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Systematic errors in the „Durchmusterung of Selected Areas", by *A. Pannekoek.*

The Durchmusterung of Selected Areas made at the Kapteyn Laboratory in Groningen, by its high quality shall for the next time afford the best basis in researches on the distribution of stars in the universe. Its magnitudes are derived from the diameters of the star images, which are estimated in parts of the scale of declination, each division (of 10″) being counted as 10 units. Below a certain value the diameters do not decrease any more, but the blackness of the images decreases to invisibility. The observer has taken the habit of simply continuing the scale through this value to zero, the numbers at first denoting diameters, then degrees of blackness. These units are afterwards reduced to magnitudes by regular curves, derived by means of series of photometric magnitudes of comparison stars.

Of course we cannot be sure that a subjective scale of units formed in this way by estimates of varying nature will be homogeneous and strictly proportional to magnitude. But for a very experienced observer, as Mr. DE VRIES, who had already made the whole measuring work of the Cape Photographic Durchmusterung, we may expect, that his subjective scale has acquired a great constancy. Personal errors, as a rule, are small, but variable, for inexperienced observers, while with greater experience they become often large but constant, and may be determined with great exactness. I have tried to find the systematic errors of the scale of estimates in the S. A. by supposing that in each area the increase of the number of stars follows the same simple law. As the same diameter (scale value) in different areas corresponds to very different magnitudes, any error in this adopted law is eliminated in the mean.

From the results of VAN RHIJN simple quadratic formulae, whose coefficients vary regularly with b, were adopted for log $A(m)$ in each zone of 10° latitude; for each area a deviation in the constant of the formula was admitted; with these formulae the numbers counted pro half magnitude (for the greater part communicated to me by VAN RHIJN) were compared, and the deviation in log A was ascribed to the mean d corresponding to this magnitude after Table XII of the Introduction. Using all the Selected Areas 1–115, we find the averages given in the following table, where n denotes the number of deviations used.

d	Dev. of log.	n	Range
0.0–0.4	−0.110	14	(0.388)
0.5–0.9	− 001	41	.499
1.0–1.4	+ 082	49	604
1.5–1.9	+ 058	62	572
2.0–2.4	+ 040	41	548
2.5–2.9	+ 036	50	543
3.0–3.4	− 016	46	482
3.5–3.9	− 064	54	432
4.0–4.4	− 047	39	449
4.5–4.9	− 084	49	412
5.0–5.4	− 031	46	466
5.5–5.9	− 011	40	488
6.0–6.4	− 001	44	499
6.5–6.9	− 033	47	463
7.0–7.4	− 053	39	443
7.5–7.9	+ 004	39	505
8.0–8.4	+ 005	52	506
8.5–8.9	+ 004	28	505
9.0–9.4	+ 039	40	547
9.5–9.9	+ 059	43	573

Correction
+0.06 for 0
− 05
− 05 „ 1
+ 05
+ 13 „ 2
+ 17
+ 22 „ 3
+ 20
+ 13 „ 4
+ 08
− 01 „ 5
− 04
− 05 „ 6
− 05
− 09 „ 7
− 15
− 14 „ 8
− 14
− 14 „ 9
− 10
− 02 „ 10

As the differences between the single values and their means give a m. e. of one deviation of ± 0.12,