Pollen mother cells of treated plants and controls were prepared by the usual acetocarmine smear technique, the preparations being made permanent by mounting in diaphane. Many clear irregularities were observed, these being most frequent in the tetraploid durum wheat and the hexaploid aestivum (vulgare) wheat. Both concentrations of activity induced rearrangements. No clear-cut aberration was detected in barley, and only one of the heads of Einkorn wheat gave evidence of chromosome breakage and rearrangement.

In 22 anthers configurations characteristic of particular rearrangements were repeated in several or many cells; anthers from several spikelets of one head all had the same chromosome rearrangment. The chromosome breakage must have occurred some divisions before formation of pollen mother cells and spikelets, respectively.

TABLE 1

NUMBER OF POLLEN MOTHER CELLS HAVING VISIBLE CHROMOSOME ABERRATIONS FOLLOWING SEED AND SEEDLING ABSORPTION OF RADIOACTIVE PHOSPHORUS

Species	Micro-curies of P^{32}	Total no. of cells examined	No. of visibly aberrant cells	No. of different chromo-some rearrange-ments*
Triticum monococcum	.018	107	26	1
	.18	112	0	0
	0	65	0	0
Triticum durum	.018	90	8	1
	.18	172	30	4
	0	54	0	0
Triticum aestivum	.018	48	6	1
	.18	216	21	4
	0	73	0	0
Hordeum distichon	.018	72	0	0
	.18	115	0	0
	0	164	0	0

* Aberrant cells occurring singly among normal cells are not recorded in this table.

Aberrations observed in division I included chromosome fragments, chains of three or four chromosomes, rings of four, and unequal pairs. The occurrence of inversion was indicated by anaphase bridges and fragments. In division II, anaphase and telophase bridges and fragments were sometimes encountered. A summary of the treatments given and the principal observations made is provided in Table 1. Aberrations are recorded in the table only if they appeared in more than one cell of an anther. Cells with fragments or configurations indicating translocation, inversion, or deficiency also occurred singly among normal cells, however.

Of 19 anthers examined from Thatcher wheat plants grown in soil to which radioactive phosphorus had been added in the form of a phosphate fertilizer (*3*), three had aberrations involving blocks or clusters of cells. A sunflower head injected with 1.8 microcuries of P^{32} yielded pollen mother cells 11 days later. Of these three (out of 45 examined) had anaphase-1 bridges.

More complete reports of this work will be published elsewhere.

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The Electric Charge of Red Blood Cells in Malaria[1]

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In a parasitic infection such as malaria, in which the relationship of the red blood cells and the parasites is so vitally important, the electrokinetic charges on the surfaces of the red cells and parasites may be of considerable importance in such aspects of the infection as the immunity, the effect of drugs, and the specificity of infections. Since it has been shown that such processes as agglutination (*7*), phagocytosis (*6*), and inflammation (*1*) are correlated with changes of the surface charge, it seems very likely that the charge on the cells may be involved in the penetration of the red cell by a malaria parasite. The reduction of the cell charge by specific agglutinins and opsonins is not without parallel in an infection of malaria. Though these antibodies are in most cases very difficult or impossible of demonstration in malaria, the importance of phagocytosis is probably not greater in any other infection. Consequently, the demonstration by Brown (*3*) that the charge on the red cells in malaria is reduced needs further investigation.

The initial work on electrophoresis in malaria carried out by Brown (*3*, *4*) and by Findlay and Brown (*5*) demonstrated that the electrokinetic charge on the red cell is reduced during the patent period of the infection, and the condition persisted for days after the parasites disappeared from the blood. Brown (*4*) observed no difference in the migration rates of infected and non-infected cells of infected canaries. Findlay and Brown found a distinct correlation between the 'cataphoretic velocity' of the red cells and the size of the spleen, and the number of splenic macrophages containing parasites. As the migration rate of the red cells decreased, the number of macrophages and the size of the spleen increased. Brown's experiments (*3*) indicate that the factor or factors responsible for the reduction in the cell charge are to be found in the serum (plasma). He found that cells of an immune bird suspended in the serum of a normal bird migrated at the same rate as normal cells, and that cells from a normal bird suspended in immune serum migrated at the same reduced rate as cells from an immune bird.

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Using the Abramson (*2*) electrophoresis cell, determinations have been made on the red blood cells of normal pigeons and pigeons infected with *Plasmodium relictum*. The cells were suspended in a buffer-glucose solution at pH 7.5, and the technique used was that developed by Abramson (*2*). The mean electrophoretic mobility of red cells of normal pigeons has been found to be 1.41 μ/sec/v/cm² in the above medium. In infected birds the migration rate of the red cells gradually decreases as the infection increases, and, following the peak in parasite number and the reduction of the parasite count, the rate decreases rapidly. At the time at which the parasite count has been reduced to zero, the mobility of the red cells is found to range between 1.15 and 1.25 μ/sec. On the first or second day following the termination of the infection, the rate increases very slightly and fluctuates about this new value for several weeks. In Fig. 1 is shown the daily parasite count and the electrophoretic mobility of the red cells of one of the infected birds, together with the mobility of the cells of a normal pigeon. In a few cases, the rates of the cells of birds with latent infections have been found to be greater than the lowest rates for normal birds, but in most cases they range well below the 'normal' values. Determinations were made on the cells of one bird 329 days following infection. The average mobility of the cells of this bird was 1.24 μ/sec.

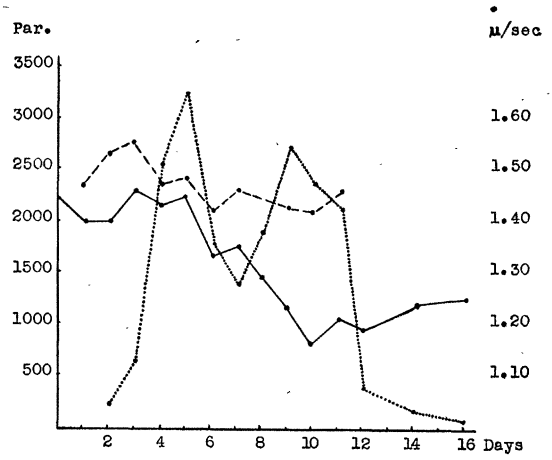

FIG. 1. Electrophoretic mobility of red blood cells from normal and infected birds.
-- Normal bird. ———— Infected bird. ..... Parasites/10,000 R.B.C.

Brown found that cells containing parasites migrated at the same rate as noninfected cells. The pigeon erythrocytes containing parasites are observed to migrate at a much slower rate than uninfected cells from the same bird. The difference in the rates of the two cells is very noticeable. The uninfected cells can be observed to approach and pass those containing parasites. On reversing the current, the uninfected cells again pass the infected cells. The corresponding rates for infected and uninfected cells are shown in Table 1. In general, the infected cells are much slower during the period of decline in parasite numbers than during the first few days when the parasites are increasing in number. Occasionally, parasitized cells have been observed to migrate at the same rate as uninfected cells. These cells almost invariably contain small parasites. Other infected cells in the same suspension which contained larger and more mature parasites were seen to migrate at a much slower rate. However, not all small parasites were observed to migrate with the uninfected cells.

TABLE 1

ELECTROPHORETIC MOBILITIES OF RED BLOOD CELLS CONTAINING PARASITES AND OF UNINFECTED CELLS FROM INFECTED BIRDS

Infected (μ/sec)	Uninfected (μ/sec)
1.08	1.31
0.88	1.35
0.80	1.21
1.08	1.26
0.82	1.18
0.77	1.22
1.11	1.20
1.04	1.21
0.94	1.30
1.09	1.32
0.85	1.29
1.04	1.27
1.05	1.35
0.89	1.09
0.86	1.19
1.01	1.21
0.74	1.13
1.04	1.29
0.80	1.22
1.09	1.26

These results show that in pigeons infected with *P. relictum* the electrokinetic charge of the red blood cells is reduced. The demonstration that the charge on the cells containing parasites is much less than that on uninfected cells of the same bird indicates that this condition may be a factor in reduction of the parasite number. The fact that the reduced charge is found to persist during the latent condition may still further indicate this possibility. The permeability of the red cell membrane may be altered by the change in the surface charge. This would undoubtedly affect the respiration and metabolism of the parasite. Further investigations are being made into this aspect of the problem with respect to the method of action of antimalarial drugs.

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