

Expulsion-Crescent: A New Pathological Red Cell Figure in Human Peripheral Blood. (17798)

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A new red cell figure was first seen by the author in 1942, in the blood of a Negress, whose possible sickling condition was under investigation. She had a moderate anemia and a greatly enlarged and granulated, apparently cirrhotic liver. The new figure was first mistaken for some type of sickling, but sickling was not found. It is not without significance that in the method of investigation at that time, there was employed a suspension of a droplet of finger-blood in a drop of the Blood-Group-Enzyme (BGE)-broth, both on a slide, and covered with a cover slip. This was the method the author began to use in 1941 and routinely applied since then, for the rapid detection of sickling(1) or, to define it better, for the detection of red cell sensitivity to the BGE, both in Negroes(2) and Caucasians(3).

The figure observed and later designated Expulsion-Crescent, consisted of 2 parts: 1. a highly refractile and crescent-like structure, 2. a smooth and pale, vesicle-like structure; resembling a spherocyte closely fitting into the legs of the crescent. Although the mutual relation between these two parts was at first not understood, it was clearly recognized in a case subsequently seen, which was that of a girl with a pluriglandular disturbance, a member of a family in which 5 other members were reported as having died of Wilson's disease (lenticular degeneration), a form of cirrhosis of the liver. Fig. 1 is the structure here described found in this patient, by the method indicated.

Continued observation of this structure revealed that it is not a static one, but that it is in motion. The spherical structure is not a spherocyte simply lying, by chance, between the legs of the crescent. Both crescent and

vesicle are 2 integral parts of the same single cell and it will be indicated that they represent apparently different materials with different qualities, and different functions with different end results. Numerous observations, constantly duplicating the picture of Fig. 1, have proven that. In this picture, the development of an Expulsion-Crescent was observed for about 10 minutes.

We see a dense refractile material take shape of a crescent, seemingly retract and expel another substance which is smooth, spherical in shape, and is swelling, paling and vanishing, finally a cell of apparently reduced size remaining. With slight insignificant differences, it is always the same event, as seen in the collection of Expulsion-Crescents in Fig. 2.

In this Fig. 2, various Expulsion-Crescents are shown as observed during the period of separation of the 2 different cell components described above, and after that, when the separation is completed and the crescent remains. There is a striking similarity among all figures, revealing their identity, thus precluding their adventitious nature.

A study of Expulsion-Crescents in 17 cases, from 1945 to 1948 inclusive, established definitely:

1. that this structure of the Expulsion-Crescent, if sought for under proper conditions, is not rare,
2. that it is commonly associated with parenchymatous liver disease, especially cirrhosis,



FIG. 1.

Expulsion of the smooth, swelling and dissolving vesicle by the retracting, refractile, crescentic part of the red cell in 5 stages. Observation for about 10 minutes, of washed red cells suspended in a blood-group-enzyme broth.

1. Neuda, P. M., and Rosen, M. S., *J. Lab. Clin. Med.*, 1945, v30, 456.

2. Neuda, P. M., *Science*, 1947, v106, 296.

3. Neuda, P. M., *Ann. Int. Med.*, 1949, v31, 1024.

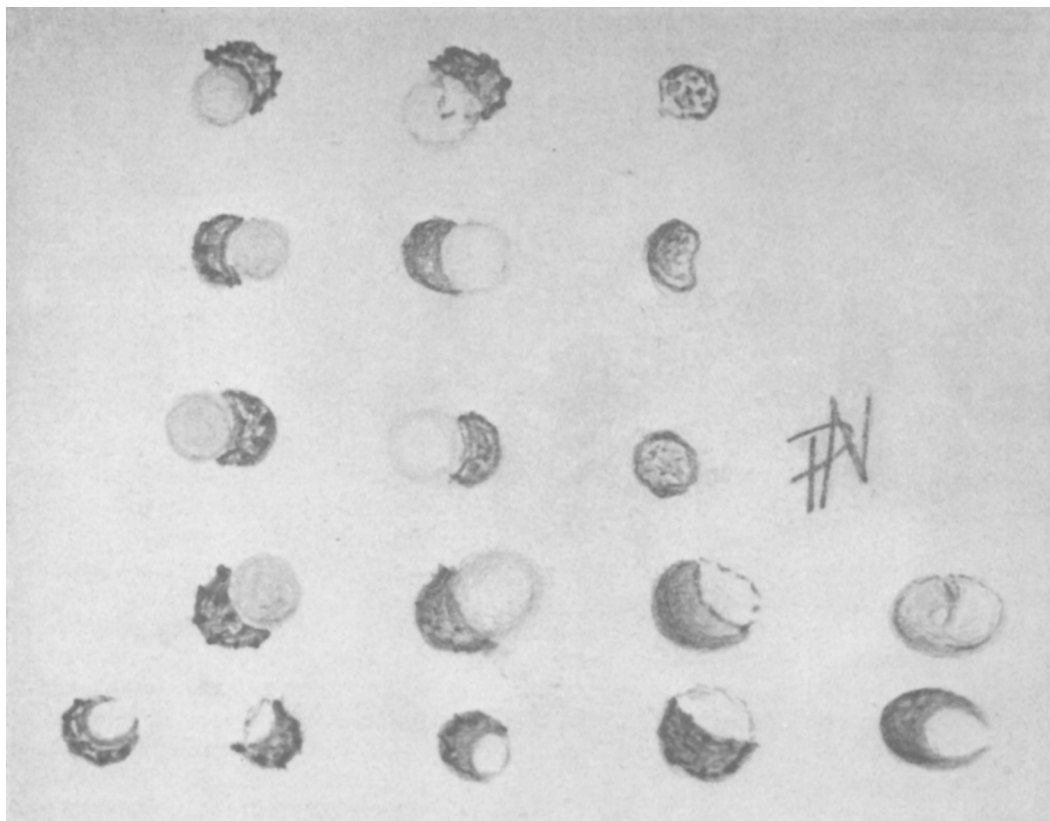


FIG. 2.
Various typical expulsion-crescents in motion (first 4 lines), and resting after the expulsion (fifth line), in a case of cirrhosis of the liver (A.Spr.).

3. that it is, apparently, the expression of a peculiar blood-destructive process,

4. that this blood-destructive process may in the main be not unlike the blood-destructive process acting in the sickling phenomenon, *i.e.* that this new crescent-like structure may belong to the category which the author has begun to designate in 1945 "hemolysis of sickle cell type".

This latter view is corroborated by the fact that in some cases Expulsion-Crescents are seen simultaneously with "block-partition" figures, the blood-destructive analogue in Caucasians and non-sickling Negroes(3), of the sickling condition in sickling Negroes. The following Fig. 3, depicts this concurrence of Expulsion-Crescent and block-partition in another case of cirrhosis of the liver.

Cirrhosis of the liver seems to be the prototype disease for the appearance of Expulsion-

Crescents. In the 17 cases, in which such characteristic crescents were observed, actual liver disease (cirrhosis) was found in 6 cases or in 35.4%. Liver involvement evidenced by an increased icteric index of the plasma was found in three more cases, raising the percentage of liver involvements to 53.1%. The diagnoses of the remaining cases testify to the seriousness and significance of the disease conditions in which this type of blood destruction may be found: malignancies, toxemias of pregnancy, hemolytic anemias.

As to the nature of this phenomenon, it is highly suggestive to regard the separation of the two substances, the one refractile and dense, the other one smooth and dissolving, in the light of separation of two similar substances in the sickling cell of Negroes, under BGE influence. In the 4 regular stages observed in the sickle cell development, the sec-

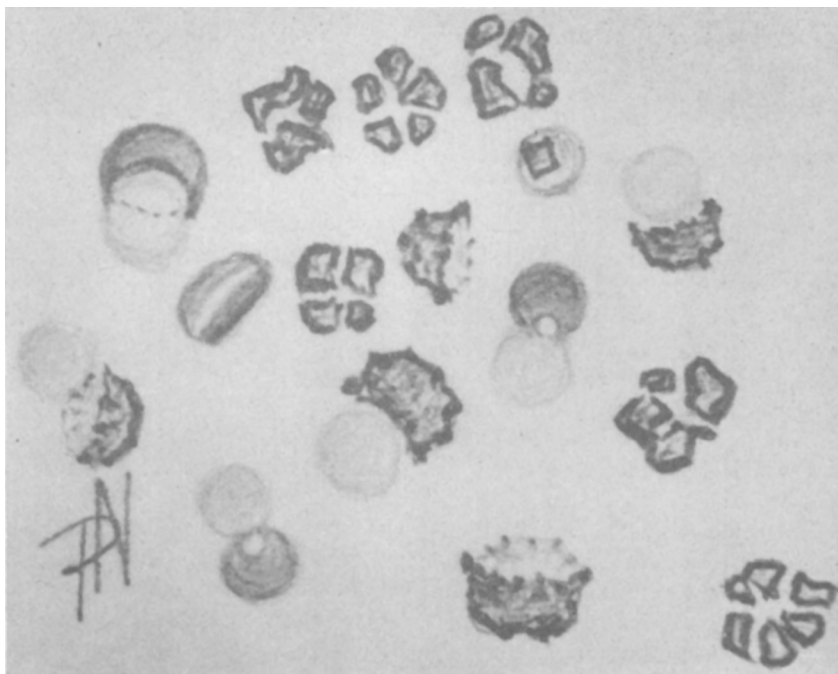


FIG. 3.

Expulsion-crescents and block-partition figures together in a case of cirrhosis of the liver (X.H.). Spontaneous appearance in oxalated blood after 36 hours.

ond stage would correspond to the Expulsion-Crescent. The following Fig. 4 is taken from a previous paper(3). It illustrates the sickle cell development under BGE influence, with the second stage in principle strikingly similar to the Expulsion-Crescent.

Inasmuch as this crescent is achromatic, it would seem to lack the properties of nuclear material. This opinion is reinforced by the fact that the expelled portion quickly dissolves.

Regarding the method of demonstration of

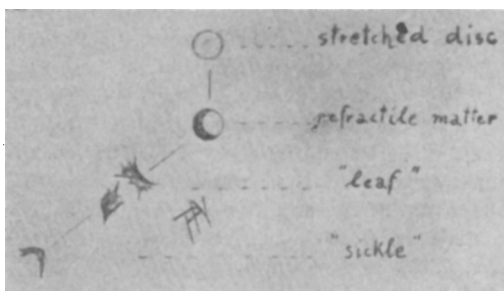


FIG. 4.

The 4 regular stages in the sickle cell development under BGE influence.

the Expulsion-Crescent, later experience has revealed that the application of the BGE is not an absolute necessity. Like the sickling phenomenon, which is accelerated by the BGE but appears also spontaneously, either in washed red cells or in the oxalated blood, the Expulsion-Crescent can thus be found without the application of the BGE, both in washed red cells and in the oxalated blood. The crescentic structures of the Fig. 3 had appeared in the oxalated blood after a lapse of time of about 36 hours. The method commonly used by me at present, is the microscopic observation on a slide covered with a cover slip, of red cells washed three times in saline. Characteristic changes in the erythrocytes will appear within about 30 minutes.

Summary. A new pathological red cell figure is described, apparently presenting another blood-destructive process of the "sickle cell type", and occurring in Negroes and Caucasians alike, in both of which cirrhosis of the liver is the probable prototype disease.

Received March 6, 1950. P.S.E.B.M., 1950, v74.