

too would he have needed a correction when he observed a rock on Kapokberg or on Riebeeck Kasteel, when he measured the angles, not from these rocks, but from an eccentric point nearby. Then too his quadrant measured angles, not in a horizontal plane, but on a slightly tilted one necessitating a further correction. His experience in this type of work in France would have stood him in good stead in all these respects. But the lighting of fires at particular times at distant points, with no communications, would also have proved a difficult logistical problem.

Unfortunately, he did not allow for the fact that his station near Aurora was so close to the mountain at Picketberg, that the plumb line did not hang truly vertical, and this induced a latitude error which, though his work was otherwise good, meant that he compared a correct distance between the two points with a difference in latitude that was some 8 seconds of arc in error. This resulted in a determination of the Earth's radius which was more or less the same as in a higher latitude

in France when it ought not to have been so. Nearly a century later Maclear sorted this out and in doing so, began a triangulation of South Africa which would later extend through the territories to the north, and which with the coming of the tellurometer, a South Africa invention, would eventually link up with the Egyptian system.

While in Paris la Caille had observed stars on the meridian at high altitudes. As Paris is at 49° north and Cape Town at 34° south, a star transiting at the zenith in Paris would be only 7° above the horizon when transiting at Cape Town. As the zenith observations would be free from refraction errors and the ones near the horizon would include such errors, it was thus possible for la Caille to get a very good idea of the value of refraction at low altitudes. He did this for a number of stars.

Working in conjunction with astronomers in the north, he did work to determine the solar and lunar parallaxes and took observations of eclipses of Jupiter's moons. His work had many sides – a truly great astronomer.

Deep-sky dedication

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Introduction

Whenever I phoned Danie Overbeek, it was answered with a brief identification "Danie" at the other end, always followed with a note of joy in his lovely deep voice and a friendly "Magda, it's good to hear from you!" Danie Overbeek was my motivation and inspiration for many years and it was truly a privilege to

have known him. His words after my success with asteroid Astrea still echo in my ears: "You have not only made an observation, but also a worthwhile scientific measurement, well done!" Some of his last written words were most appropriate: "I shall now bow out gracefully." Danie, we miss you.

My observatory is situated in the Northern Province, at latitude $23^{\circ}53.9$ South, longitude $29^{\circ}28.3$ East, just north of the Tropic of Capricorn. The observatory is located far from any major metropolitan areas. Using 20cm and 30cm Schmidt-Cassegrain telescopes this location enables me to do much useful deep-sky observing, which I have done with great passion and satisfaction over the past ten years. I have written up all my observations, and wherever possible sketched the objects for future study. With this presentation I would like to show a sample of my results, focusing on some more northern objects and a few rarely known open clusters, and urge other amateurs to develop their own observing programs.

Selection of objects

Firstly, I have opted for a discussion of some northern deep-sky objects, and though these are not necessarily bright objects, they do have certain exceptional and unique characteristics. Each one can be described as special and a challenge, especially when they are situated fairly close to the northern horizon. Secondly I have opted for a few interesting clusters and asterisms. Many of these

were first described by James Dunlop or John Herschel, and I have found it interesting to revisit these objects and compare my own observations.

The Objects

I will describe the following twelve objects:

- NGC 6826 Blinking nebula in Cygnus
- NGC 1554/5 Hind's Variable Nebula
- NGC 3228 cluster in Vela
- NGC 6204 cluster in Ara
- NGC 5281 cluster in Centaurus
- NGC 4609 cluster in Crux
- NGC 4439 cluster in Crux
- NGC 272 asterism in Andromeda
- NGC 1963 galaxy & asterism in Columba
- NGC 2017 multiple star in Lepus
- 'Mini Coat Hanger' asterism in UMi
- 'Stargate' asterism in Corvus

NGC 6826 in Cygnus

Blinking Planetary Nebula, RA 19h 44.8 Dec $+50^{\circ} 31'$

Magnitude 9.8 and Size 2.3'

Telescope: 8-inch Schmidt-Cassegrain f/10, 26mm Super Plössl x77, fov 40.6' and 18mm Super Wide x111, fov 36.2'

NGC 6826 is a fine bright green-bluish

James Dunlop

Scotsman James Dunlop was born on 31 October 1793 at Dalry, near Glasgow, and 33 years later found him in Australia, at the eyepiece of a 9-inch f/12 reflector searching the southern sky for nebulae and clusters. Dunlop constructed the telescope himself, making the mirror from burnished metal (speculum) using methods similar to Herschel. His sky survey produced a catalogue of 629 objects, for which he was awarded the prestigious Gold Medal of the Royal Astronomical Society in February 1828.

Sir John Herschel

John Friedrich William Herschel, was born on 7 March 1792 at Slough near Windsor Castle, the only son of William. After revising his father's observations of the skies visible from Slough, Herschel spent the years 1834–1838 surveying the southern stars from the Cape of Good Hope. He published a consolidated catalogue of over five thousand nebulae and clusters. He died at his home in Kent on 11 May 1871 and was buried in Westminster Abbey.

planetary a little elongated east-southeast and west-northwest. The planetary displays a non-stellar blob in the Milky Way with a bright 10.6 magnitude central star. This beautiful nebula certainly blinks as its name states. To the eye it brightens up to a star-like point just to fade out again like a hazy patch of light. The nebula exhibits a soft disk with a hint of an outer envelope. Mr. Mulaney indicates to stare directly at the centre of the star-like core of the planetary until the brightness overwhelms the eye, and the nebula disappears. However, using averted vision, the nearby 9.5 magnitude star to the southwest suddenly reappears. Our President, Tim Cooper, does not agree wholeheartedly with me but he nevertheless described it as a fine object.

Steve Coe commented to look directly at the planetary, the central star is prominent within the greenish nebulosity. Using averted vision, the nebula appears brighter and overwhelms the star. Alternating between direct and averted vision will produce a blinking on then off that is fascinating. There are several other planetary nebulae that have the right central star to the nebula brightness to show of this effect.

William Herschel discovered this planetary in 1793. My fortunate position in South Africa has enabled me to easily locate the nebula. The Blinking nebula is at declination $+50^\circ$; my most northerly object visible in the night sky is at declination $+57^\circ$.

NGC 1554/5 in Taurus

Hinds Nebula RA 04h 21.8 Dec $+19^\circ 32'$
 Magnitude when observed 12–13, Size 0.5'
 Date: 14 February 1999
 Telescope: 8-inch Schmidt-Cassegrain f/10,
 26mm Super Plössl x77, fov 40.6' and 18mm
 Super Wide x111, fov 36.2'

Hind's Variable Nebula is a reflection/emission nebula associated with the variable star T Tauri. This 9.8 magnitude star has a definite pinpoint appearance, with an extremely faint, gentle north-south arc, close to its western side. The nebula is somewhat dimmer towards the centre, which explains its two NGC numbers. Mr. Jan Hers indicated to me that the nebula was approximately 12.5 magnitude at the stated date in February 1999. J.R. Hind discovered the nebula in the year 1852; it faded from view in 1868 and did not reappear until 1890.

NGC 3228 Dunlop 386 in Vela

Open Cluster RA 10h 21.8 Dec $-51^\circ 43'$
 Magnitude 6.0 and Size 18'
 Telescope: 12-inch Meade Schmidt-Cassegrain f/10, 40mm Super Wide x76, fov 52.8' and 14mm Ultra Wide x218, fov 23.1'

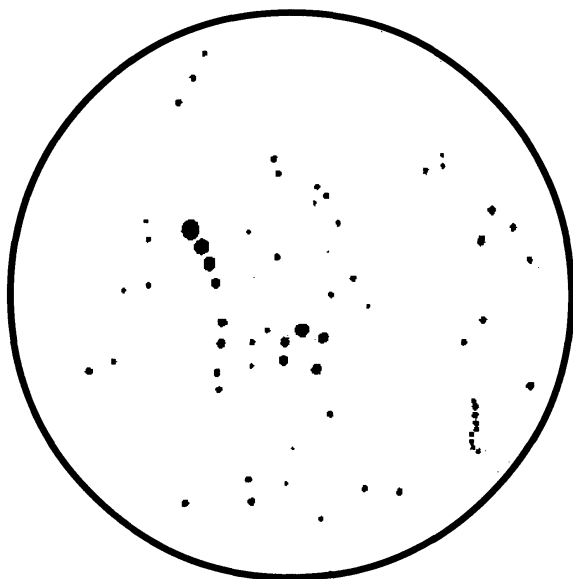
An impressive small grouping of bright stars with a distinctive formation that strongly reminds me of a daisy flower and stem. It displays an overall brightness of approximately 6th to 7th magnitude, unattached to each other and strongly defined against the background stars. Towards the south of this little flower cluster with higher magnification, more fainter stars can be seen which could be part of this whole cluster, giving it an elongated shape in another context. The cluster of approximately nine outstanding stars fills the middle section of my field of view in a north-south direction. Bright and outstanding just like a summer daisy in bloom.

NGC 6204 Dunlop 442 in Ara

Open Cluster RA 16h 46.5 Dec $-47^\circ 01'$
 Magnitude 8.2 and Size 5'

To me, one of the most outstanding compositions, two groupings can be seen. The

group toward the east is virtually a long string, which drapes from north to south in a perfect oval. Outstanding is the top bright



star, situated in the south, and as the stars in the line progress they become fainter with the least faint one ending the line at the bottom. Six fainter stars toward the eastern side represent a perfect question mark, with a faint star to the fullstop beneath it.

NGC 5281 Dunlop 273 Centaurus

Open Cluster RA 13h 46.6 Dec $-62^{\circ} 54'$

Magnitude 5.9, size 5'

Date: June 2000 and May 2002

Telescope: 8-inch Schmidt-Cassegrain f/10, 26mm Super Plössl x77, fov 40.6' and 18mm Super Wide x111, fov 36.2'

Telescope: 12-inch Meade Schmidt-Cassegrain f/10, 40mm Super Wide x76, fov 52.8' and 14mm Ultra Wide x218, fov 23.1'

Mary FitzGerald once said, "Mr. Dunlop certainly had a great fondness for strange small open clusters." This cluster displays an unusual "cross shape" appearance. Five bright stars, along with another seven faint-

er stars, form a gently curved line forming the shape of a cross. Only one star is a little askew from the almost perfect "cross". This cluster contains about forty stars with the brightest star at 6.6 magnitude. Although NGC 5269 is situated twelve minutes to the west in a busy star-field, it could well be the one and same bright NGC 5281 cluster. John Herschel described it as a fine rich Milky Way group, or an outlying cluster of a much finer cluster following it.

NGC 4609 Dunlop 272 in Crux

Open Cluster RA 12h 42.3 Dec $-62^{\circ} 58'$

Magnitude 6.9, Size 5'

The cluster lies in a starry part of the Coal Sack dark nebula just northwest of the reddish magnitude 5 star HD 110432. Cluster looks like an artistic style impression of a comet. The star forms the nucleus and the cluster the tail to the northwest. The cluster members accompany the star, extend away and spray out to the northwest forming an irregular triangle. At both the south and northern end of the grouping lies a small triangle of stars.

NGC 4439 Dunlop 300 in Crux

Open Cluster RA 12h 28.4 Dec $-60^{\circ} 06'$

Magnitude 8.0 and Size 4'

Telescope: 12-inch Meade Schmidt-Cassegrain f/10, 40mm Super Wide x76, fov 52.8' and 14mm Ultra Wide x218, fov 23.1'

Approximately eleven stars resemble a dome-shape that is quite outstanding from that of the background star-field. Typical of Dunlop's clusters, is the fact a few bright stars form star-strings of different shapes and forms. A double star nestles inside a dome of half-moon stars. A comparatively bright 8th magnitude star, just outside this cluster and towards the north, ends the star compo-

sition. To my mind, the cluster reminds me of the sickle emblem in the Russian flag. Hogg 14, situated about 18' to the north, comprises a few faint stars with an overall brightness of magnitude 8.5.

NGC 272 Asterism in Andromeda

RA 00h 51.4 Dec +35° 50'

Magnitude 10, Size 4'

Date: October 2001

Telescope: 8-inch Schmidt-Cassegrain f/10, 26mm Super Plössl x77, fov 40.6' and 18mm Super Wide x111, fov 36.2'

Eight stars in an L-shape slightly outstanding to the background star-field. Six of them display approximate 10 magnitude, while one corner of the L-shape is formed by a 7 magnitude star and fainter companion, probably a double star. It is more representative of a star-string than a genuine star cluster due to its rather doubtful star cluster classification.

NGC 1963 Galaxy & asterism in Col

RA 5h 33.3m, Dec -36° 25'

Telescope: 8-inch Schmidt-Cassegrain f/10, 26mm Super Plössl x77, fov 40.6' and 18mm Super Wide x111, fov 36.2'

Telescope: 12-inch Meade Schmidt-Cassegrain f/10, 40mm Super Wide x76, fov 52.8' and 14mm Ultra Wide x218, fov 23.1'

This string of stars appears like an archer's bow. It is rather outstanding against the background stars. Eight stars represent the handle of the bow and another 6 distinct stars form the tip of the v-shaped arrow point. John Herschel, the object's discoverer, described it as a cluster of stars about 8th to 11th magnitude, arranged almost exactly as a bow. The description of the star group suggests a 13th magnitude galaxy towards the west, but I cannot confirm this. The galaxy NGC 1963

is controversial, yet the star-string easily stands out to form a cluster.

Auke Slotegraaf says that he does not know who originally described the galaxy as NGC 1963. Initially, the thought was that such an object might have formed part of the Revised NGC. The coordinates are roughly the same but NGC 1963 is obviously a cluster according to the description given by John Herschel. The first ESO/Uppsala survey of the ESO(B) atlas indicated it to be a cluster. The Reference Catalogue of Galaxies did not list NGC 1963 at all. Principle Galaxy Catalogue noted an object labeled PGC 17433 as IC 2135, IC 2136, NGC 1963 and ESO 363-G to be the same object. The Second Catalogue ESO 363-G7 noted IC 2135 and IC 2136 as the same object according to Lewis Swift's inscription. Mr Swift, who was well acquainted with Herschel's work, was looking for new objects that Herschel had overlooked. Swift therefore would have known NGC 1963 as a cluster. Whatever the case may be, it is inappropriate to allocate the number NGC 1963 to a galaxy as it is obvious what Herschel saw and described.

The coordinates of this 13th mag galaxy are RA 5h33m12.7 and Dec -36°23'59" and it is also known as IC 2135 and situated 12' toward the east of this cluster grouping.

NGC 2017 multiple star in Lepus

RA 5h 39.4, Dec -17° 51'

Magnitude: about 7, Size: 4.5'

Telescope: 12-inch Meade Schmidt-Cassegrain f/10, 40mm Super Wide x76, fov 52.8' and 14mm Ultra Wide x218, fov 23.1'

Five stars with an unusual appearance stand out clearly against the background star-field. With its variety of colours, it can truly be described as one of the most beautiful stel-

lar groupings I have ever seen. The brightest 6.4 magnitude star has a very smooth grey-blue colour. Towards the south of the primary is a yellow 8.8 magnitude star accompanied by a smaller one. The 7.7 magnitude star on the northern edge of the primary displays a strong orange colour. Further westwards, a much smaller, slightly dirty blue 8.2 magnitude star can be seen. These stars seem to form a physically inter-related system. Hartung describes it as an: "Attractive group of six stars, which show different colours of blue, yellow, orange and ash.

Mini Coat Hanger asterism in UMi

RA 16h 29.0 Dec +80° 15'

Magnitude: 9.5, Size: 14'

Date: May 2001, Portugal

During my May 2001 visit to an Astro-Camp in Portugal I viewed and sketched this northern object. In the northern hemisphere my hosts were not even aware of the mini coat hanger when I showed this jewel to them. Compared very well with "older brother coat hanger" which can be found in Vulpecula (Brocchi's Cluster, Collinder 399). The mini star-string has a clear shape, which appears from north to south and well defined against the background star-field. There is a faint 15.2 magnitude galaxy classified as UGC 10447 and situated on the edge of the hanger's neck, which I could not confirm.

Stargate asterism in Corvus

RA 12h 35.7 Dec -12° 00'

Magnitude 6-7, Size 8'

Telescope: 8-inch Schmidt-Cassegrain f/10, 26mm Super Plössl x77, fov 40.6' and 18mm Super Wide x111, fov 36.2'

An almost perfect equilateral triangle of stars, nestle inside another almost perfect equilateral triangle of stars. An outstanding

defined composition of stars between 6th to 9th magnitude and well defined against a bare star-field. The two brightest stars in this breathtaking composition display a golden yellow colour.

Brief Description of my Observing Programs

My studies of the deep-sky led me to be the first to obtain the Deep-Sky Section's Bennett Certificate. I am still involved with observation of these objects, together with Jenny Kay in Australia. I have also made an intensive study of Herschel's non-existent objects and the Dunlop Catalogue, and I contribute to the Webb Society and The Deep Sky Magazine (Washington DC). Inbetween my deep-sky work I also contribute to the Comet and Meteor, Double Star and Occultation Sections of ASSA.

Conclusion

The foregoing demonstrates some of the useful work that can be done on the deep sky by a dedicated amateur astronomer using modest instruments under dark skies. I hope and trust that my humble contribution has assisted in revealing the wonders of the universe that unveils itself to us and that these results on some of my favorite objects will motivate others to try observing and recording deep-sky objects and develop their own deep-sky dedication.