(or by convenient multiples), and the F's are brought to negligible values ('liquidated') by operations which have nothing in common with 'scanning', and are *not* performed in an iterative sequence.

It was on this account (I suppose) that Prof. H. W. Emmons wrote in the *Quarterly of Applied Mathematics* (October 1944): "In fact, for the computer (as opposed to those who think only about the logic behind the computation methods) the relaxation method has a spirit lacking entirely from the iteration process. The former challenges one's intellect at each step to make the best possible guess, while the latter reduces one to the status of an automatic computing machine." Working throughout in terms of F's, not f's, a computer is *not* compelled to "alter the value of f only at one point at a time"; nor, when he does so, does he make that alteration (usually) what is given by choosing f_P so as to make $F_P = 0$. That rule, as Prof. Temple shows, defines the best way of altering f_P in a single operation; but economy of time demands the minimum number of operations, and from this point of view the rule can usually be bettered. Herein lies the 'challenge' to the computer.

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Economy in space compelled me to focus attention on the most fundamental and elementary process of the 'squares' method, and I could only indicate briefly in the concluding paragraph the higher flights of relaxation technique.

Readers of *Nature* will be grateful for Dr. Southwell's fuller statement of the principles and the spirit of this method.

G. Temple

Effect of Mono- and Divalent Salts on Red Blood Cells

Greville and Lehmann[1] reported that less hæmolysis occurred when human blood was stored with $M/7$ magnesium chloride as an anticoagulant than if isotonic sodium citrate was used. We have investigated this phenomenon for several reasons, one of which was its possible practical bearing on the storage of sheep blood corpuscles used for the Wassermann reaction in the diagnosis of syphilis.

Fragility Tests. When fragility tests are performed on human blood cells, it can be seen that the osmotic pressure of divalent salts, such as magnesium and calcium chloride and magnesium and sodium sulphate, is about twice that of sodium or potassium chloride (Table 1).

The cells were obtained from citrated blood, washed in the corresponding salt solution and centrifuged. When stored, they were kept at + 4° C. in $M/7$ salt solution in a concentration of 4,000,000 cells per c.mm. For the fragility test, packed cells were suspended to give a concentration of 100,000 cells per c.mm. in 3 ml. of salt solutions diminishing in concentration by 1 per cent of $M/7$ from sample to sample. The highest concentration at which complete hæmolysis was seen was noted after the tubes with the cell suspensions had been allowed to stand for 2 hours at + 4° C.

Table 1. Highest salt concentrations at which human red blood cells are completely hæmolysed. Two typical experiments. Concentrations of salt solutions tested diminishing by 1 per cent of $M/7$

Experiment	KCl	NaCl	$MgCl_2$	$CaCl_2$	Na_2SO_4	$MgSO_4$
A	$M/24$	$M/23$	$M/46$	$M/44$	$M/46$	$M/50$
B	$M/26$	$M/25$	$M/58$	$M/50$	$M/48$	$M/46$

Storage of cells in solutions of divalent salts was seen to alter the properties of the cell surface. Compared with $M/7$ sodium chloride, in $M/7$ magnesium or calcium chloride red blood cells became more brittle. They were more easily destroyed by mechanical trauma such as centrifuging, but, at the same time, they became more resistant in hypotonic salt solutions. A similar observation was made by Aub *et al.*[2] when they treated red cells with small quantities of lead. The phenomenon can be observed particularly well in sheep cells, which due to a slight difference in shape from human cells are more easily broken up in hypotonic solutions.

Table 2. Highest concentrations of sodium chloride at which sheep red blood cells are completely hæmolysed after previous storage in $M/7$ solutions of sodium and magnesium chloride

Storage	None	2 days		9 days		16 days	
Salt used for storage	—	NaCl	$MgCl_2$	NaCl	$MgCl_2$	NaCl	$MgCl_2$
Highest NaCl concentration showing complete hæmolysis	$M/14$	$M/13$	$M/17$	$M/13$	$M/28$	$M/14$	$M/39$

It will be seen from Table 2 that the highest concentration of sodium chloride at which sheep red blood cells were completely hæmolysed was the same whether the cells were tested immediately after they were obtained, or whether they had been stored in $M/7$ sodium chloride; storage in $M/7$ magnesium chloride, however, increased the resistance against hypotonic sodium chloride solutions, and the 'toughening' of the cell membrane became more noticeable the longer the storage.

Sensitivity to Hæmolysin. When sheep cells were hæmolysed by antibodies from sensitized rabbits, there was no difference seen when the corpuscles used were stored in $M/7$ sodium or magnesium chloride. The extent of hæmolysis was varied by the addition of various amounts of complement (Wassermann reaction), but the degrees of lysis were the same however long and in whatever isomolecular salt solution the corpuscles had previously been stored (sixty-four experiments).

Table 3. Average mean corpuscular volumes of ten samples of human red blood cells suspended in various salt solutions

Average mean corpuscular volume in plasma: 86 ± 8 cubic μ.

Salt concentration		KCl	NaCl	$MgCl_2$	$CaCl_2$
$M/7$	cubic μ	101 ± 5	105 ± 6	80 ± 15	77 ± 20
$M/14$	cubic μ	124 ± 4	131 ± 6	107 ± 5	104 ± 6

Corpuscular Volume Measurements. Table 3 shows the average of the mean corpuscular volumes found when ten different samples of human red cells were suspended in solutions of potassium and sodium chloride and of magnesium and calcium chloride respectively. Sodium and magnesium sulphate could not be tested as they rendered the cells so brittle that they were destroyed during the centrifuging necessary for the determination of the packed cell volume, and deteriorated even when shaken in the diluting pipette prior to transfer to the counting chamber.