THE DIFFERENTIAL LEUCOCYTE COUNT IN MONGOLS.

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TURPIN AND BERNYER (1947), working on the influence of heredity on the Arneth count (Cooke and Ponder's (1927) modification), found that in mongols it was shifted to the left, i.e., that their polymorphonuclears had fewer lobes and were therefore more immature.

These results were very interesting, and it was decided to repeat the experiment and at the same time investigate the differential counts in these patients.

Method.—Blood smears were taken from a group of ten mongols and ten control mentally defective cases, all adult females. The presence of infection was excluded clinically in both groups.

As the lobulation is frequently irregular, particularly in the young polymorphs, it is often difficult to decide whether the filament of chromatin joining the lobes is thin enough for the nuclear material to be considered as completely divided. This ultimately depends on personal judgment, and it was therefore decided that a control group should be examined at the same time. To diminish the personal factor still further the counts were done " blind," and it was not known to which group the smears belonged until the differential counts had been computed.

In order to keep all the factors as constant as possible the control group was matched for age with the mongols, but otherwise was a random sample of mentally defective patients at the Colony. Their figures are given in the table. All the smears were taken just before lunch at 11.45, some five hours after breakfast, to keep the alimentary leucocytosis in the same phase.

McGregor, Richards and Loh (1940) have shown that differential counts vary according to the area of the smear examined. To allow for this error a standard method of carrying out the count was adopted. This consisted in counting horizontally across a $\frac{7}{8}$-in. square coverslip along both edges of the smear, and working horizontally inwards towards the centre.

It was found that although the type of cells found did vary with the area of the smear, small lymphocytes being much more numerous towards the centre, there appeared to be no definite variation in the maturity of the polymorphonuclear cells in the different parts of the smear.

Approximately 500 cells were counted on each smear to increase the validity of individual counts. This gave the number of polymorphonuclear cells counted as about 250, their exact number depending of course on the percentage of polymorphonuclears in the total count. This is well in excess of the standard method devised by Cooke and used by Turpin and Bernyer, when only 100

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polymorphonuclear cells are counted. Turpin and Bernyer used an index of shift to record their results. This was obtained by neglecting the number of cells with three lobes, and by multiplying two lobed cells by -1, and one lobed cells by -2 and by multiplying the four and five lobed cells by 1 and 2 respectively. The average lobulation may be calculated from the index by

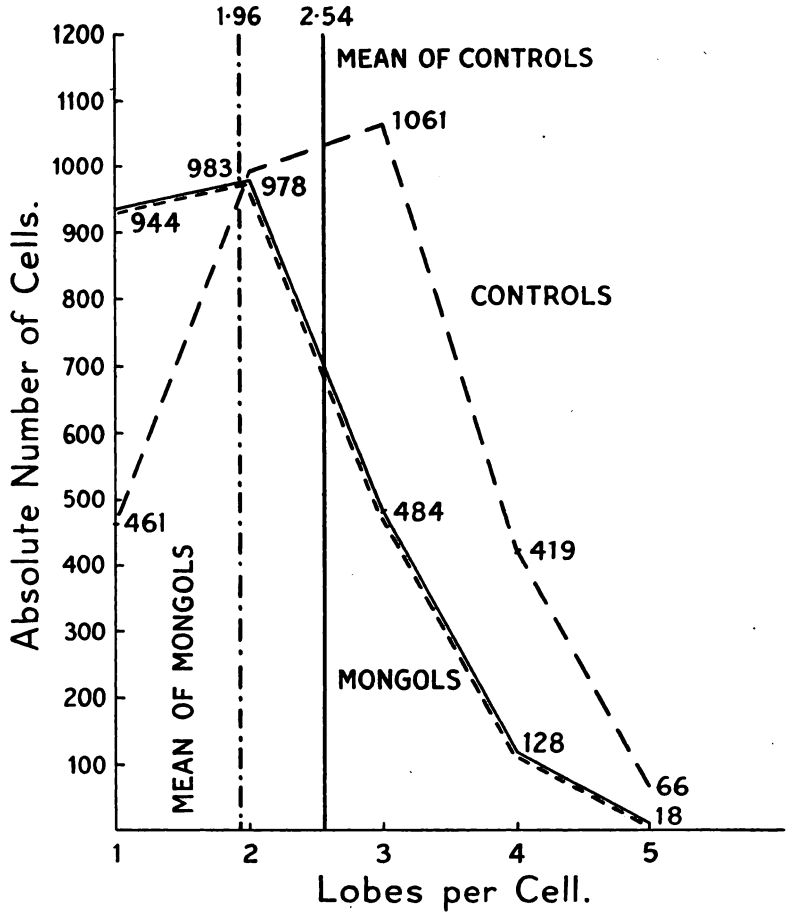


FIG. 1.—Showing the total numbers of the differently lobed polymorphonuclears in the mongol and control groups. All counts have been adjusted to 500 leucocytes. Figures on the graph give the exact values.

dividing the index by 100 and subtracting the result from 3. It was considered that working with the average lobulation was a simpler and a more direct method, which moreover did not assume the mean to be artificially located at three lobes, and the index was therefore not used.

The appended table gives details of all the counts. The figures show that the average number of lobes per polymorphonuclear cell was $1{\cdot}93 \pm 0{\cdot}2339$ for the mongols and $2{\cdot}54 \pm 0{\cdot}1613$ for the controls.

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Table Comparing the Means of the Two Groups and their Statistical Significance.

Cells.	Mongols.		Controls.			
	Mean.	σ.	Mean.	σ.	t.	p.
Polymorphs	51·2	8·9	59·2	6·8	2·25	·02–·05
,, lobe count	1·96	0·23	2·54	0·16	6·45	$<10^{-8}$
Lymphocytes	35·9	8·5	29·3	7·3	1·75	—
Eosinophils	2	3·1	1·7	1·8	—	—
Basophils	1·6	2·4	0·6	0·4	—	—
Monocytes	9·3	3·2	8·8	4·1	0·3	>0·1

The difference between the means is significant, the value of "t," the critical ratio, being 6·45. This means that the probability of the difference being due to chance is very much less than 10^{-3}.

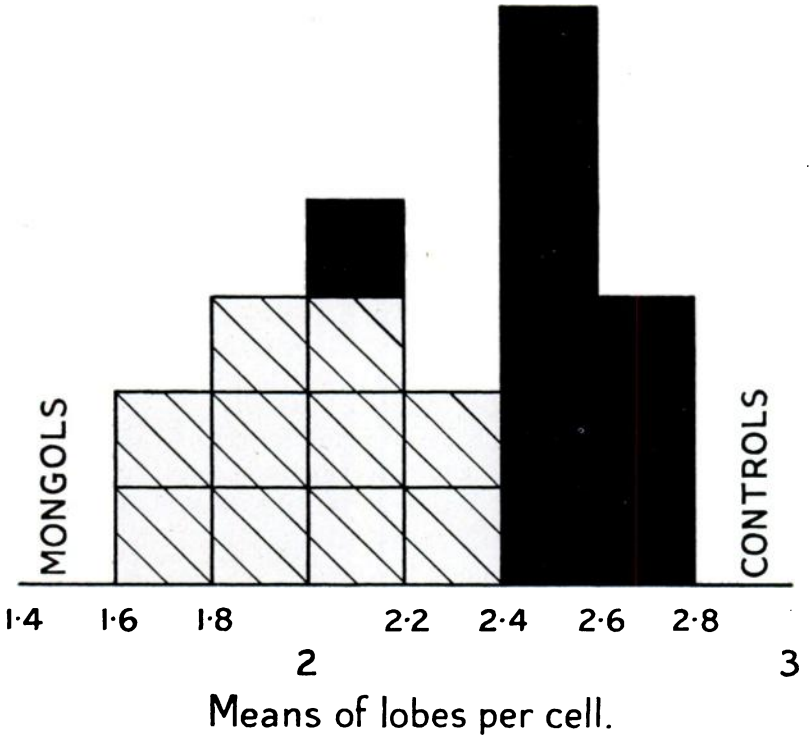


Fig. 2.—Histogram showing the distribution of mean lobulation of polymorphonuclear cells.

The results of the rest of the differential count are much less significant than the polymorphonuclear count. The slight lowering of the polymorphonuclear percentage has a critical ratio ("t") of 2·25, that is, a probability of less than ·05 but greater than 0·02 of the two samples being drawn from the same universe.

The lymphocyte counts do not differ significantly, and there is too much

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variation in the counts of the eosinophils, basophils and monocytes for any conclusion to be drawn from them. The apparently greater variability in the percentage of most of the cells of the mongolians is not statistically significant.

Discussion.

As far as could be ascertained there are no reports in the literature on the polynuclear count of mongols except the one by Turpin and Bernyer already quoted.

The reasons for the marked shift to the left are unknown. The counts have been shown to be constant in individuals and subject to hereditary influences (Turpin, Piton and Caratzali, 1939 and 1941). They are known also to vary with the climate, shifts to the left having been observed in Europeans and indigenous inhabitants in Iraq, Egypt, Malaya and China. As the shift to the left usually disappears on return to temperate climate (Whitby and Britton, 1946), it is probable that its causation is a metabolic one. Speculation without further knowledge of the mechanisms involved would be, it is felt, rather profitless, and the finding is presented merely as a contribution to the general clinical picture of mongolism. This finding may be of use in investigating the heredity of mongolism, should this characteristic prove to be due to parallel causes produced by the same genetic make-up, and not a consequence of the final physical configuration. It is hoped to make this problem the subject of a further communication.

Two further points merit mention. It will be noted that all the controls form a distinct group, which does not overlap the mongol group except for the one case of athetosis among the controls.

The shift to the left in this case proved to be fairly constant on retesting, and she was free from any infection. The results merit a further study of these cases.

Secondly, one of the mongols has over 10 per cent. of eosinophils. This eosinophilia has been reported before by Manitz (1932), who found 17 per cent. of his 27 cases to have eosinophilia, and there was a count of 21 per cent. and 13 per cent. among the cases. The reason for this phenomenon is also obscure.

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