Lindblad: Sinnerstad, whose work was referred to, obtained from the line profiles two equivalents, line width and line depth. Thus two series could be obtained, and the dispersion in the inferred absolute magnitudes reduced. The line depth as a parameter can be effectively replaced by the intensity of the Balmer continuum. Sinnerstad is continuing his work by applying the Hβ index measured photoelectrically to his analysis.

Haro: Can the Hβ index method be used to determine the luminosity of early type stars in the halo? Some of these stars show very faint and narrow H lines similar to the ones that characterize the Morgan OB natural group.

Graham: This would be rather risky on the basis of Hβ studies alone because the stars might be of differing compositions. Perhaps it could be reinforced by multicolour observations.

Bok: Now that we know how to measure the Hβ indices in stars down to 15^m, the big problem is how to locate the OB stars in the low-latitude regions observed in the fields of the southern hemisphere, as many are reddened by absorption in this region.

18. THE REGION OF NGC 6522

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The field of NGC 6522 is of especial importance because Baade considered that the cluster-type variable stars found in this field were located in a stellar concentration at the centre of the Galaxy. This particular field is a few degrees away from the actual centre, but is a region of comparatively small absorption, so that stars at considerable distances from the Sun can be seen and studied. Baade found a marked maximum in the frequency of these variables between 17^m and 18^m apparent photographic magnitude on plates which were exposed down to a limit of 20^m. He supposed that this maximum was due to an actual concentration of cluster-type variables round the centre of the Galaxy. Assuming $0^m.0$ for the absolute magnitude, and allowing 3 magnitudes for absorption, Baade found a value of 8·2 kpc for R_0, the distance to the centre of the Galaxy. The absorption was computed from a rather high value for the reddening of the cluster NGC 6522 itself, which was given by Stebbins and Whitford.

During a visit to Pretoria, Mr. J. B. Alexander secured a number of direct photographs of this region at the Newtonian focus of the 74-inch Radcliffe reflector (stopped to 44 in.). Despite the low altitude of NGC 6522, Arp has secured a photoelectric sequence in the field, with the 200-inch telescope, and at Pretoria, where NGC 6522 passes near the zenith, Eggen tied this sequence in to suitable standards. Dr. Eggen communicated these results to us and we have calibrated Alexander's plates and constructed an HR diagram for NGC 6522; but as the cluster is in a very crowded region there are of course many field stars which cannot be distinguished easily from cluster stars. Indeed in the colour-magnitude array shown it requires the eye of faith to see at all the familiar HR pattern of a globular cluster showing amongst the field stars.

To meet this situation we determined the values of B and V for a number of stars in an annulus centered on this cluster but so far out that we were confident that there were few cluster stars in it. The next slide shows the HR diagram of this

annulus. It is of interest on its own account as it shows a far greater proportion of red stars than would be in an array of a field in the solar neighbourhood, and we may assume that most of these red stars are objects which are actually near the centre of the Galaxy. Be this as it may, we used this comparison field to remove, statistically, the field stars from our HR diagram of the cluster plus field stars by subtracting a suitable allowance for the field, and the third slide shows a subtraction diagram representing the HR diagram of NGC 6522. It is distinguished by a very long giant branch, but it seems very likely that the brightest stars are indeed members of the cluster because they all occur close in and because no stars as bright as this occur in the comparison annulus.

Seven variables occur close to the cluster and it seems likely that they are members of it, but they have so great a spread in V and also in $B-V$ that it is very tempting to suppose that several of them are unresolved optical pairs. If so, the four faintest variables are those which should be used to determine the distance of the cluster; but it should not be forgotten that the cluster is not necessarily at the centre of our Galaxy. The distance to the centre should be determined (if Baade's reasoning be allowed) by studying the colours of the variables in the field. Work is proceeding on this at Herstmonceux, but the work is undoubtedly made very difficult by the crowded nature of the field.

Discussion

Arp: I have established the photoelectric sequence in the NGC 6522 region with the 200-inch telescope and am in the process of deriving from plates taken with the same instrument the colour-magnitude diagram for the cluster and the field. From greater numbers measured in the field, the outstanding result is similar to the results suggested by Dr. Woolley's slide but perhaps a little clearer, namely, that there is a definite giant branch observed due to stars situated near the nucleus of the Galaxy. These giants are not globular cluster giants but several magnitudes fainter.

de Vaucouleurs: What was the derived distance of NGC 6522?

Woolley: I have not finished the reductions yet but it is probably about 12 kpc.

Bok: What is the value of A_V for NGC 6522?

Woolley: The absorption was $B-V=0^{\mathrm{m}}4$, and therefore $A_V=1^{\mathrm{m}}2$.

Feast: I am not clear why it should necessarily be assumed in discussion of the HR diagram of the field that all the field stars lie at the same distance.

Woolley: It is not of course necessary that this should be so, but it seems quite likely. This assumption does not of course alter in any way the argument about the distance to the centre of the Galaxy.

Ambartsumian: How have you made the subtraction of the field stars from the diagrams shown?

Woolley: Take the number in any given square in the field HR diagram and subtract this number from that in a similar square in the cluster field; thus substantially only cluster stars remain. Of course the breakdown into squares is arbitrary.