

## THE YALE - COLUMBIA SOUTHERN PROPER MOTION PROGRAM

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This program is the southern counterpart of the well-known Lick proper motion program. These programs are almost identical in design and execution, their chief feature being the use of faint extragalactic nebulae and QSO's as stationary reference objects.

The Lick program has been described by S. Vasilevskis on various occasions; it serves as an example to the Yale-Columbia work.

The southern proper motion program was initiated by D. Brouwer and J. Schilt as a joint enterprise of the Yale and Columbia Universities and is supported by the National Science Foundation.

The telescope, a double astrograph, is located at El Leoncito, a remote place in the Western Andes in Argentina. Observing of the first epoch plates was begun vigorously only in 1966 with A. Klemola as the first observer. A. G. Samuels took over from Klemola in the middle of 1967 and is still continuing.

The objective gratings and the two exposures of different duration both serve to give proper motions for stars between  $6^m$  and  $18^m$  essentially free of magnitude error.

The Figure indicates the progress made to date in the observing of the first epoch plates for the different zones of declination.

Program II intends to overlap with the Lick program, which extends to  $-23^\circ$ , but very little observing on II has been done to date.

### DISCUSSION

Vasilevskis: I have a few comments. I would like to correct Wesselink's statement that the telescope is similar to Lick. It is much better optically, and much poorer mechanically. But it is also maybe about the same. This is, of course, the reason for your trouble with polar fields. The second thing is that I believe that your yellow lens is better than your blue lens. When you focus, as we have done, with the blue lens according to the table, we always get blue pictures that are pretty good. But this is not the case with the yellow lens. Sometimes you see that they are quite poor images. And, so we quite recently introduced knife-edge focusing for the yellow lens. And the yellow lens is so excellent that to my amazement you can focus to 0.05 mm. The telescope has 3.7 meters focal length, and you can certainly notice that you cannot be off more than 0.1 mm in focus setting if you use a knife-edge. Since we started to focus with a knife-edge, all yellow plates have been excellent. Our yellow plates are as good as even — well Lick might be below the 48-inch Schmidt, but there is not very much difference. Therefore, they are poor for photometry because the images are too small

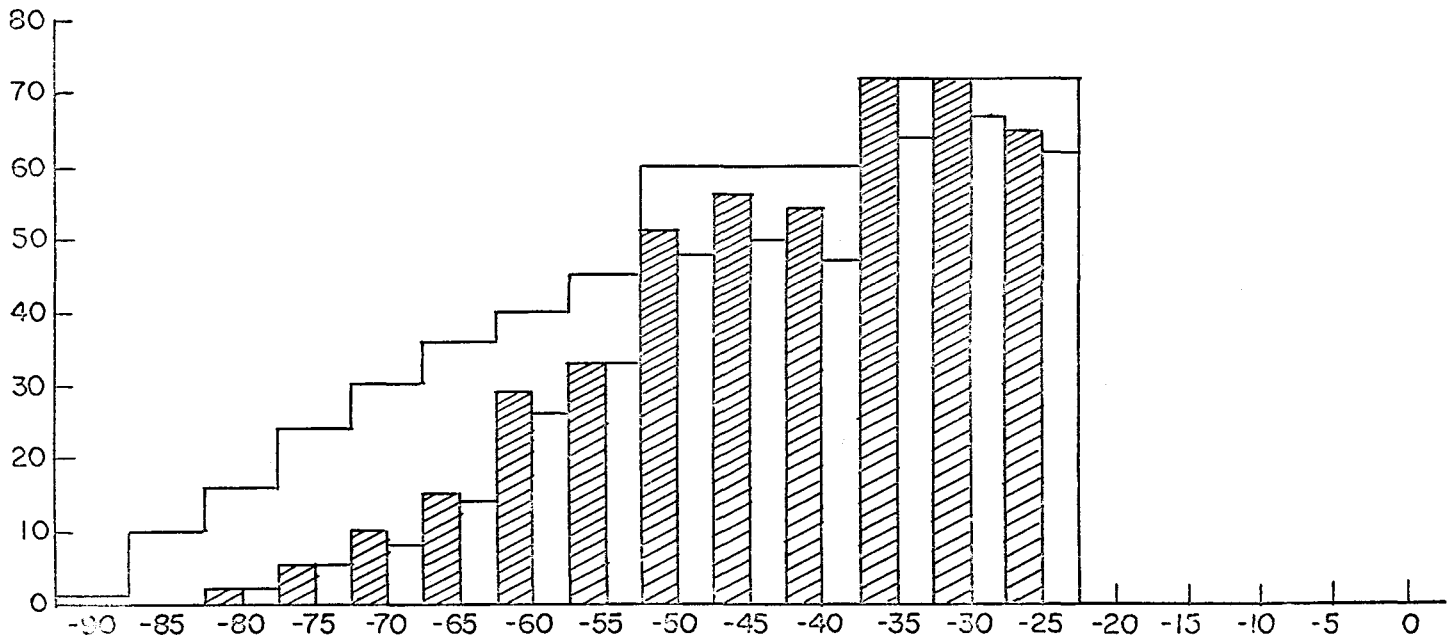
and sharp. And since your telescope is a duplicate of ours; therefore, I think this might be the reason. I would suggest that you use knife-edge focusing.

The second thing that I would like to suggest, is that, since you have not yet taken the overlap with Lick, could we finally agree that you would tell us when you are taking particular fields and we will, within a few days, do the same. This would be extremely important, because then both plates, and both proper motions involved, can be compared directly and we can see the relationship between yours and ours. I would like this also to go into the record because I hope this would be done.

Finally, I would like to offer one suggestion made by Klemola, just before I came here. After we went through this data, and since he is quite familiar, as you know, with the southern programs, he suggests very strongly that you do not wait as long as we did for the second epoch. Because you are taking plates with two lenses and your blue lens is much better than our blue lens. While your yellow lens, I am convinced, is as good as our yellow lens. Therefore, you have much higher weight for each epoch because you have both colors, and excellent photographs. Therefore there is a good chance that very significant results may be obtained within ten years, thus cutting the waiting time into half. Also our program will suffer and is suffering as long as you do not have your results.

Wesselink: Did you say ten years?

Vasilevskis: Yes, I think in ten years it will be quite feasible to begin repeating the plates.



Table

Details of Telescope and Program

	blue	yellow
aperture of refractors	20 inch	20 inch
mean effective wavelength	4300 Å	5550 Å
mean scale 1 mm =	55"036	55"136
size of plates	17" x 17"	
size of plates	6:3 x 6:3	
designer of optics	R. H. Baker	
manufacturer of optics	Perkin Elmer	
designer mechanical parts	B. Hooghoudt	
manufacturer mechanical parts	Rademakers	
distance adjacent declination zones:	five degrees	
distance between centers of adjacent fields within same zone	five degrees	
plate overlap	one degree or more	
difference in magnitude between central image and first order images due to objective grating	3.5 magnitude	
Exposure times of two exposures on same plate:	two hours and two minutes	
limiting magnitude long exposure blue:	19 <sup>m</sup>	
limiting magnitude long exposure yellow:	18 <sup>m</sup>	
expected accuracy of annual proper motions in 20 years	±0"005	
Program I: zone -25° and further south including -90°		
Program II: zone -20° and further north including the zone of 0° declination		
total number of fields program I:	598	
total number of fields program II:	360	
Total	958	
Total number of acceptable plates so far obtained (31 December, 1969)		
Program I: blue: 464; percentage of I:	78%	
yellow: 426; percentage of I:	71%	
percentage of plates obtained of entire program (I and II)		
blue: 48%		
yellow: 44%		