an extreme case. To begin with we forget the time parameter. In the first one the stars are completely homogeneously distributed—except for some random groupings. In the second one there are no "free" stars at all, only clusters and associations of clusters in some sort of hierarchic organization. Observations tell us that none of the models is correct but that the real situation is somewhere in between these extreme cases. The natural question then is: *Where* in between? Here we must introduce the time parameter; the relation between "free" and "bound" stars is definitely correlated to the stage of evolution of the Galaxy—unless we believe that the processes of creation and disintegration of clusterings are in perfect equilibrium.

Personally I do not think that it would be realistic to use the number of cluster(ing)s as a criterion of the age of a galaxy but, more probably, it could be used in an empirical check of the theories for the dynamical stability of these clusters and that is interesting enough.

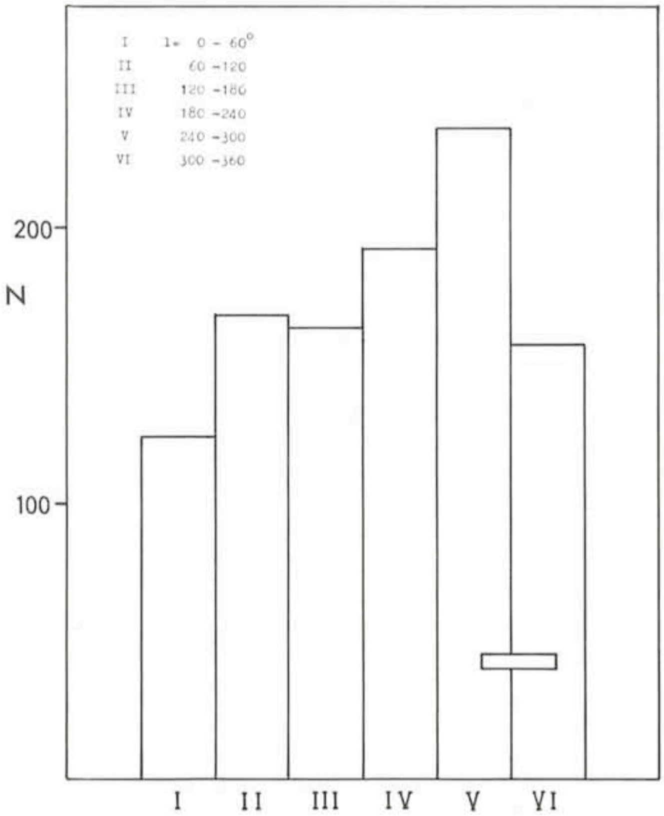

Fig. 3: *The distribution of known open clusters in 60° intervals of galactic longitude. The small rectangle indicates the area investigated by the author and his collaborators at the Stockholm Observatory.* ▶

Discovery of New Wolf-Rayet Stars in the Magellanic Clouds

J. Breysacher and M. Azzopardi

As a result of a thorough search with the ESO GPO astrograph, the number of known Wolf-Rayet stars in the Small Magellanic Cloud has just been doubled (from 4 to 8). Drs. Jacques Breysacher (ESO) and Marc Azzopardi (Observatoire de Toulouse, France) also discovered 17 new WR stars in the Large Magellanic Cloud. Slit spectra of these stars have been obtained with the 3.6 m telescope and there is an indication of a significant difference between the WR stars in the Clouds and those in our own galaxy.

The Magellanic Clouds offer the possibility to study objects of various classes which are at the same distance from us. It is known that some notable differences exist between the stellar populations of the two Clouds, and the Wolf-Rayet (WR) stars do not seem to be an exception to the rule. However, before any comparative study can be undertaken, it is first necessary to make sure that the detection of WR stars in both Clouds is as complete as possible.

The Objective-Prism Search

A systematic search for this kind of star was carried out in October 1977, in March, and in November 1978 with the ESO 40 cm Objective-Prism Astrograph using an interference filter centred at λ 4650 which has a passband of 120 Å wide. WR stars show up strongly in this spectral region due to the emission, mainly from either λ 4650 C III (WC) or λ 4686 He II (WN). This detection technique enabled us to study very crowded regions by reducing the background fog and the length of the spectra, i.e. the number of overlapping images.

Figure 1 reproduces an LMC survey plate. The field has 85′ in diameter. The limiting magnitude of the survey is $m_{pg} = 16.5$ for the Small Cloud and $m_{pg} = 17.5$ for the greater part of the Large Cloud. But due to the poor sensitivity of some of the IIa-O plates used, for a few LMC fields only the continuum of 16.0 m_{pg} stars was reached. The B magnitudes of the WR stars were determined from astrographic plates taken after removing the prisms of the Objective-Prism Astrograph, in combination with a Schott GG385 filter. In order to get an accurate classification of the newly discovered WR stars, slit spectra were obtained for all of them with the Boller and Chivens Cassegrain spectrograph equipped with either the Carnegie image-tube or the Image Dissector Scanner at the ESO 3.6 m telescope.

SMC

In the Small Magellanic Cloud, 4 new WR stars of the WN type ($12.9 \leq m_{pg} \leq 15.3$) were identified (Azzopardi and Breysacher, 1979a) increasing to 8 the number of known WR stars in this system. Considering the distribution among the different WR subclasses, it is remarkable that in the SMC only subclasses W3 to WN 4, 5 are present with, in the WC sequence, one doubtfully (Breysacher and Westerlund, 1978) extreme Wolf-Rayet of type WC4. This has possibly something to do with the general metal deficiency of the SMC and one of us (J. B.) is now studying this point. Adopting the absorption-free distance modulus of 19.2 for the SMC, we come to the result that the 3 faintest SMC WR stars, also binaries, have absolute magnitudes which are hardly compatible with the existing absolute magnitude calibrations for WR and OB stars. These 3 WR binaries located in the same south-west region of the SMC tend to confirm that the extension in depth of the Small Cloud is rather large, as previously suggested by Hindman (1967) from 21-cm radio observations.

LMC

In the Large Magellanic Cloud the present survey led to the detection of 17 new WR stars of the WN type ($11.9 \leq m_{pg} \leq 16.4$), 13 of which are in the region of and to the west of the 30 Doradus nebula (Azzopardi and Breysacher, 1979b, 1979c). 101 WR stars are now known in the LMC; the corresponding figure for the Galaxy is 154.

With an LMC distance modulus of 18.5 the absolute magnitudes obtained for 8 WR stars ($m_{pg} > 15$) are significantly fainter than the values given by Smith (1973) for the corresponding subclasses. Since the Large Cloud is generally considered as a system which is seen almost "face on", local stronger absorption is possible but it may

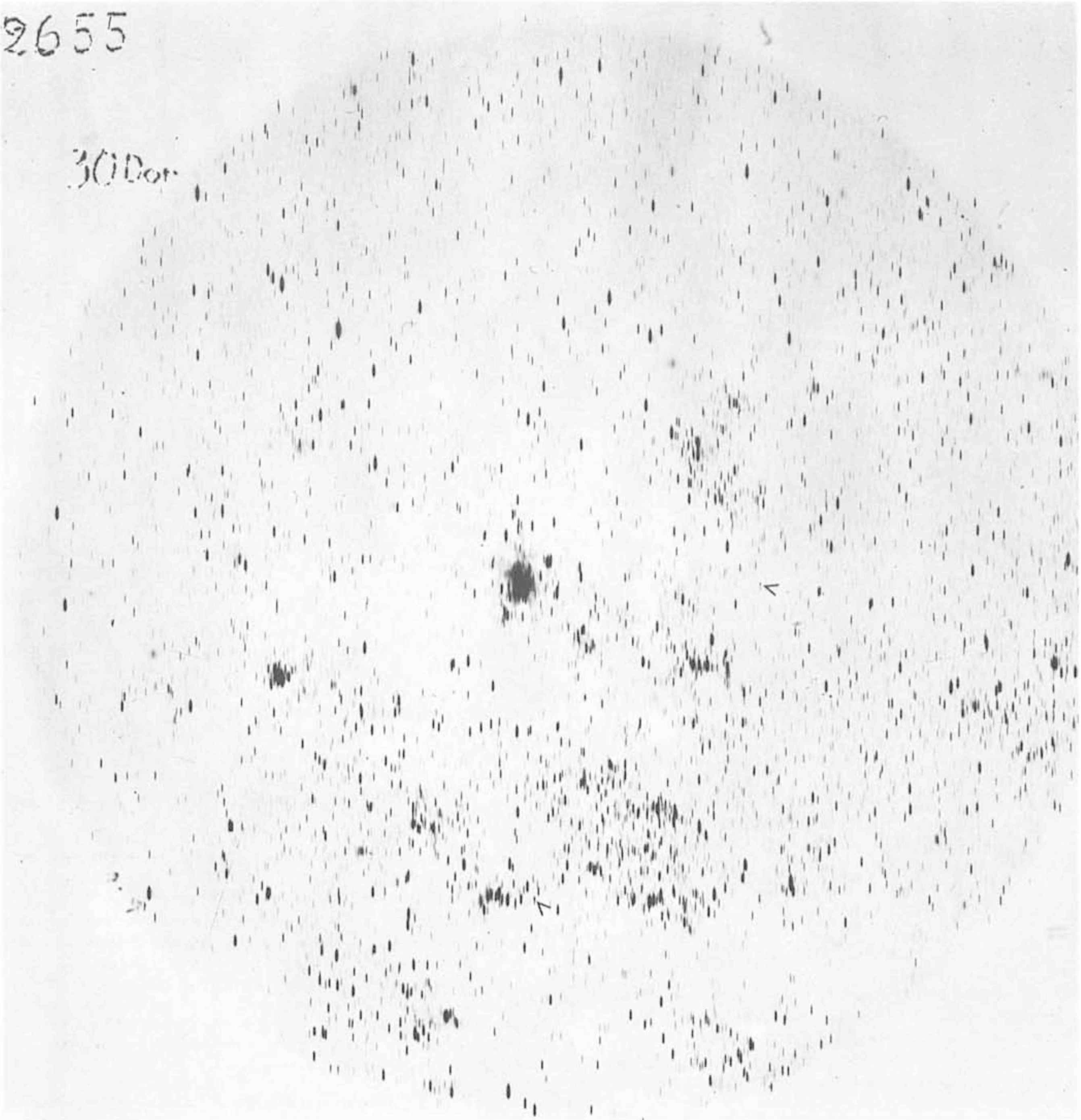

Fig. 1: *A 6-hour exposure on IIa-O nitrogen baked plate in the 30 Doradus region obtained in October 1977 by M. Azzopardi with the Objective-Prism Astrograph and the λ 4650 filter. Wolf-Rayet stars with their emission feature are easily recognizable. Two of them are indicated by arrows.*

well be that these WR stars really have lower intrinsic luminosities than those stars of similar types previously observed in the LMC. This is now being investigated.

The census of the WR population in the Magellanic Clouds can now probably be considered as quite complete, except, maybe for subclass WC 5 which has possibly escaped our detection due to the technique employed: the width of the λ 4650 emission feature is comparable to the filter passband in this case.

References:

Azzopardi, M. and Breysacher, J.: 1979a, *Astron. Astrophys.* (in press).

Azzopardi, M. and Breysacher, J.: 1979b, *Astron. Astrophys.* (in press).

Azzopardi, M. and Breysacher, J.: 1979c, Submitted to *Astron. Astrophys. Suppl.*

Breysacher, J. and Westerlund, B. E.: 1978, *Astron. Astrophys.* **67**, 261.

Hindman, J. V., 1967, *Australian J. Phys.* **20**, 147.

Smith, L. F. 1973, IAU Symposium, N°49, 15.

Instrumentation Schedule

This is the up-dated time schedule for the major instruments which are being developed at ESO in Geneva for use on the 3.6 m telescope. See also *Messenger* No. 15, p. 10.

Triplet Adaptor (M. Tarenghi, M. Ziebell). Target date: Sept. 1979. The components are:
- two 3-lens correctors for prime focus
- an adaptor with tv for acquisition and guiding
- a remote-controlled shutter and changer for 4 filters
- a remote-controlled changer for 8 plates (3 magazines); plate size is 240 × 240 mm.

For more details see *Messenger* No. 16.

4 cm McMullan Camera (W. Richter). Target date: October 1979.
- Electronographic camera as developed by McMullan. Can be used behind triplet adaptor in prime focus.

Coudé Echelle Scanner (CES) (D. Enard, J. Andersen [Copenhagen], A. Danks). Target date: mid 1980.
- instrument to record very high resolution digital spectra (up to 100,000) on a 1876-channel-DIGICON detector. Double-pass scanning mode permitting calibrations on bright objects with very clean instrumental profile.

For more details see *Messenger* Nr. 11.

Coudé Auxiliary Telescope (CAT) (T. Andersen, M. Dennefeld). Target date: mid 1980.
- 1.5 m spectroscopic telescope feeding CES of the 3.6 m telescope. Three-mirror alt-alt telescope with f/120 (f/32 after focal reducer). Dall-Kirkham optics with spherical secondary. Direct drive servos without gear.

For more details see *Messenger* No. 10.

Infrared Top-End (R. Grip, P. Salinari). Target date: mid 1980.
- Wobbling secondary mirror with f/35 in Cassegrain focus, new telescope top-ring which puts radiating material away from light beam.

For more details see *Messenger* Nr. 13.

Cassegrain Echelle Spectrograph (CASPEC) (M. le Luyer, J. Melnick). Target date: end 1980.
- Instrument with resolution of 15,000, 30,000 and 60,000 with an SEC-Vidicon detector. Data-reduction process not yet defined in detail.

  More details are published on page 27 in this *Messenger*.

Compared to the schedule which was published three months ago, the target date for the Triplet Adaptor has changed from before to after the holiday period.

NEWS and NOTES

The 100th Anniversary of the Birth of Bernhard Schmidt

Fig. 1: *Bernhard Schmidt (1879–1935).*

The inventor of the so-called "coma-free telescope" was born a hundred years ago, on March 30, 1879, as the son of a poor fisherman on the island of Nargen in the Baltic Sea near Reval in Estonia. Already as a child he experimented scientifically, and he lost his right arm, due to an explosion in his primitive laboratory.

In 1901 he registered as a student of engineering sciences at the Technical High School at Mittweida in Germany. Very soon, however, he gave up his regular studies and became independent as designer and constructor of small optical elements for amateurs. He, himself an outstanding amateur astronomer, is known as one of the first explorers of Nova Persei 1901.

Due to the high quality of his products and the deeply founded knowledge in practical optics, he soon (1904–1913) became an independent collaborator to the Astrophysical Observatory at Potsdam under K. Schwarzschild and later at the Hamburg Observatory at Bergedorf under R. Schorr.

During a long travel to the solar eclipse at Manila he accompanied W. Baade. Maybe inspired by him, he conceived the famous telescope, which in 1930 got its final shape in the "Original Hamburg Schmidt Telescope". This first Schmidt with a free aperture of 36 cm was a real optical sensation. With a hitherto unbelievable F ratio of 1 : 1.75 it covered a field of 15 degrees of diameter, completely free of all optical aberrations, except field curvature. Shortly after Bernhard Schmidt's sudden death in 1935 the Schmidt telescope started its triumphal procession throughout the astronomical world. There is a straight line from the Original Schmidt to the big Hamburg Schmidt and finally to the ESO-Schmidt telescope on La Silla.

On the occasion of his centenary the Hamburg Observatory, in cooperation with the Astronomische Gesellschaft, organized an international meeting of observers with modern Schmidt telescopes, showing the ever-growing importance of the Schmidt telescope as an instrument especially suitable for all kinds of sky surveys.

On March 30, 1979 a small Bernhard Schmidt Museum on the site of the Hamburg Observatory was inaugurated where a number of optical elements and tools made by his own hands have been collected. Most important of all, the original handwritten manuscripts, hitherto unknown, could be shown for the first time to the