M42: A History of Discoveries in the Trapezium

By Greg Morgan

Next time you look at the Great Nebula of Orion, crank up the magnification and check out the small box shaped cluster at the center of M42. Yes, these four stars are called the Trapezium. A guy by the name of Hodiema first drew the group as a triple system in 1654 (Fig 1: Star A, C and D). Christen Huygens also described it as a triple system in 1656. Star B was independently discovered by both Abbe Jean Picard and Huygens in 1684. William Struve discovered star E in 1826 with a 9.5 inch refractor. Star F was discovered by John Herschel in 1830. Star G was discovered in 1888 by Alvan Clark while testing the 36 inch refractor that he built for the James Lick Observatory. E. E. Barnard discovered star H later in the same year with the same scope. Barnard later discovered that H was actually a double star composed of two 16th magnitude companions.

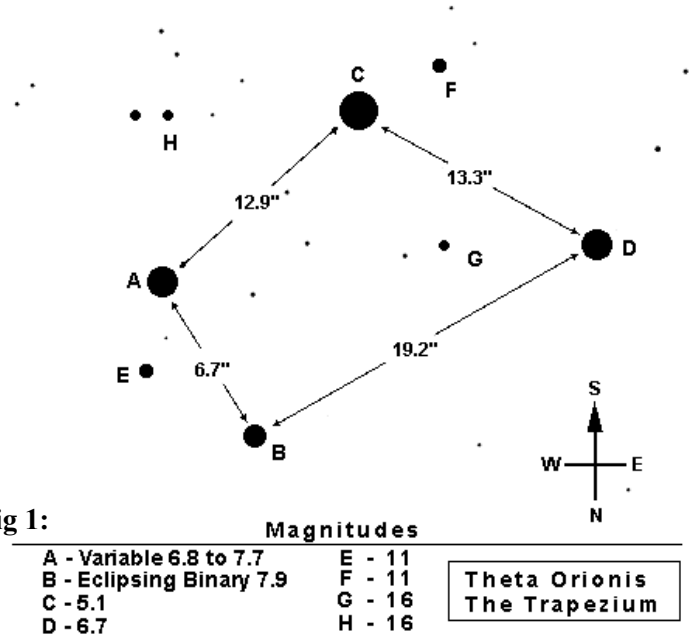

Fig 1:

Theta 1 C (Star C) is actually the brightest or the primary star at magnitude 5.1 rather than star A. The group of stars A, B, C, and D are collectively called Theta Orionis. This cluster of stars is part of a larger cluster of about 1,000 young hot stars that are only about 1 million years old. They are tightly packed into a sphere that is only about 4 light years in diameter.

Theta 1 A (Star A) is also known as V1016 from the General Catalog of Variable Stars. It is itself an eclipsing binary system. Its period is about 65 days. Theta 1 A normally shines at magnitude 6.8 but fades during the eclipse which lasts 20 hours. Theta 1 A sits at magnitude 7.7 during maximum eclipse for 2.5 hours.

Theta 1 B (Star B) is also known as BM Orionis. It also is an eclipsing binary system. It has a period of 6.5 days with a magnitude range of 7.9 to 8.7.

The Trapezium story gets even better. Recent infrared studies by McCaughrean have shown an additional companion to Theta 1 A making it a triple star system. Theta 1 B shows additional separate near-infrared companions making it a quadruple system. Theta 1 C is also a close binary at infrared wavelengths. Theta 1 D is the only star of the Trapezium that has not been determined to be a multiple.

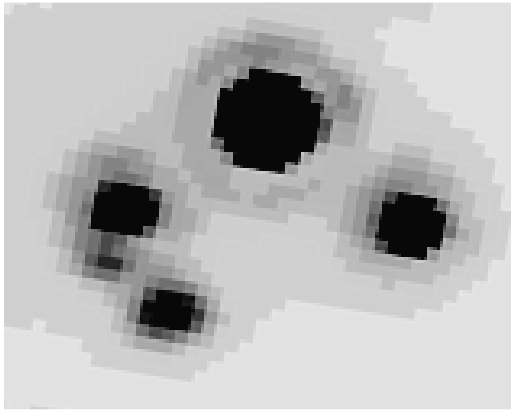

Fig 2: Image of the Trapezium with the 10" at f/6.3 unfiltered. Image scale is at 1.16 arcseconds / pixel. The Trap was fairly small on the original image. This is an enlargement that shows the individual pixels. The image was processed with the Lucy-Richardson algorithm that created the halo artifact and each pixels wavy appearance. This post processing was used to help visualize star E at magnitude 11.

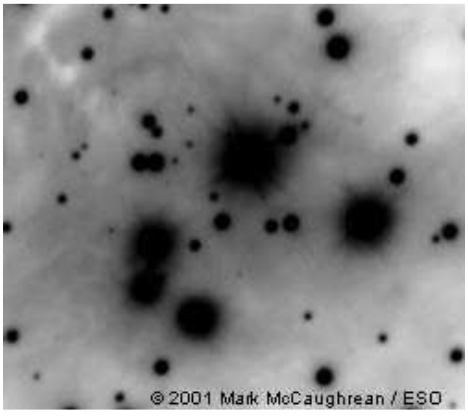

Fig 3: This Image was taken by Mark McCaughrean of the Astrophysikalisches Institut in Potsdam with the 332 inch (8.2m) Very Large Telescope at the European Southern Observatory in infra-red light. In the infrared, many more stars can be "seen" through the intense nebulosity of M42. The true extent of the number of stars in the cluster is just beginning to be understood.