Anaemia in the eczematous infants was treated with oral iron for 8 to 12 weeks, and a satisfactory response occurred in all cases of both races.

Discussion

Our results show several important differences between the West Indian and European infants. It appears that there may be an intrinsic racial difference between the mean haemoglobin levels of healthy negro and white infants. In our series of infants with normal M.C.H.C.s the difference between the mean haemoglobin levels of the two races rose from 0.7 g./100 ml. in the 5 to 7 months group, to 1.6 g./100 ml. in the 11 to 13 months group; thereafter it decreased to 0.6 g./100 ml. by 20 to 23 months. Munday *et al.* (1938) found a difference between the mean haemoglobin levels of negro and white infants of 0.5 g./100 ml. at 4 months, rising to 1 g./100 ml. at 13 months. Similarly, the mean haemoglobin levels at the age of 1 year in Munday's series were 11 g./100 ml. for the white and 10.5 g./100 ml. for the negro infants, while our values at this age were 10.9 and 9.1 g. respectively. As the nutrition of Munday's infants was carefully supervised, dietary deficiency was an unlikely aetiological factor in his series.

A surprisingly high incidence of iron deficiency was found in the European infants (22.4%), while the incidence of anaemia was very much higher in the West Indian group (53.5%). No simple explanation for this difference in incidence between the two races could be found. There was no evidence to suggest that prematurity, excessive growth, malnutrition, or the presence or absence of eczema was responsible. The failure to find ova in the stools eliminated intestinal worms as a factor, and the satisfactory response to oral iron made severe malabsorption an unlikely cause. The possibility of inadequate diet or deficient iron stores at birth was considered. Although detailed dietary surveys were not carried out there seemed to be little difference between the diets of the two races or in the time at which mixed feeding was started. Furthermore, all the children attending the day nurseries received the same diet for five days of the week. While dietary factors may have played some part in the older children, they are unlikely to have accounted for the differences found in the infants aged 5 to 7 months. In this age-group an M.C.H.C. below 30% was found in five out of seven West Indian infants but in only one out of twelve European infants. Thus, at the end of the first five to seven months of life many more of the West Indian infants were already iron-deficient, and in the preceding period the diet of both races would have consisted almost entirely of milk. Thus it seemed probable that the iron deficiency in this group resulted from diminished iron stores at birth.

Summary

Among infants aged 5 to 23 months the haemoglobin levels and the mean corpuscular haemoglobin concentration were lower in the West Indians than in the Europeans. Atopic eczema did not contribute to this difference, since similar haemoglobin levels were found in the healthy and eczematous infants.

Iron-deficiency anaemia, indicated by an M.C.H.C. of less than 30%, occurred in 22.4% of the European and in 53.5% of the West Indian infants.

Such a striking difference could not be explained by prematurity, excessive growth, malnutrition, or the presence of worms. Furthermore, the satisfactory response to oral iron excluded any obvious absorption defect.

While deficient iron intake may have played a part in the older infants it would not have accounted for the high incidence of iron deficiency in the West Indians aged 5 to 7 months; in these infants diminished iron stores at birth may have been responsible. Even when the M.C.H.C. was normal, haemoglobin levels were lower in the West Indians than in the Europeans. This suggested an inherent racial difference in haemoglobin levels in this age-group.

We thank Dr. W. H. S. Wallace, the L.C.C. Divisional Medical Officer, for allowing us to study children at the day nurseries, and the matrons and staffs of these nurseries for their willing co-operation. We are indebted to Miss J. I. Silk, Miss M. Mundy, and Miss T. Smith for technical assistance. Finally, we are grateful to Professor W. M. Davidson for his advice.

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INCOMPLETE ANTI-O IN A PREGNANT MOTHER

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Naturally occurring anti-O, complete and bivalent in type, has been demonstrated by many workers (Landsteiner and Witt, 1926; Henry, 1946; Boorman, Dodd, and Gilbey, 1948). Morgan and Watkins (1948) differentiated anti-H from true anti-O by agglutination inhibition technique. Agglutination of group O cells with anti-H was inhibited by saliva of secretors, but that produced with anti-O agglutinin remained unaffected. Bhatia and Bhende (1954) demonstrated that H-agglutininogen was antigenic to rabbits, but completely mutated O antigen failed to produce any antibody. While investigating a woman with a history of stillbirths, an incomplete type of anti-O was detected in her serum towards the later months of pregnancy. The details of the investigations on this patient are presented below. A similar instance of an incomplete type of anti-O was first demonstrated by Mollison (1959) in a group A patient.

Case Report

A woman aged 34 was first examined on October 10, 1958, during the sixth month of pregnancy. She was

delivered by caesarean section on January 21, 1959. The child was underweight but otherwise normal, and was alive and well at the time of writing.

Obstetrical History.—The patient was married in 1944 and had had four pregnancies. *First pregnancy* (1948): toxæmia; full-term forceps delivery; baby stillborn. Cause of death could not be ascertained. *Second pregnancy* (1950): baby stillborn, post-mature (17 days); normal full-term delivery. Cause of death unascertained. *Third pregnancy* (1952): full-term female baby, delivered by caesarean section because of placenta praevia and unfavourable obstetric history. Baby living and in normal health. Mother came under investigation at the fourth pregnancy.

Blood.—The patient had not received any previous blood transfusion. Group A₁ CDE MN, non-secretor. The cells showed agglutination with natural anti-H serum, signifying the presence of H-substance. Serum showed agglutination with all the group O cells in albumin medium but not in saline. The serum was also tested with A₁ and A₂ cells, both of Rh-positive and negative types. The results obtained are shown in the Table.

Results of Serum Tested with O, A₂, A₁ Cells at 37° C.

Medium Used	Group O			Group A ₂			Group A ₁		
	Total No. Tested	Agglutination		Total No. Tested	Agglutination		Total No. Tested	Agglutination	
		Yes	No		Yes	No		Yes	No
Albumin	40	40	Nil	8	2	6	32	Nil	32
Saline	40	Nil	40	8	Nil	8	32	„	32

The antibody was best demonstrable at 37° C. At 22° C. the reaction was feeble. The titre of the incomplete antibody in the serum during the later part of the antenatal period varied from 2³ to 2⁴ up to the confinement. Indirect Coombs tests with group O and A₂ cells were negative. The serum was not tested with enzyme-treated cells. Both the W.R. and the V.D.R.L. test of the serum were negative.

Inhibition Tests.—Agglutination inhibition tests were carried out with saliva of secretors—six from group O, four from group A, and two from group AB persons. In every case the action of the albumin-acting antibody on group O cells was not altered by addition of saliva. The results were compared with known anti-H serum.

Examination of Newborn Baby.—Female child, born at full term—weight 4 lb. 2 oz. (1,870 g.). Blood: Group A₁ CDe MM; haemoglobin, 17 g./100 ml.; osmotic fragility—normal, started at 0.44% and completed at 0.34% of sodium chloride solution; reticulocytes, 3.5%; serum bilirubin, 3 mg./100 ml. of plasma. Direct and indirect Coombs tests were negative in different dilutions. The cells showed no agglutination with mother's serum or even in albumin medium. No sign of haemolytic anaemia was obtained at birth.

The husband was group O CDe MM, non-secretor. The cells showed agglutination with mother's serum only in albumin medium.

Child of Third Pregnancy.—Female, living, healthy, aged 9 years. Blood: Group A₁ CDe MM; the cells do not show any agglutination with mother's serum or even in albumin medium.

Discussion

The antibody found in the mother's serum was active only in albumin medium. In Mollison's case antibody was most active at 25° C., whereas in the present case the optimum temperature was found to be 37° C. The antibody agglutinated all the group O cells and two of the group A₂ cells, but none of the A₁ cells tested. As the mother belonged to CDE MN type, she could not develop any antibody against these antigens. The mother's cells showed agglutination with anti-H serum, signifying the presence of H-substance in her erythro-

cytes. No anti-H could be obtained in her serum, indicating that she belonged to incomplete mutated type. By agglutination-inhibition technique with the saliva from 12 secretors it was demonstrated that the activity of the mother's serum against group O cells remained unaffected. The selective activity of the serum on group O and A₂ cells which was not affected by saliva from secretors proved that the antibody in question was anti-O and not anti-H.

It is difficult to explain how this incomplete anti-O appeared in the serum of this patient. Either the antibody was naturally present in the mother's serum or it had appeared owing to iso-immunization by the heterozygous AO cells of the foetus. Incomplete antibody appears in the serum by the process of iso-immunization, but occasionally it remains naturally in the serum of some individuals. Ervin and Young (1950) reported the presence of incomplete anti-A in two group O donors; one was a group O male, and the other a group O female whose husband belonged to group O. Both these individuals were dangerous universal donors. Zuelzer and Kaplan (1954) reported the presence of immune anti-A in two cases of homospecific pregnancy. The nature of the possible antigenic stimulus in both cases was obscure.

Whatever may be the source of origin of this incomplete anti-O, no sign of haemolytic disease was obtained in the baby of the fourth pregnancy. The causes of neonatal death in the first and second pregnancies were not known to us.

Summary

Incomplete anti-O was present in the serum of a mother towards the later months of pregnancy. The mother belonged to group A₁ CDE MN, and was a non-secretor of A-substance.

Antibody showed agglutination with all group O cells, both Rh-positive and Rh-negative, and two out of eight A₂ cells only in albumin medium.

The mother's cells showed agglutination with anti-H serum of animal origin.

Addition of saliva of secretors six from O, four from A, and two from AB did not alter the effect of antibody on group O cells.

The antibody was more effective at 37° C.

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A striking increase in the prevalence of epidemic hepatitis in Poland is reported. The number of cases registered has risen from 26,000 in 1957 to 43,000 in 1958 and 75,000 in 1959. W.H.O.'s Regional Office for Europe has been asked to assist studies in the prevention of this disease.