

A new Sculptor-type dwarf elliptical galaxy in Carina

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Received 1977 April 28

Summary. A star system discovered on a plate taken with the UK 1.2-m Schmidt Telescope appears to be a dwarf elliptical galaxy and a new member of the Local Group of galaxies.

The new galaxy is illustrated in Plate 1. It was discovered during visual inspection of a plate of field 206 in the ESO/SRC Southern Sky Survey. This was a sky-limited exposure on hypersensitized Eastman Kodak IIIaJ emulsion through a Schott GG395 filter. The system can also be seen at the extreme edge of the adjoining Survey field, number 207, and can be detected under low-power magnification as a local increase in star density on the less-deep ESO(*B*) glass copy plate of field 206.

The system is centred at $06^{\text{h}}40^{\text{m}}.4$, $-50^{\circ}55'$ (1950), or $l = 260^{\circ}.1$, $b = -22^{\circ}.2$; the brightest foreground star near the centre is SAO 234657 at $06^{\text{h}}46^{\text{m}}27^{\text{s}}.8$, $-50^{\circ}57'05''$ (1950.0). The overall angular extent is about 30×20 arcmin, with major axis at position angle 70° . The object is completely resolved into stars and has all the attributes of a dwarf elliptical galaxy of the type often known as dwarf spheroidal or extreme dwarf (Wilson 1955; van den Bergh 1968; Hodge 1971); namely very low surface density, a low degree of central concentration, and marked symmetry and uniformity with no evidence of gas or dust. Its large angular extent and the faintness of the member stars make it much too large and distant to be a star cluster. It is also clear that it consists of stars rather than of galaxies; the high contrast and resolution of IIIaJ plates greatly reduces the possibility of confusion between dwarf galaxies and clusters of galaxies mentioned by van den Bergh (1959). Perhaps the most convincing argument for identifying the system as a dwarf elliptical is that it is very similar to the Sculptor and Fornax dwarf ellipticals which also appear on SRC(*J*) Survey plates, although it is much less populous. Most of the new galaxy is in the constellation Carina, although the northern part extends into Puppis, and we propose that following the usual convention it should be known as the Carina dwarf elliptical galaxy.

Although the Carina dwarf is the same kind of system as the six previously known nearby 'spheroidal' galaxies, it is perhaps the least populous member of the class. Its low surface

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density and the moderately high foreground star density make it very difficult to detect, almost as difficult as the Draco and Ursa Minor systems on the less deep Palomar Sky Survey. Accurate determinations of the distance and extent of the Carina dwarf elliptical will only be possible when detailed star counts are made, and it is planned to do this using the COSMOS automatic plate measuring machine at Edinburgh. However, a preliminary distance estimate can be made from comparison of sky-limited blue (Kodak IIIaJ) and red (Kodak 127-04) Schmidt plates. These two plates have approximately equal numbers of images in a comparison field near the galaxy, but within the galaxy there are about 1.7 times as many images on the blue plate. The most likely explanation of this result is that the Carina dwarf galaxy has a strong blue horizontal branch just at the plate limit, making it similar to the Ursa Minor dwarf elliptical (van Agt 1967). If this is correct, and assuming a red plate limit of $R \sim 21.5$, then the distance of the Carina dwarf is 170 ± 50 kpc. This makes the Carina dwarf certainly a member of the Local Group of galaxies, and in fact a companion of our own Galaxy. There do not appear to be any globular star clusters within the Carina dwarf galaxy. Such clusters are readily seen on SRC(J) Survey plates of the Fornax dwarf elliptical which is at a similar distance.

While it is gratifying to have discovered a new nearby dwarf elliptical galaxy on the SRC(J) Survey plates, it is now clear that such systems are few in number and any remaining will be very difficult to detect, even with the approximately 1.5-mag advantage over the Palomar Survey. The ESO(B) Survey is almost complete for the southern part of the sky not covered by Palomar, and any new systems comparable to Sculptor or Fornax would certainly have been detected. Deep IIIaJ plates for the SRC(J) Survey have now been taken for over 90 per cent of the same fields, and galaxies comparable to any of the six previously known systems should also have been found. The only possibility for detecting new systems of this type would seem to be in regions of relatively high foreground star density, and will probably require careful scanning under low power magnification or detailed star counts.

The Carina dwarf elliptical galaxy is only about 20° from the Large Magellanic Cloud. It is thus yet another system which may be associated with the Clouds and the Magellanic Stream, although it does not lie directly on the locus defined by the high-velocity hydrogen clouds (Lynden-Bell 1976; Kunkel & Demers 1977; Mathewson & Schwarz 1976). An accurate distance determination is needed before such an association can be established.

Acknowledgment

It is a pleasure to thank several colleagues at the Royal Observatory, Edinburgh, for helpful comments on a first draft of this paper.

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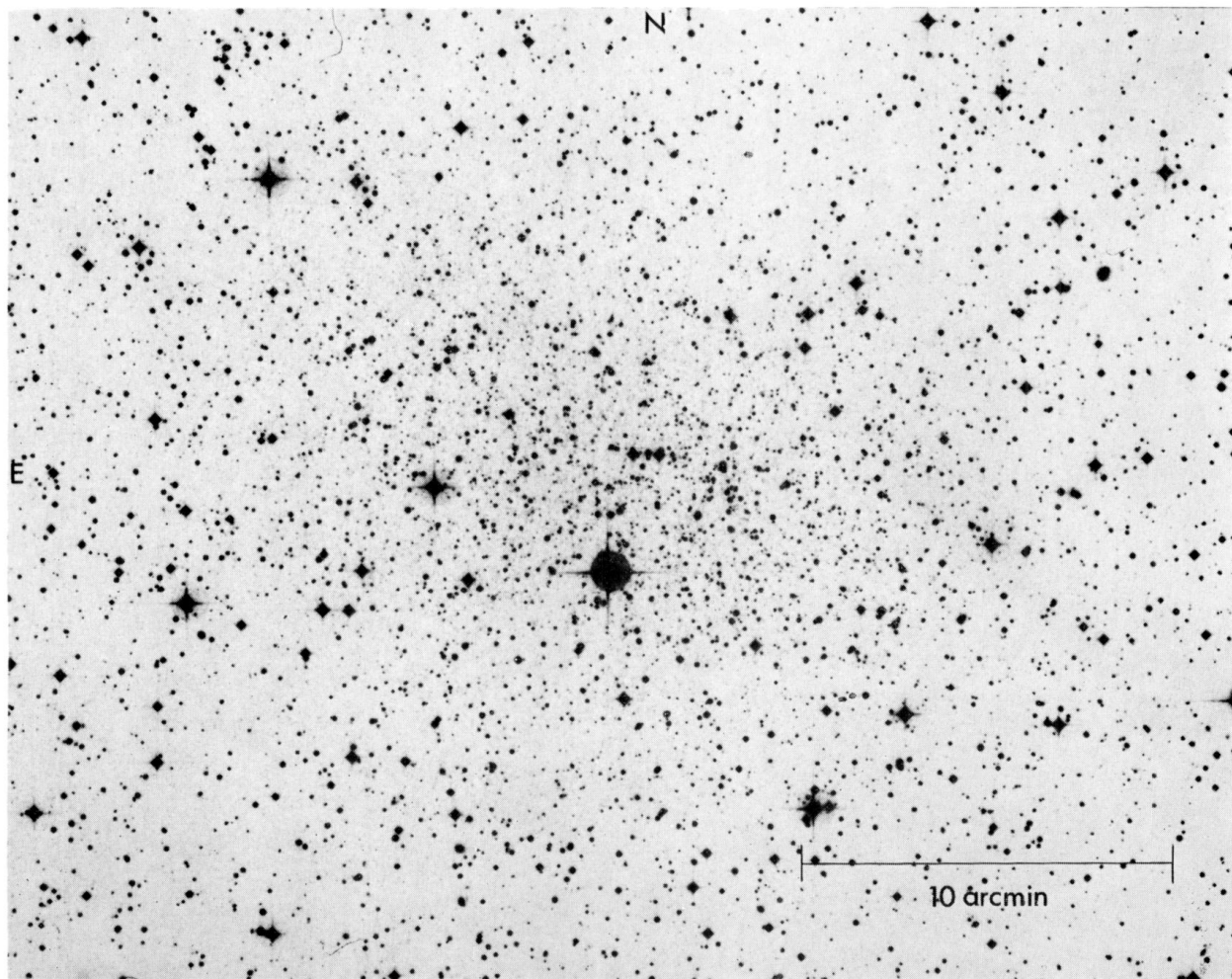


Plate 1. The Carina dwarf elliptical galaxy, from a IIIaJ plate taken on the UK 1.2-m Schmidt telescope.

