary to use photography.

If you are not into hunting down faint deep-sky objects, then simply take the binoculars and aim them at the star clouds of Cygnus. You won't be disappointed.

Further reading

Burnham's Celestial Handbook, Vol.2. R. Burnham Jr.; Dover Publications Inc., 1978.

Uranometria 2000.0, Vol.1. Tirion, Rapport and Lovi; Willmann-Bell Inc., 1987.

The Deep Sky Field Guide to Uranometria 2000.0. Cragin, Lucyk and Rappaport; Willmann-Bell Inc., 1993.

Stars and Planets: Peterson Field Guide. Passachoff and Menzel; Houghton Mifflin Co., 1992.

Deep Space CCD Atlas: North. J. Vickers; Back River Observatory, 1993.

A View of the Universe. D. Malin; Sky Publishing Co. & Cambridge University Press, 1993.

The last book in the list, *A View of the Universe*, is an excellent book on astrophotography by the master astrophotographer himself. If you can't see some of the fainter deep sky objects, then sit back in an armchair and browse through this book.

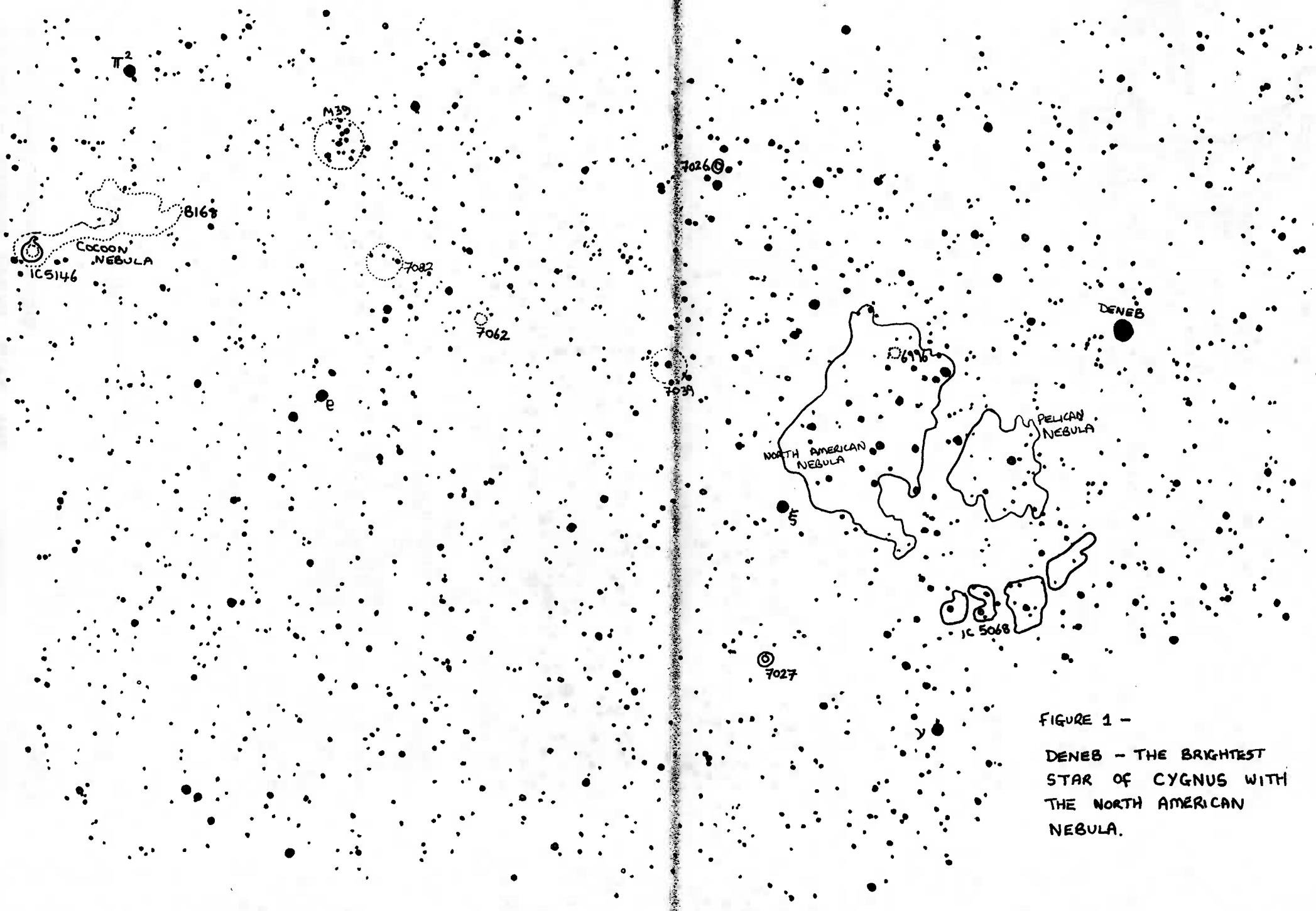


FIGURE 1 –

DENEB – THE BRIGHTEST STAR OF CYGNUS WITH THE NORTH AMERICAN NEBULA.

FIGURE 2 - GAMMA CYGNI WITH THE SURROUNDING NEBULA IC 1318.