SECTION VI.

DISEASES OF THE BLOOD AND DUCTLESS GLANDS.

I. ANÆMIA.

Anæmia may be defined as a reduction in the amount of the blood as a whole or of its corpuscles, or of certain of its more important constituents, such as albumen and hæmoglobin. The condition may be general or local. The former alone we are here considering. It is interesting to note, however, that the pallor, particularly of the face, which is one of the most striking symptoms of anæmia, is just as characteristic of local anæmia due to fright or to nausea. There are persons persistently pale without actual anæmia in whom the condition may be due to inherited peculiarities.

Our knowledge is not yet sufficiently advanced to classify satisfactorily the various forms of anæmia. The following provisional grouping may be made: (1) Secondary or symptomatic anæmia; (2) primary, essential, or cytogenic anæmia.

Secondary Anæmia.

Under this division comes a large proportion of all cases. The following are the most important groups, based on the etiology:

(1) *Anæmia from hæmorrhage*, either traumatic or spontaneous. The loss of blood may be rapid, as in lesions of large vessels, in injury or in rupture of aneurisms, or in cases of ulcer of the stomach or duodenum, or post-partum hæmorrhage. If the loss is excessive, death results from lowering of the arterial pressure. In sudden profuse hæmorrhage the loss of three or four pounds of blood may prove fatal. In the rupture of an aneurism into the pleura the loss of blood may amount to seven pounds and a half, the largest quantity I have known to be shed into one cavity. In a case of hæmatemesis the patient lost over ten pounds by measurement in one week and yet recovered from the immediate effects. Even after very severe hæmorrhage the number of red blood-corpuscles is not reduced so greatly as in forms of idiopathic anæmia. Thus in a case just

mentioned, at the termination of the week of bleeding there were nearly 1,390,000 red blood-corpuscles to the cubic millimetre. The process of regeneration goes on with great rapidity, and in some "bleeders" a week or ten days suffice to re-establish the normal amount. The watery and saline constituents of the blood are readily restored by absorption from the gastro-intestinal tract. The albuminous elements also are quickly renewed, but it may take weeks or months for the corpuscles to reach the

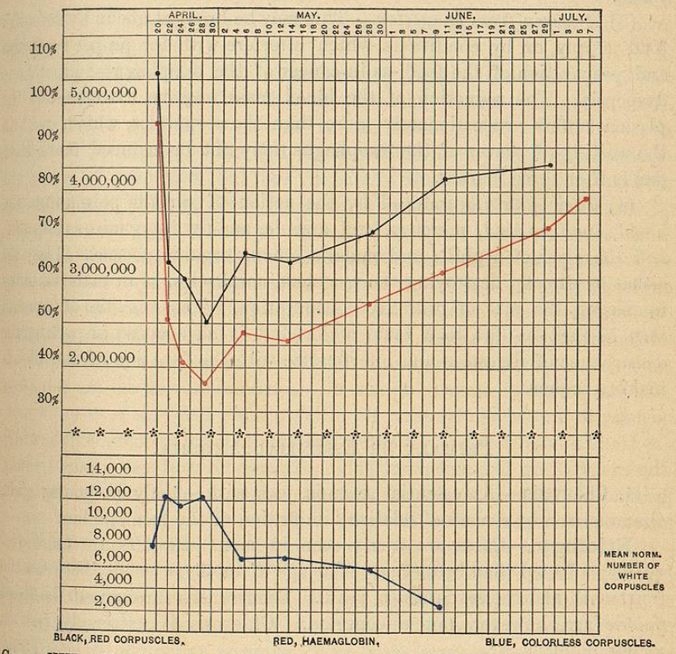

Chart XVI.—Illustrates the rapidity with which anæmia is produced in purpura hæmorrhagica and the gradual recovery.*

normal standard. The accompanying chart illustrates the rapid fall and gradual restitution in a case of severe purpura hæmorrhagica.

The microscopical characters of the blood after severe hæmorrhage are not much changed; the white corpuscles are relatively increased, producing a condition of leucocytosis. Nucleated red corpuscles are present, though usually not numerous. In the regeneration of the blood the de-

* On September 27th the patient returned from the country, where she had spent the summer. The blood count was then: Red corpuscles, 5,350,000; white corpuscles, 5,500; hæmoglobin, ninety-four per cent.

velopment of the hæmoglobin does not keep pace with that of the corpuscles.

(2) Anæmia is frequently produced by long-continued drain on the albuminous materials of the blood, as in chronic suppuration and Bright's disease. Prolonged lactation acts in the same way. Rapidly growing tumors may cause a profound anæmia, as in gastric cancer. The character of the blood in these cases is similar to that in anæmia after hæmorrhage.

(3) *Anæmia from Inanition.*—This may be brought about by defective food supply, or by conditions which interfere with the proper reception and preparation of the food, as in cancer of the œsophagus and chronic dyspepsia. The reduction of the blood mass may be extreme, but the plasma suffers proportionately more than the corpuscles, which, even in the wasting of cancer of the œsophagus, may not be reduced more than one half or three fourths.

(4) *Toxic anæmia*, induced by the action of certain poisons on the blood, such as lead, mercury, and arsenic, among inorganic substances, and the virus of syphilis and malaria among organic poisons. They act either by directly destroying the red blood-corpuscles, as in malaria, or by increasing the rate of ordinary consumption. The anæmia of pyrexia may in part be due to a toxic action, but is also caused in part by the disturbance of digestion and interference with the function of the blood-making organs.

Primary or Essential Anæmia.

1. **Chlorosis.**—An essential anæmia met with chiefly in young girls, characterized by a marked relative diminution of the hæmoglobin.

Etiology.—Cases are rarely seen in men. Blondes are more frequently affected than brunettes. The age of onset is usually between the fourteenth and the seventeenth years. Recurrences throughout the third decade are, however, not uncommon. Chlorosis is extremely rare in young children.

Hereditary influences probably play a part. Virchow pointed out that in many cases there was a defective development of the circulatory system, either congenital or resulting in a failure of the normal rate of growth. In some instances a compensatory hypertrophy of the heart has been found.

The disease is most common among the ill-fed, overworked girls of large towns, who are confined all day in close, badly-lighted rooms, or have to do much stair-climbing. Cases are frequent, however, under the most favorable conditions of life. Lack of proper exercise and fresh air, and improper food are important factors. Emotional and nervous disturbances may be prominent, so prominent that certain writers have regarded the disease as a neurosis. Menstrual disturbances are not uncommon, but are probably a sequence, not a cause of chlorosis. Sir Andrew Clark believes that constipation plays an important *rôle*, and that the condition is in reality a *copræmia* due to the absorption of poisons—leucomaines and ptomaines—from the large bowel.

Morbid Anatomy.—Fortunately the disease is rarely fatal. The fat is well retained. Hypoplasia of the aorta and larger arteries has been found in some cases, and the vessels have had a remarkable degree of elasticity. The heart is usually dilated and the left ventricle hypertrophied. Hypoplasia of the uterus and defective development of the genitalia have also been found.

Symptoms.—The blood examination: Johann Duncan in 1867 first called attention to the fact that the essential feature was not a quantitative but a qualitative change in the hæmoglobin. This has been abundantly confirmed. The red blood-corpuscles may show only a moderate grade of reduction, but the corpuscles themselves are very poor in hæmoglobin. Thus in forty consecutive cases examined at my clinic by Thayer, the average number per cubic millimetre of the red blood-corpuscles was 4,225,181, or over eighty per cent, whereas the percentage of hæmoglobin for the total number was 44·1 per cent. The accompanying chart illustrates well these striking differences. The least blood-count in the series of cases referred to above was 1,932,000. There may be all the physical characteristics and symptoms of a profound anæmia with blood-corpuscles nearly at the normal standard. Thus in one instance the globular richness was over eighty-five per cent with the hæmoglobin about thirty-five. These characteristics are distinctive, I believe, and not found in the same grade in any other form of anæmia. The importance of the reduction in the hæmoglobin depends upon the fact that it is the iron-containing element of the blood with which in respiration the oxygen enters into combination. This marked diminution in the iron has also been determined by chemical analysis of the blood. The microscopical characteristics of the blood are as follows: In severe cases the corpuscles may be extremely irregular in size—poikilocytosis—which may occasionally be as marked as in pernicious anæmia. The large forms of red blood-cells are common, but the average size is stated to be below normal. The color of the corpuscles is noticeably pale and the deficiency may be seen either in individual corpuscles or in the blood mixture prepared for counting. The leucocytes may show a slight increase; thus, the average of the forty cases above referred to was 8,256 per cubic millimetre.

The general symptoms of chlorosis are those of an anæmia of moderate grade. The subcutaneous fat is well retained or even increased in amount. The complexion is peculiar; neither the blanched aspect of hæmorrhage nor the muddy pallor of grave anæmia, but a curious yellow-green tinge which has given the name to the disease, and to its popular designation, the green sickness. In cases of moderate grade the color may be deceptive, as the cheeks have a reddish tint, particularly on exertion (chlorosis

rubra). The subjects complain of breathlessness and palpitation, and there may be a tendency to fainting. The palpitation and breathlessness

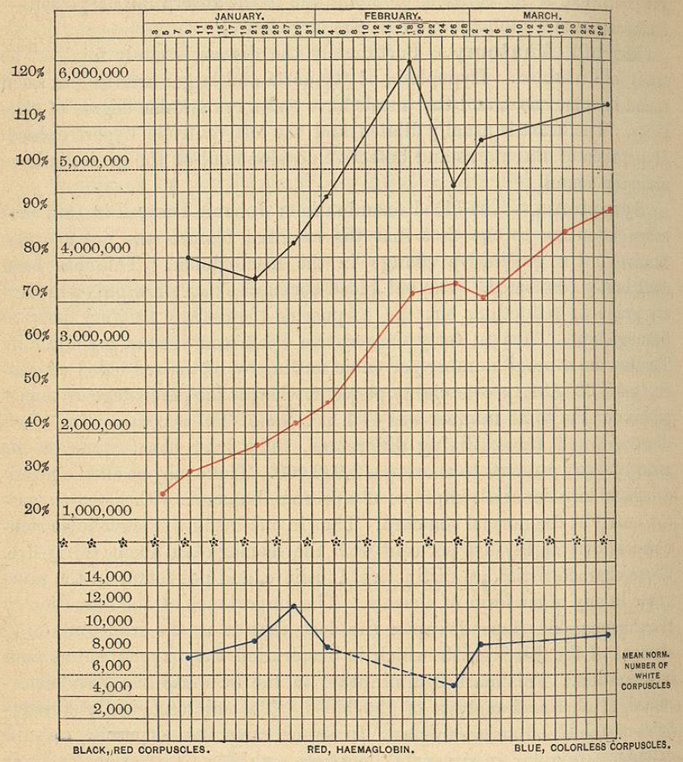

CHART XVII.—Chlorosis,

often lead to the suspicion of heart or lung disease. The eyes have a peculiar brilliancy and the sclerotics are of a sky-blue color Occasionally the skin shows areas of pigmentation, particularly about the joints.

Digestive symptoms are common. The appetite is capricious and the patients often have a longing for unusual articles, particularly acids. In some instances they eat all sorts of indigestible things, such as chalk or even earth. Constipation is a common symptom, and, as already mentioned, has been regarded as an important element in causing the disease. Contourier has noted the frequent association of dilatation of the stomach with chlorosis, and states that in some cases this may be an etiological factor, while in others it may be a result.

The circulatory symptoms are important. Palpitation of the heart occurs on exertion, and may be the most distressing symptom of which the patient complains. Percussion may show slight increase in the transverse dulness. A systolic murmur is heard at the apex or at the base; more commonly at the latter, but in extreme cases at both. A diastolic murmur is rarely heard. The systolic murmur is usually loudest in the second left intercostal space, where there is sometimes a distinct pulsation. The exact mode of production is still in dispute. Balfour holds that it is produced at the mitral orifice by relative insufficiency of the valves in the dilated condition of the ventricle. On the right side of the neck over the jugular vein a continuous murmur is heard, the *bruit de diable*, or humming-top murmur.

The pulse is usually full and soft. Pulsation in the peripheral veins is sometimes seen. There is a tendency to thrombosis in the veins; most commonly in the femoral, but in other instances in the longitudinal sinus, or the thrombosis may be multiple. Except in the sinuses, the condition is rarely serious. Tuckwell has reported an instance in which there was embolism of the right axillary artery with the loss of a thumb and part of the fingers. Brayton Ball has recently called attention to the importance of this feature of chlorosis.

As in all forms of essential anæmia, fever is not uncommon. Especial attention has of late been directed to this by French writers.* Chlorotic patients suffer frequently from headache and neuralgia, which may be paroxysmal. Hysterical manifestations are not infrequent. Menstrual disturbances are very common—amenorrhœa or dysmenorrhœa. With the improvement in the blood condition this function is usually restored.

Diagnosis.—The green sickness, as it is sometimes called, is in many instances recognized at a glance. The well-nourished condition of the girl, the peculiar complexion, which is most marked in brunettes, and the white sclerotics are very characteristic. A special danger exists in mistaking the anæmia of the early stage of pulmonary tuberculosis for chlorosis. The palpitation of the heart and shortness of breath frequently suggest heart-disease, and the œdema of the feet and general pallor cause the cases to be mistaken for Bright's disease. In the great majority of cases the characters of the blood readily separate chlorosis from other forms of anæmia.

2. **Idiopathic or Progressive Pernicious Anæmia.**—The disease was first clearly described by Addison, who called it idiopathic anæmia. Channing and Gusserow described the cases occurring post partum, but to Biermer we owe a revival of interest in the subject.

Etiology.—The existence of a separate disease worthy of the term progressive pernicious anæmia has been doubted, but there are unquestionably cases in which, as Addison says, there exist none of the usual causes or concomitants of anæmia. Clinically there are several different

* Trazit, Paris Thesis, 1888.