

It will also probably be necessary to ask the Cape Observatory to repeat the photographs of the areas of the southern circumpolar region after a final adoption of their centres.

In addition to Carte-du-Ciel instruments, astrographs with a longer focal length in Moscow, Kiev, Bucharest and Shanghai (Zô-Sè) and also with a wide-angle camera (focal length 2.3m, focal-ratio 1/10, field 36 square degrees) in Moscow were used for photographing the galaxies. The observations with these instruments are considerably advanced, but the number of galaxies suitable for observation and the number of areas is naturally smaller. At the other observatories the estimates of galaxies in the adopted system of units are lower by unity than at Pulkovo. The estimates made for the Moscow wide-angle astrograph are lower by 0.5 units as compared with the Pulkovo Carte-du-Ciel astrograph. Nevertheless, with the addition of these observations it can be considered that the zone $+90^\circ$ to -25° is well provided for.

However, it is desirable that one more southern observatory with a Carte-du-Ciel astrograph participate in observations in the zone -5° to -25° . According to our plan the main task of astrographs of longer focal length is to photograph the fundamental KSZ stars for the reference of the KSZ catalogue to galaxies using background stars of the 13-14th magnitudes. The list of 240 fundamental stars in the zone $+90^\circ$ to -5° and 71 stars for the zone -5° to -25° has been completed and published. The observations of these stars have either been completed or are nearing completion. The stars are selected so that they are located close to the centres of the areas with galaxies and also fill up the "zone of avoidance" with about the same density, so as to make possible the connection of the galactic belt with regions where absolute proper motions are obtained by reference to galaxies. The astrographs in Bucharest and especially in Shanghai (the latitude $+31^\circ$ permitting photography to -35°) are of great value in this respect.

The list of the FKSZ stars in the zone -25° to -90° will be compiled as soon as the final co-ordinates of the centres of the areas with galaxies are adopted. I should like to request that observatories with Carte-du-Ciel astrographs and astrographs of long focal-length participate in the photography of areas with fundamental stars. It is necessary to take two plates of each area with an exposure of 20 minutes. An objective grating which gives diffraction companions fainter by four magnitudes than the central image, is required. At present it is possible to commence observations in the zone -5° to -25° , as so far only the Shanghai Observatory can photograph this zone completely.

8. THE LICK PROGRAM OF ABSOLUTE PROPER MOTIONS

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The determination of stellar proper motions with reference to galaxies was proposed by Wright (1, 2, 3, 4). The first-epoch plates were taken with the 20-inch Carnegie Astrograph by C. D. Shane and C. A. Wirtanen between 1947 and 1954. There are 1246 fields north of declination -23° ; each $6^\circ \times 6^\circ$ field is covered by a 17-inch square plate. Plates are centered 5° apart in declination and 5° or less in right ascension. An additional series of photographs down to -33° has been taken for counts of galaxies; these plates may also be considered for proper-motion purposes. Two exposures, of lengths two hours and one minute, through a coarse diffraction grating have been used for reference of bright stars to the frame of faint galaxies.

An automatic measuring engine (5) is under construction by the Gaertner Scientific Corporation, the project being sponsored by the National Science Foundation. It is expected that the machine will be installed in 1962. It is also expected that the Carnegie Astrograph will be equipped with a second, yellow-corrected, lens in 1962; this lens has been ordered from the Perkin-Elmer Corporation.

It is being planned to start the second-epoch photographs of the main (Wright's) program in 1967; the epoch-difference will be 20 years. Plates both in blue and yellow will be taken simultaneously. Since the measuring engine will contain a photometer, it is being planned to determine proper motions, magnitudes and colors of stars measured. Stars within a range of magnitudes 6 to 18 can be selected for measurement. If only first-order spectra of grating images are measured, the range is not continuous because of overlaps between the spectrum and the central image (6). Investigations of the accuracy to be expected have shown, however, that the second-order spectra can be measured without any appreciable loss of precision (7), and that any star can be measured within the magnitude range mentioned. The expected probable error of a proper motion is of the order of $\pm 0''.005$ (7, 8).

Selection of stars to be measured is the most important topic to be considered before the start of the second epoch. At least 50 galaxies per plate will be chosen for reference outside the zone of avoidance; this number may be increased if necessary. Stars to be selected can be grouped as follows:

1. AG stars for comparison with proper motions based on a fundamental system, for determination of correction to the precession constant and for investigation of the systematic errors of star catalogues.
2. A certain number of stars, two or more per square degree, with a nearly uniform distribution in positions, magnitudes, and colors for general statistical investigations. An additional number of stars will be selected in areas of particular significance, *e.g.* in low galactic latitudes, faint stars in vicinity of galactic poles, etc.
3. Reference stars for other Lick programs.
4. Special types of stars (variables and others), selection of which needs careful consideration and has to be done in co-operation with representatives of various fields of astronomy. Therefore an invitation is hereby extended to submit suggestions, proposals and lists of stars in this group. It is intended to prepare a detailed list of stars for inclusion in the program for the time of the 12th General Assembly of IAU in 1964, when the selection can be discussed.

REFERENCES

1. Wright, W. H. *Proc. Am. Phil. Soc.* **94**, 1, 1950.
2. Vasilevskis, S. *A.J.* **59**, 40, 1954.
3. Vasilevskis, S. *A.J.* **62**, 126, 1957.
4. Vasilevskis, S. *A.J.* **65**, 207, 1960.
5. Vasilevskis, S. *A.J.* **65**, 208, 1960.
6. Vasilevskis, S. *A.J.* **58**, 126, 1953.
7. Vasilevskis, S. *A.J.* **62**, 113, 1957.
8. Shane, C. D. and Vasilevskis, S. *Trans. IAU* **8**, 794, 1954.