LH 120-N 70 in the Large Magellanic Cloud

By Zac Pujic

LH 120-N 70 was the seventieth emission nebula in the LMC characterised by Karl G. Henize in his 1956 Catalogues of Hα-Emission Stars and Nebulae in the Magellanic Clouds (in Astrophysical Journal supplement Number 2, 1956, page 315).

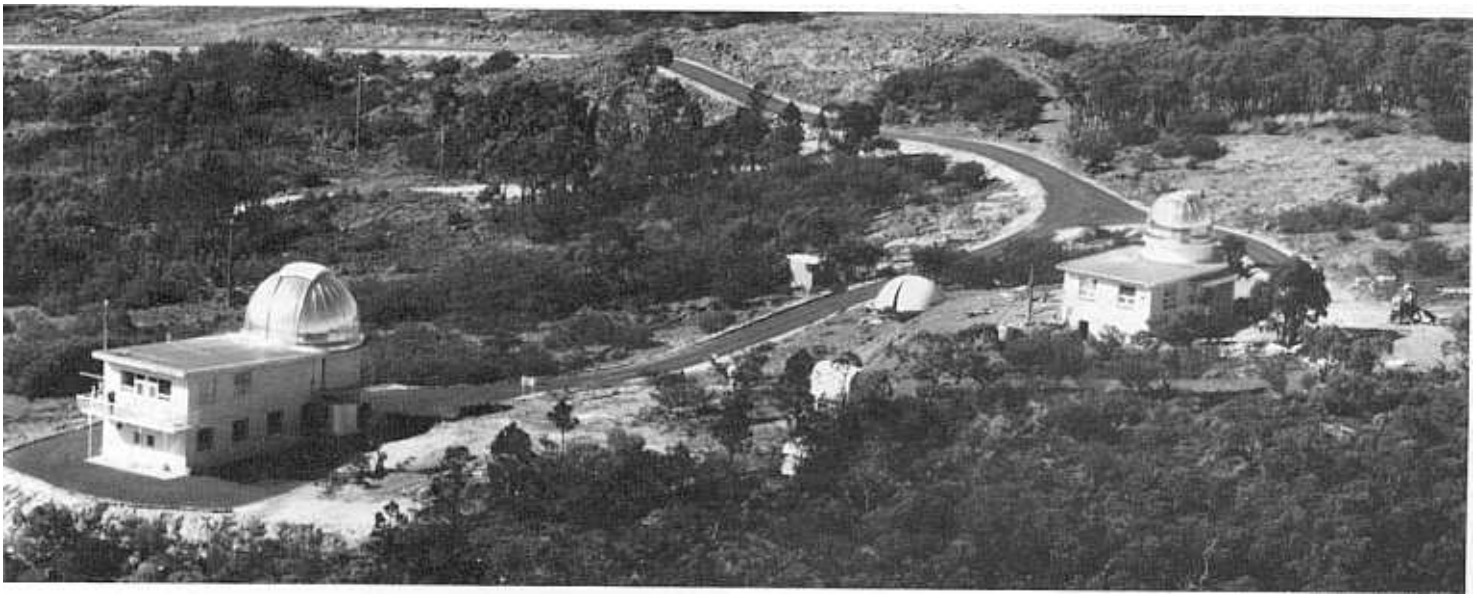
It is a beautiful nebula located away from the main bar of the Large Magellanic Cloud and it was initially thought that, due to the bubble, hollow sphere-like appearance of this object, it must be a supernova remnant. However, studies by radio, x-ray and optical telescopes have revealed that a cluster of stars at the centre of the nebula have been produced only recently—it is a region of star birth rather than death (older copies of Burnhams Celestial Handbook state that it is a supernova remnant. You should add a note into the margins to the contrary to avoid confusion in the future).

A few of the very young stars in the centre, called Wolf-Rayet stars, have developed strong stellar winds which have started to blow away the hydrogen gas which has been falling towards the cluster. These Wolf-Rayet stars eject a stream of particles of hydrogen and helium nuclei which have velocities of up to 3,800 kilometres per second. The infalling hydrogen gas is ionised by this stellar wind, causing it to emit red light of the Hα (hydrogen alpha) line. The tendency of the gas to fall onto the cluster is balanced by the force of the stellar wind, causing the gas to remain in equilibrium, showing very little movement. This is one of the characteristics which suggested it was not a supernova remnant. Filaments of supernova remnants often show considerable velocities since they were generated by the most energetic explosions known.

Visually, the nebula appears extremely faint. I observed it from a dark-sky site using 32 and 20 mm eyepieces with an OIII filter through a 32-cm Newtonian. It is very easy to find but difficult to observe due to its faintness. Its circular shape was easily visible, as was the cluster of stars at the centre. Photographs, such as the one taken by David Malin, show that the nebulosity is more concentrated along the eastern side of the bubble. I could not discern this uneven distribution of nebulosity with my equipment. In fact, the nebula appeared uniform in light intensity throughout. At first, I could not understand why I failed to see filaments or other hints of structure visible in photographs, but eventually I realised that the photographs were taken in the light of Hα, whereas I had observed the object in the light of OIII (500.7 and 495.9 nm light of doubly-ionised oxygen). Observing objects in different light can cause the object to assume a slightly different shape or morphology. For example, the Helix Nebula (NGC 7293) when photographed in the light of Hα, shows highly filamentary structure, while a photograph in the light of OIII shows the nebula to look like a thick walled sphere showing little filamentary structure. Observers should take note that comparing their views of objects as seen through Lumicon's OIII, Hβ or Swan Band filters to photographs taken in light of any other wavelength may cause confusion.

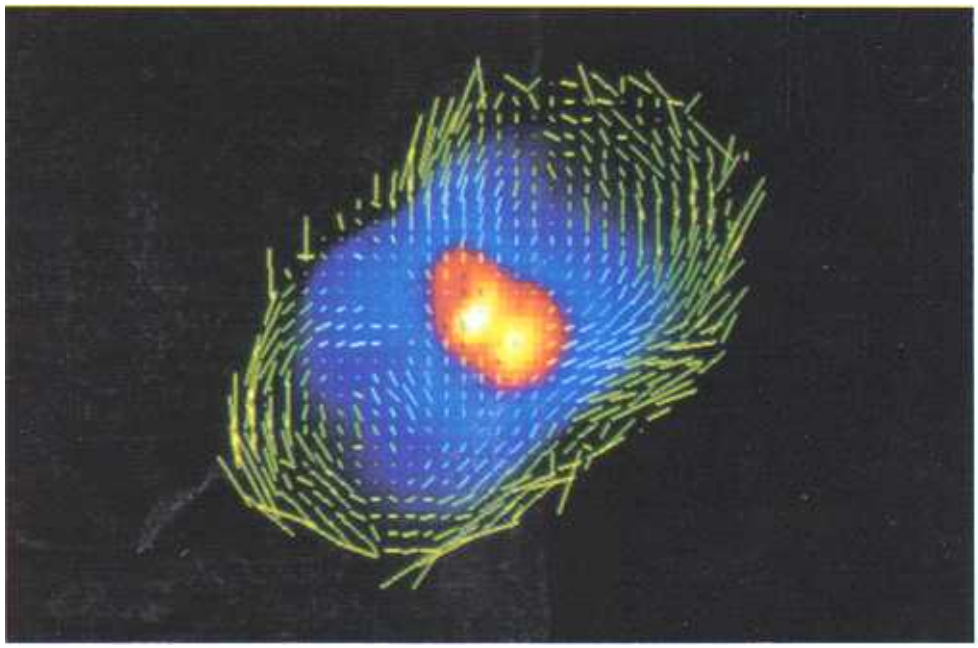
N70 is about 360 light-years in diameter and lies at approximately the same distance as the LMC, 169,000 light years, to which it is gravitationally bound. With an apparent angular diameter of 7 or 8 arc mins, 15 to 32 mm eyepieces will provide the best views. A Lumicon Deep Sky filter enhanced the visibility of the nebula less than the OIII did, and I did not try a UHC filter, though I suspect it will also make the nebula more easily visible.

Besides some X-ray sources, LH 120-N 70 is the only non-NGC object shown on the cover of *Uranometria 2000.0 Vol. II*. It is located at RA: 5^h 43.5^m, DEC: -67° 51' (1950) and RA: 5^h 43^m, DEC: -67° 52' (2000).



Above
Eta Carinae Nebula, photo by Claude Voarino with 30cm Schmidt-Cassegrain on Konica 3200 film, 25 minutes exposure at f/5.

Above, N-70, the Henize 70 Nebula.
AAT Photograph, David Malin.



Right
False-colour mid-infrared image of Eta Carinae at 12 microns, showing radiation from warm dust. The superimposed vector pattern reveals an ordered magnetic field in the expanding dust shell. Image obtained by Craig Smith, Dave Aitken and Toby Moore of the Department of Physics, University College ADFA (Canberra) using their newly-developed mid-IR imaging polarimeter (NIMPOL).

Opposite page, Siding Spring Observatory in 1965. Photo courtesy MSSSO.