Comparison between the magnitudes of the Yale Zone Catalogue and the Harvard Photographic Photometry

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Comparison between the magnitudes of the Yale Zone Catalogue and the Harvard Photographic Photometry, by *P. Th. Oosterhoff.*

SCHILT's magnitudes of the *Yale Zone Catalogue* between + 57°.5 and + 60° have been compared with the H.P.P. The zeropoint differences show rapid and irregular variations with a range of about $^{m}.75$. It is not known which part should be attributed to each catalogue. Scale and colour conception seem to be practically equal.

In *Harvard Bulletin* No. 902 C. PAYNE GAPOSCHKIN and S. GAPOSCHKIN have compared the magnitudes of the *Yale Zone Catalogue* between + 20° and + 25° with the *Harvard Photographic Photometry* [1]). They have derived the following relation:

$$H - Y = +.02\,(Y - 7.7) - .05$$

and they state that there exists no appreciable colour equation between the two photometries. They have also divided the material into twenty-four groups according to right ascension and found considerable differences in zeropoint from group to group. It proved however difficult to represent these differences as a function of the right ascension and the authors have regarded them as accidental, the mean error of a one-hour group being ± .15.

A similar comparison can be made for the zone from + 57°.5 to + 60° between SCHILT's magnitudes [2]) and the H.P.P. [3]). The results are presented in this note. With the omission of all double stars and of those stars the magnitudes of which are given to one decimal only there are 296 stars common to both catalogues. The differences H—S show a conspicuous variation with the right ascension, although also in this case it is hardly possible to represent the variation by a smooth function of the right ascension. It seems to be very irregular and sometimes very rapid. As an illustration we give here the mean differences for three intervals in right ascension:

$10^h00^m - 11^h00^m$	+ .17	± .04	(7)
22 00 — 22 30	— .56	± .02	(10)
22 30 — 23 00	— .22	± .03	(13)

The first two values are rather extreme, the mean difference for all stars being — .11. The question remains still open whether these zeropoint errors must be attributed to one of the two catalogues or to both. The H.P.P. magnitudes consist in this zone of magnitudes derived by I. LEHMANN BALANOWSKAJA [4]), which were reduced to the international system by C. PAYNE GAPOSCHKIN [1]), who applied a zeropoint correction depending on α. SCHILT's magnitudes have been analysed by S. J. HILL [2]), who concludes that they are reasonably free from systematic errors. No definite statement about these zeropoint corrections can therefore be made as yet.

In view of the irregularity of the zeropoint differences no corrections have been applied, which renders the determination of a scale and colour coefficient very uncertain. Dividing the material into six groups according to spectral type we obtain the following mean values of (H—S):

O —B4	— .14	13
B5 —A4	— .14	87
A5 —F4	— .09	35
F5 —G4	— .01	31
G5 —K4	— .12	108
K5 —M	— .15	21

From these figures it is clear that the colour equation is of no importance, which confirms the fact that SCHILT derived small colour coefficients relative to the magnitudes of SEARES and DE SITTER for some Polar stars.

Finally the stars were arranged according to their brightness with the following result:

H + S	$\overline{H-S}$	n
< 10	— .10	3
10—11	— .16	9
11—12	— .23	10
12—13	— .07	29
13—14	— .04	39
14—15	— .12	45
15—16	— .10	75
16—17	— .13	58
17—18	— .22	26
18—19	— .43	2

The two scales seem therefore to be practically equal, the only serious discordance between the two catalogues being the above mentioned zeropoint differences.

1) For some corrections see: *B.A.N.* No. 358, 429, 1943.
2) *Contr. Rutherford Obs.* No. 30, 1937.
3) *Harvard Mimeogr. Ser.* 1, No. 1, 1933.
4) *Poulkovo Bull.* **13**, No. 2, 1932.

1) *H.B.* No. 892, 6, 1933.
2) *A.J.* **50**, No. 3, 1942. Not yet received at the Leiden Observatory.

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