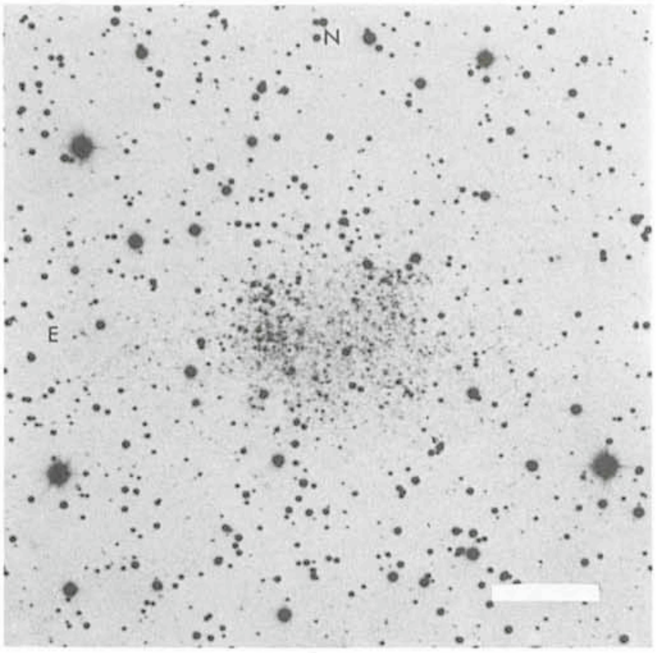


Fig. 2. — *New stellar system in Sagittarius, photographed on July 15, 1977 with the ESO 3.6 metre telescope. 90 min, IIIa-J + GG 385. Observer: S. Laustsen. Same scale as figure 1.*

Tentative Meeting Schedule

The following dates and locations have been reserved for meetings of the ESO Council and Committees:

September 22	Committee of Council, Geneva
November 3/4	Finance Committee, Garching
November 8	Joint meeting of Scientific Policy Committee and Instrumentation Committee
November 24/25	Observing Programmes Committee
December 1/2	Council, Munich

find a distance somewhere between 100 and 250 kiloparsecs (300,000 to 800,000 light-years) and a linear diameter of 30 to 75 parsecs.

On the contrary, the *Sagittarius* object (Fig. 2) at R.A. = $19^h\ 27^m.0$; Decl. = $-17°\ 47'$ (1950) resembles the Phoenix and Sculptor objects and is more likely to be yet another, new irregular dwarf galaxy. In that case, it is well outside the Local Group of Galaxies, at a distance of several megaparsecs, and has a diameter of some kiloparsecs.

It is interesting to note that all four objects mentioned here can in fact be seen as weak, patchy "blobs" on the Palomar Sky Survey prints, if you know where to look! Otherwise they can easily be mistaken for plate faults.

Eclipsing Binaries in the Globular Cluster Omega Centauri

Of the many thousand eclipsing binary stars known, fewer than five are members of globular clusters. The powerful methods for determining masses, radii and chemical composition by means of photometric and spectroscopic observations of eclipsing binaries can therefore not be applied to the population II stars in globular clusters. This is really a pity, because improved knowledge about these very old objects would have direct impact on our ideas about the universe (distance scale, earliest epoch, etc.). Hoping to get things moving along this line, two Danish astronomers, Drs. Birger Niss and Henning E. Jørgensen of the Copenhagen University Observatory, have recently started a systematic search for eclipsing binaries in the bright southern globular cluster Omega Centauri. This is their preliminary report, not without hope for the future:

In a recent article (*Messenger,* No. 7—Dec. 1976) one of us discussed the determination of *masses* and *radii* for eclipsing binaries, and from that the *helium abundances.*

For one particular group of astronomical objects, such data are of vital importance for our understanding of their past und present. We are thinking of *globular clusters.* As far as we know today, these are among the oldest objects known, and we believe that their chemical composition resembles the mixture of elements in the very early universe.

According to modern calculations of the formation of elements during the first few minutes of the universe, the abundance of helium should be somewhere between 20 und 30 per cent by weight. Could we therefore determine the amount of helium present in globular clusters, we should have an important cosmological parameter in our hands to check Big-Bang theories.

Stellar Masses in Globular Clusters

With well-determined masses from binaries, we could also establish the absolute mass scale on the cluster sequence. Today, we only know the relative masses of stars in the HR diagrams of the globular clusters from stellar evolution calculations. We believe that horizontal branch stars have masses close to 0.65 $M_\odot$ (solar masses) and that substantial mass loss has occurred in the preceding very luminous red-giant phase. By determining masses of stars at subgiant luminosities we should therefore be able to derive the amount of mass lost. In this field we are also faced with another problem, namely that we cannot find the predicted amount of gas in globular clusters; where has it gone?

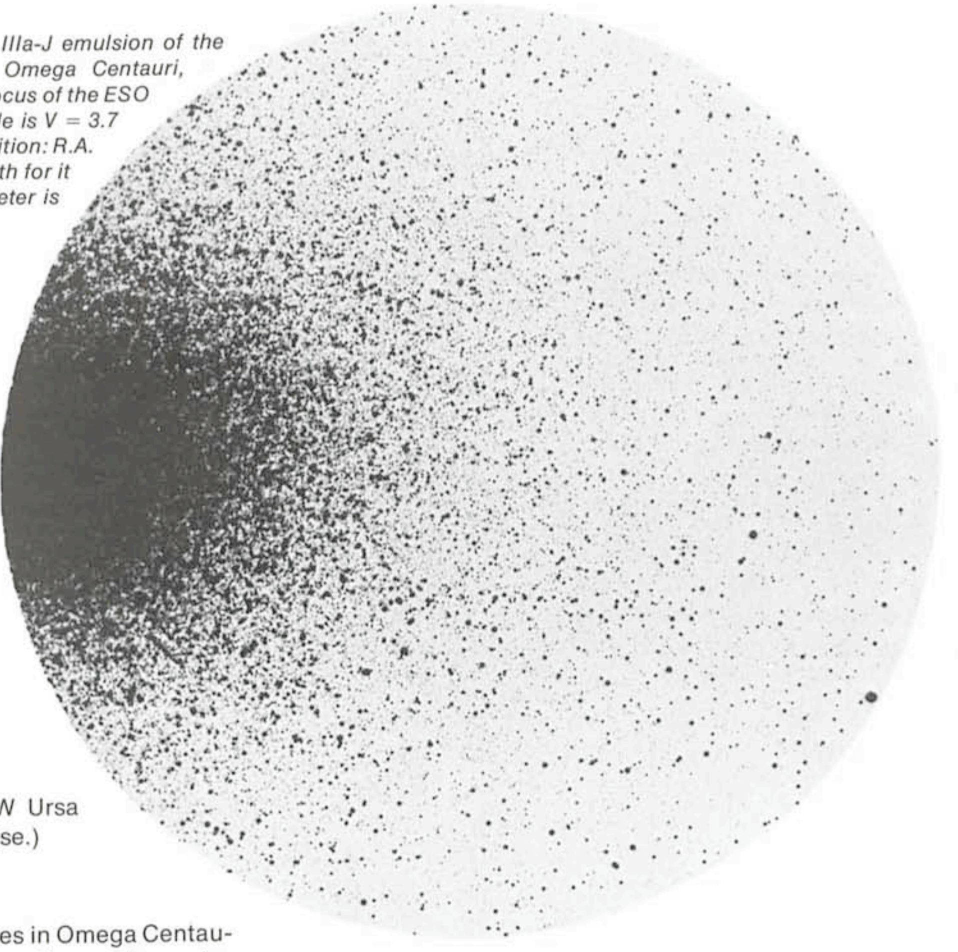
From the radii and temperatures we should be able to make an independent determination of the distance of the clusters. This in turn would give a better value of the absolute magnitudes of RR Lyrae variable stars, which are essential for determining the distance scale of the universe.

Still another property of importance in globular cluster research is the frequency of binary stars. At present we know that five clusters are X-ray sources. It has been suggested that these sources are not of the "classical" binary nature, using among others the argument that the frequency of binaries is low, which is, however, an open question.

From this it should be evident that a thorough search for binaries in globular clusters is of importance in clearing up such problems.

Today only 11 eclipsing binaries are known in the direction of globular clusters, but only three of these are thought to be real members. (One of these three, we believe, is not

A 10-minute exposure on blue-sensitive IIIa-J emulsion of the brightest globular cluster in the sky, Omega Centauri, obtained by Dr. S. Laustsen at the prime focus of the ESO 3.6 m telescope. The integrated magnitude is V = 3.7 and it is visible with the naked eye. The position: R.A. = 13^h 24^m; Decl. = —47° 13' is too far south for it to be seen from Europe. The linear diameter is about 50 parsecs (160 light-years).



a member, and the other two are W Ursa Majoris systems which are of little use.)

A Search in Omega Centauri

We started to look for eclipsing binaries in Omega Centauri, a bright and large globular cluster on the southern sky. Omega Cen is very massive, and contains approximately three million stars. Furthermore it is a fairly loose cluster, and stars even fainter than RR Lyraes can easily be distinguished in the centre. The distance is only 5 kpc, which makes it one of the closests globular clusters.

The material, i.e. the photographic plates, for this search was obtained by Dr. S. Laustsen with the 3.6 m telescope on La Silla. In January 1977 the primary focus was being tested, so the opportunity was taken to procure 11 plates of the cluster on 5 consecutive nights. The exposure times were 2, 4 and 10 minutes to make a search for variables in the subgiant branch possible. A search for variables in a dense stellar field should be straight forward by blinking the plates. However, before knowing the variables, we decided to investigate if a simple photographic technique could pick out most of the variables for us:

A "sandwich" consisting of a plate put together with a copy on lithfilm of another plate is viewed in a microscope. A lithfilm is a film of extreme contrast, in principle only pure black und pure white is available. In this way the stars on the plate are lit through a perfectly fitted mask, so we see a bright ring around each star.

If, however, a star has changed its magnitude from one plate to the other, the hole in the mask, and therefore the bright ring is either too big or too small. Stars that have varied more than 0.3 magnitude can immediately be seen in the microscope. Using this technique, we found 79 possible variables. Among these are practically all the known variables in the field.

During a pleasant stay at ESO in Geneva, where some of the plates were blinked on the Zeiss comparator, we found 22 more candidates, mostly closer to the plate limit. The simple "sandwich" method proved to be very efficient, as many candidates were only found by that method.

One Probable Eclipsing Binary

We cannot at present establish with certainty how many of the candidates really are new variables. Iris photometry shows that approximately 30 are very probably variables; they are mostly RR Lyrae stars, but half a dozen might be eclipsing binaries.

At least one looks very promising, since this star has dropped 0.7 magnitude on two plates (obtained immediately after each other) when compared to the rest of the plates. It is almost certainly an eclipsing binary, a little more than 1 magnitude fainter (in V) than the RR Lyrae stars, and there are good indications from proper-motion measurements (Woolley, *Roy. Obs. Bull.* No. 2, 1966) that it actually belongs to the cluster.

If it does, there are favourable odds that it is also a spectroscopic binary so that the radial-velocity curve should be measurable. Before definite conclusions can be reached, many more observations must be carried out in order to get a proper light-curve of this and the other candidates, but it looks indeed as if we were one step closer to the determination of the properties mentioned in the beginning of this article.

Binary Frequencies

Finally we should mention that we predict, from the distribution functions of radii, semi-major axes and inclinations, the fraction of binaries that were detected on our plates, and we can therefore give an estimate of the frequency of binaries among the population II stars in Omega Centauri.

The statistics are of course *very* uncertain, but half a dozen eclipsing binaries do *not* support the hypothesis that the Omega Centauri frequency of binaries is much lower than that of population I stars.