the sensation of continuity, to fix one's attention of a single cell, and to take the time between the moment when it first begins to fade and the time when it appears a mere shadow with a pigment concentration about 10% of the initial. Since the footage which passes through the camera as the film is being made and also the footage which passes through the machine as the film is being observed are known, one can arrive at a very good idea of the time which the cell takes to haemolyse, and the fact that the machine can be reversed so as to give the appearance of the shadows regaining haemoglobin makes the observations all the more accurate.

Observations made in this way show that the loss of pigment is quite a slow process, occupying from 2 to 6 sec. This is very much slower than would correspond to the haemoglobin diffusing generally across a completely permeable membrane (*i. e.,* through water). There is no visual evidence that it leaves through a rent or hole, and, although the slow rate is consistent with this mode of escape, it is equally consistent with the pigment's leaving by diffusion across an injured membrane which permits less free diffusion than does water.

The second method of dealing with the film is to carry out densitometry on the film-images in every fourth frame, so as to determine the amount of pigment in the cells at intervals of 0.25 sec. This is a highly technical procedure. It is sufficient to say that the rate of loss of pigment from the individual cell is such as might be expected if the loss were roughly represented by an exponential function. The results, which are of little interest apart from their mathematical treatment, and also results (very similar in kind) obtained when other lysins and types of cell are used, will be reported elsewhere.

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Quantitative Nature of the Red Cell Response to a Single Bleeding.

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In the course of experiments designed to test for the presence of an erythrocytogenic hormone in the serum of rabbits subjected to bleedings,[1] a close correspondence between the number of red cells and reticulocytes of several control animals during the recovery

[1] Gordon, A. S., and Dubin, M., *Am. J. Physiol.*, in press.

period was observed. These control rabbits were bled a certain percentage of their body weight by cardiac puncture, and red cell and reticulocyte counts made daily for approximately 2 weeks following the bleeding. Because considerable discrepancy was found between counts made on successive samples taken from the ear veins, the red cells and reticulocytes were counted in samples drawn from the heart. Care must be taken that the heart punctures are made cleanly and that the needle is held steadily while the blood is being withdrawn. When these precautions are observed, autopsies performed on animals subjected to daily heart punctures for as long as a period of a month showed no damage to the heart or hemorrhage around it. The red cell counts which were required to agree to within 2.5%, were made in duplicate, a total of 800 squares on a Levy-Hausser chamber being counted for each sample of blood. Reticulocytes were counted in wet mounts according to the method described by Ramsey and Warren.[2]

TABLE I.

Day	31 Wt. 3.25 kilos R.B.C.	Ret.	32 Wt. 2.56 kilos R.B.C.	Ret.	34 Wt. 2.85 kilos R.B.C.	Ret.	35 Wt. 2.85 kilos R.B.C.	Ret.	52 Wt. 2.70 kilos R.B.C.	Ret.
1	5,218	0.9	5,470	1.0	5,322	1.1	5,724	0.9	5,268	0.3
2	3,962	2.6	3,818	2.6	3,776	2.6	4,136	1.5	4,108	1.0
3	3,592	3.9	3,728	3.1	3,612	4.3	3,862	3.5	3,580	4.9
4	3,548	4.4	3,838	5.6	3,592	5.8	3,974	5.6	3,688	6.9
5	3,550	5.1	3,842	6.1	3,572	7.7	3,904	6.4	4,036	7.6
6	3,870	7.2	4,018	7.8	3,798	8.1	4,162	7.9	4,184	6.4
7	4,092	5.0	4,006	4.7	4,116	7.4	4,324	7.6	4,152	4.8
8	3,980	4.1	4,126	4.0	4,218	5.9	4,330	4.9	4,358	3.6
9	4,116	2.8	4,320	3.2	4,008	3.6	4,750	4.5	4,224	2.4
10	4,376	1.6	4,414	1.5	4,416	2.5	4,826	2.6	4,300	2.4
13	4,614	1.2	4,572	1.1	4,512	2.1	4,914	2.8	4,622	2.0

In Table I are presented the red cell counts ($\times 10^{-3}$), and reticulocyte counts (%) for 5 animals bled 1/64 of their body weight on the first day. The reticulocyte peak, ranging from 7.2% to 8.1%, is reached in all the animals on the 4th or 5th day of anemia. There is a fairly close similarity in the behavior of the red cell counts. Some of the animals, however, showed a greater post-hemorrhagic drop (*i. e.,* that occurring after the first day of anemia) than others.

If such a relatively good quantitative picture occurs with animals picked at random, with no regard as to weight, age, breed, etc., it seemed likely that a still more quantitative set of results might be obtained if animals from the same litter were chosen. Consequently 5 litter mates were subjected to the same procedure (*i. e.,* bled 1/64

[2] Ramsey, R., and Warren, C. O., Jr., *Quar. J. Exp. Physiol.,* 1932, **22**, 49.

of their body weight on the first day) and counts made for a period of about a month after the bleeding. The results are given in Table II. Here the reticulocyte peak, ranging from 6.6% to 7.2%, is

TABLE 2.

Day	81 Wt. 1.97 kilos R.B.C.	Ret.	82 Wt. 1.92 kilos R.B.C.	Ret.	83 Wt. 1.87 kilos R.B.C.	Ret.	84 Wt. 1.87 kilos R.B.C.	Ret.	85 Wt. 2.02 kilos R.B.C.	Ret.
1	6,198	0.7	6,044	1.0	5,620	0.7	6,262	0.3	6,256	0.2
2	4,124	1.2	4,106	1.3	3,762	1.5	4,524	0.6	4,462	0.9
3	4,284	3.2	4,220	2.1	3,704	2.6	4,684	1.6	4,426	2.5
4	4,436	4.5	4,332	3.8	3,868	4.8	4,592	3.3	4,548	4.6
5	4,408	5.7	4,344	5.4	4,024	5.8	4,560	5.3	4,466	6.4
6	4,492	6.9	4,368	7.1	3,922	6.6	4,584	7.2	4,528	6.6
7	4,522	6.2	4,352	6.4	3,964	5.6	4,612	5.6	4,568	5.0
8	4,458	4.7	4,444	3.7	4,010	4.0	4,528	4.3	4,602	3.5
9	4,602	4.1	4,520	3.3	4,108	3.7	4,504	3.9	4,516	2.8
10	4,824	3.2	4,728	3.0	4,284	3.4	4,876	3.5	4,796	2.9
12	5,012	3.1	4,840	2.7	4,442	3.3	5,122	2.9	4,910	2.2
14	5,176	2.5	5,008	1.9	4,628	2.3	5,204	2.3	5,086	1.9
17	5,286	2.0	5,174	1.8	4,852	1.8	5,402	2.3	5,198	1.6
24	6,012	1.2	5,820	1.4	5,596	0.8	6,032	1.0	6,128	1.8
31	6,108	0.6	6,086	0.8	5,712	1.5	6,214	0.4	6,212	0.6

reached in all the animals on the 5th day of anemia. The red cell counts show a remarkably close correspondence, all the animals recovering completely from the anemia on about the 30th day after the bleeding. The same is true of the reticulocyte counts, which return to normal at approximately the same time as the red cell counts do. No post-hemorrhagic drops were observed in any of the 5 animals. All the animals, however, showed no significant increase in their red cell counts for about 6 days following the bleeding.

Calculation shows that the red cell drop on the first day of anemia in these 5 animals ranges from 30% to 32%. This percentage drop is necessary to produce a reticulocyte peak of approximately 7.0%. With the first group of animals (those presented in Table I) the percentage drops on the first day of anemia do not fall within as small a range as that obtained in the second group, but if instead of computing the percentage drop on the day following the bleeding, the drop from the normal count to the lowest count in the post-hemorrhagic period is calculated, as small a variation as that observed with the litter mates is obtained (30% to 33%).

These results show that a stimulus such as a bleeding which results in a loss of approximately the same percentage of red cells, elicits a quantitative response from the bone marrow in the form of an outpouring of a remarkably constant quantity of young red cells into the circulating blood.