

T H E S I S
PRESENTED FOR THE DEGREE OF M.D.
UNIVERSITY OF GLASGOW.

"Anaemia and Pregnancy"

by

GEORGE POLLOCK, M.B., Ch.B.

April, 1937

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Section I.

ANAEMIA and PREGNANCY.

In view of the variety of the anaemias and their varying incidence in pregnant women, I decided, while a casualty officer at Selly Oak Hospital, Birmingham, to investigate the types and frequency of the anaemia, if any existed, in patients attending the ante-natal clinic at this hospital between June, 1935 and January, 1936.

Anaemia during pregnancy occurs in most countries but differs greatly in its forms and severity. Fortunately, by far the most common anaemia found in pregnancy in this country is due to iron deficiency and is characterised by its insidious onset, its very mild symptoms and rapid response to iron therapy. The severe types of anaemia have more often been reported from abroad, especially India, where tropical macrocytic anaemia is common. These latter anaemias are characterised not only by the sudden onset, the severity of the symptoms and the difficulty in diagnosis, but also by the fact that some immediate life-saving procedure, such as blood transfusion, has frequently to be adopted.

Before commencing the discussion of the work done by the writer, which forms the basis of this thesis, it cannot but be of value to summarise the relevant literature.

One important investigation is that of Keith, Rowntree and Geraghty⁽¹⁾ who in a series of normal pregnant women injected intravenously known quantities of vital red which remained long enough in the circulation to ensure thorough mixing. They demonstrated an increased blood volume which was chiefly due to an increase in the volume of plasma. They also showed that seven days after delivery there was a diminution of the blood plasma to the extent of 1100 ccs.. Partial confirmation of this was provided by Van Donk, Feldman and Steenboch⁽²⁾ in their experiments on the anaemia of pregnancy in rats. They found that the water content of the blood was increased by 4% in the later stages of pregnancy but in addition the blood solids were also increased. They pointed out that this could not therefore be due to a simple hydration. Using a modification of the procedure of Keith and his associates, Dieckmann and Wegner⁽³⁾ found an increase in the cellular content and plasma volume during pregnancy. The increase in the plasma volume was 25%, rather more than the increase in cellular volume. From these observations it may be assumed that a certain degree of blood dilution normally occurs in the pregnant state.

Blood examination reveals during pregnancy a proportionate reduction of red blood corpuscles and haemoglobin, resulting in a colour index about unity, followed by a

rapid increase in both after delivery. Absence of reticulocytosis after delivery in women was observed by Richter, Meyer and Bennett⁽⁴⁾ and Boycott,⁽⁵⁾ Van Donk, Feldman and Steenbock⁽²⁾ made a similar observation after parturition in rats. It would appear, therefore, that the spontaneous recovery at the end of the first week of the puerperium was not due to blood regeneration but to a diminution of blood volume resulting in a relative increase in haemoglobin and red blood corpuscles.

Such findings probably account for the rapid recovery from anaemia observed in the puerperium of apparently normal pregnant women by Castle and Strauss,⁽⁶⁾ Davies and Shelley⁽⁷⁾ and Dieckmann and Wegner⁽⁸⁾. This was found also after parturition in rats by Beard and Myers.⁽⁹⁾ A reduction in number of red blood cells, one or two days after delivery, however, has been shown to occur by Bland, Goldstein and First⁽¹⁰⁾ in 73.4% of 94 pregnant women with normal counts during pregnancy. This decrease, they suggested, was possibly due to loss of blood. They also demonstrated that there was a gradual return of these cases to normal later in the puerperium and it therefore seemed probable to them that some time must elapse before the reduction of blood volume was completed. The improvement in the red cell and haemoglobin estimations which occurs some weeks after delivery will be discussed elsewhere in this

thesis.

In brief, there seems to be no doubt that hydraemia occurs and reaches its peak between the 26th and 35th week of pregnancy (Diekmann and Wegner)⁽³⁾ when there follows a slight decrease towards term. The suggested explanation is that such a physiological condition would allow of a more rapid circulation during pregnancy and a conservation of haemoglobin and red blood corpuscles at parturition.

Unfortunately, anaemia occurring during gestation cannot always be regarded as physiological. In the following paragraphs are discussed widely differing factors which alone or in combination may give rise to pathological blood conditions. It seems unnecessary to postulate that the primary cause of anaemia in pregnancy lies in the products of conception and the demands which the growing foetus makes for haematopoietic substances. Not the least of these is iron of which the foetus requires 4.7 mgms. daily, particularly in the later months. That this is stored in the liver and spleen of the foetus (for use during the time when its sole food is the mother's iron-poor milk) is suggested by Toveraud.⁽¹¹⁾

There are anaemias of pregnancy due to a deficiency or absence of certain haematopoietic factors in the diet. By far the commonest of these in this country is the

anaemia resulting from a deficiency of iron. Davidson,
(12)
Fullerton et alia in a number of poor families in
Aberdeen have shown that the iron intake was far below
what is normally required to maintain an iron balance.
Yet in some cases anaemia was absent or very mild. De-
ficiency of iron may however be minimised by the presence
of a suitable amount of calcium in the diet because of the
iron-sparing qualities of calcium.

In the same way deficiency of vitamin C may assist
in causing minor degrees of anaemia. However, anaemia
during gestation must rarely originate from such a lack
because women with antenatal supervision in this country
are advised to include fruit in their dietery.

Also, anaemia may be due to a deficiency of the
extrinsic factor of Castle in the diet. Such an anaemia
is rare in this country but very common in India where it
is known as tropical macrocytic anaemia. It has been
fully investigated by Wills (13) and described in America
(14)
by Rowland. The most frequent complaints in this
anaemia are those associated with a severe loss of blood,
for example, pallor and weakness usually accompanied by
diarrhoea and vomiting. Clinically, it is characterised
by its onset at an early age, pallor, breathlessness,
oedema, glossitis and albuminuria. A high colour index,
macrocytosis and anisocytosis with a negative indirect

van den Bergh reaction in the blood are usually present. Hydrochloric acid is usually present in the stomach and also the "intrinsic factor" as far as can be judged by the presence of free hydrochloric acid (Witts)⁽¹⁵⁾, though Castle and Strauss⁽¹⁶⁾ point out that the intrinsic factor may or may not be present in association with hydrochloric acid. Wills⁽¹³⁾ points out the amazing recovery which takes place at delivery. She suggests that the majority of the population are on a diet poor in the extrinsic factor, and possibly just sufficient to meet normal requirements. When, however, pregnancy occurs and the superadded demands of the foetus have to be met, this fine balance of intake and requirement is upset, resulting in the production of anaemia. One other feature of this anaemia is the rapid regeneration of red blood cells following the administration of Marmite (Wills)⁽¹³⁾.

A diet deficient in meat, fruit and vegetables may be yet another cause of anaemia. Odin and Lindgren⁽¹⁷⁾ noted that reduced gastric secretion was a widespread phenomenon among those of the population who lived on a farinaceous diet which was devoid of meat and vegetables. In 68% of their subjects who showed achlorhydria, they were able to demonstrate deficiency in intake of B vitamins. On the addition to the diet of fruit and meat, the secretion of hydrochloric acid was resumed only to disappear again

when a return was made to the poor and almost entirely farinaceous diet.

Thus, so far the causes of anaemia noted have been blood dilution, the demands of the foetus, and various dietary deficiencies. There remain the internal abnormalities of the patient. Anaemia in pregnancy may result from diminution or absence of certain factors in the gastric secretion. The gastric juice may be deficient in or devoid of free hydrochloric acid. Now (18) Mettier and Minot, point out that the absorption of iron is more rapid in an acid pH, as far as can be gathered from the degree of reticulocytosis. It follows that any condition present in pregnancy leading to a hypoacidity or achlorhydria would tend to diminish the amount of iron absorbed and consequently produce an anaemia. Such hypoacidity or achlorhydria may occur in pregnant women apparently as part of their gravid state. This has been shown by both Castle and Strauss (19) and Davies and Shelley (7) in a series of normal pregnant women in whom there was a fall in the free hydrochloric acid content of the stomach, most marked in the later stages of pregnancy.

(7) Davies and Shelley have shown that there is a progressive fall in the hydrochloric acid content of the stomach in parous women as the menopause approaches, and that, with the concomitant anaemia, the condition grad-

usually merges into achlorhydric anaemia. Witts, ⁽²⁰⁾ too, has shown that there is a marked increase in the incidence of achlorhydria towards the end of the reproductive period.

It is difficult to assess the importance of achlorhydria in the production of anaemias of pregnancy in view of the following observations. Bennett and Ryle ⁽²¹⁾ have shown that the incidence of achlorhydria in 100 healthy students was 4 per centum. ⁽²²⁾ Hartfall, however, observed that 14% of the average population of all ages was achlorhydric. Accordingly, it seems reasonable to suppose that, while achlorhydria may allow of the absorption of sufficient iron for the normal bodily needs of a non-pregnant woman, it might prevent the absorption of enough to meet the additional demands incurred by a pregnancy.

⁽²³⁾ Apperly has shown that anaemia per se can cause a fall in the hydrochloric acid content of the stomach. He observed that, whenever the erythrocyte count of the blood fell to one half or two-thirds of the normal, free acid disappeared from the stomach. In the non-pregnant woman, such a condition would produce a vicious circle and lead to a further increase in the anaemia; in pregnancy, the additional iron requirements of the growing foetus would lead to a still greater degree of anaemia in the mother.

The gastric juice, during pregnancy, may be deficient

in yet another essential substance - the intrinsic factor of Castle - which may be only temporarily lost, as in pseudo-pernicious anaemia of pregnancy, (Castle and Strauss)⁽¹⁶⁾, or permanently lost, as in true Addisonian anaemia. In the latter, the features of the disease in no way differ from Addisonian anaemia uncomplicated by pregnancy. It may, in fact, be noted that the onset of true Addisonian anaemia can sometimes be traced back to a pregnancy.⁽²⁴⁾ Cabot, quoted by Smallwood, observed that in a series of 1200 cases of Addisonian anaemia, one in twenty-five began during pregnancy or at its termination.

In pseudo-pernicious anaemia, where the intrinsic factor is only temporarily absent from the gastric secretion, the onset of the disease occurs at an earlier age than does true pernicious anaemia. It affects primiparae and multiparae equally and usually occurs during the last three months of pregnancy. Clinically the disease is characterised by the rapid onset of pallor and slight icterus, of breathlessness and albuminuria. The symptoms are often accompanied by fever, which may occur after delivery, but the temperature usually falls once treatment has been initiated. The spleen may be enlarged. While there is no involvement of the central nervous system, retinal haemorrhages can occur. The blood changes are typical of a macrocytic anaemia. The erythrocytes are

proportionately more reduced than is the haemoglobin and the colour index is therefore high. Macrocytosis is common, and while the number of leucocytes is normal or reduced, there may be a relative lymphocytosis. The condition responds well to treatment with liver extract, as is evidenced by an increase in the number of red blood corpuscles, by the occurrence of reticulocytosis and increase in the percentage of haemoglobin. In untreated cases, spontaneous recovery may occur, if the patient survives labour, but blood transfusion may be required prior to the confinement. The maternal mortality in untreated patients is 30% to 75%. Cases have also been described by Petersen, Field, and Morgan, Studdiford, and Evans.

Finally mention must also be made of haemolytic anaemia of pregnancy. Occurring in both primiparae and multiparae, and usually in the last three months of a pregnancy at any stage of reproductive life, it is characterised by the rapid onset of pallor and slight jaundice, breathlessness, vomiting, diarrhoea and fever. Purpuric spots may frequently appear and bleeding may take place from mucous membranes. When glossitis and gingivitis occur, they are secondary to the blood condition. The spleen, and occasionally the liver, is enlarged in some instances. The erythrocytes are markedly reduced, and

the figure may drop below one million per cubic milli-
 metre. Findings as to the colour index vary. Witts⁽¹⁵⁾
 claims that it is high, and Smallwood⁽²⁸⁾ points out that
 it is about unity; Esch, Minot and Pohl (quoted by Witts)⁽¹⁵⁾
 on the other hand have described cases with a low colour
 index. Anisocytosis, poikilocytosis and polychromasia
 may be present, but macrocytes are few in number. Normo-
 blasts may appear in untreated cases, where the bone
 marrow is not destroyed, as for instance in the plastic
 form. The white blood corpuscles are normal, or slightly
 reduced in number, although Smallwood⁽²⁸⁾ has observed that
 a marked leucocytosis may occur. Before the onset of
 labour immature white cells of the granular series and
 reticulocytes may appear in the circulation. Van den
 Bergh's reaction is positive indirect, and urobilin may
 be present in the urine. Free hydrochloric acid is
 usually to be found in the stomach. The disease, begin-
 ning late in pregnancy, reaches its height in the puer-
 perium, when it may prove fatal. Should the patient,
 however, survive the shock and strain of labour, recovery
 can and usually does take place. It is marked by an
 increase in the haemoglobin and red blood corpuscles, and
 by reticulocytosis: but, recovery may be delayed for
 many months (Witts)⁽¹⁵⁾. As treatment, Witts⁽¹⁵⁾, Smallwood,⁽²⁸⁾
 Kersley and Mitchell⁽²⁹⁾ advise blood transfusions at short

intervals, the latter workers advocating this in order to prevent obstetric shock, or to permit of the induction of labour. Wित्त⁽¹⁵⁾ and Kersley and Mitchell⁽²⁹⁾ maintain that liver preparations may help, but that neither liver, nor any other anti-anaemic substance will arrest the disease, so long as the foetus is in utero. The prognosis is accordingly good if the uterus can be emptied without much shock, and after delivery recovery usually begins early. The mortality is about 30%. Discussing the etiology, Wित्त⁽¹⁵⁾ suggests that it may be due to some obscure infection of the Bartonella type, or to an increased haemolysis of maternal blood, designed to provide the foetus with blood-forming substances.

Anaemia during pregnancy may of course have existed prior to conception. Such diseases as tuberculosis or chronic pyelitis or sepsis may well result in impoverishment of the blood, as may repeated blood loss - the result of menorrhagia, haemorrhoids or peptic ulcer. The probability is that such a condition of the blood would be accentuated during pregnancy.

It is apparent then that anaemia of pregnancy may be due to some physiological variation associated directly with the gravid uterus, or to deficiency of the diet in haematopoietic substances such as iron, vitamins B and C, or to gastric abnormality such as subacidity and absence

of intrinsic factor, or finally to haemolysis of unknown origin and infections.

It is therefore important to know how often these anaemias may be met with in ordinary obstetrical practice.

The Incidence of Anaemia in Pregnancy.

(30)

Price Jones in London using Haldane's haemoglobinometer, found in 100 healthy non-pregnant women that the average haemoglobin was 98 per cent on the scale, corresponding to an oxygen carrying capacity of 18.1 ccs. per 100 ccs. of blood or equivalent to 13.6 gms. of haemoglobin per cent. Using the Newcomer haemoglobinometer, (31) Wintrobe, of Johns Hopkins University, found the closely corresponding figure of 14 gms. of haemoglobin per 100 ccs of blood; again healthy non-pregnant women were the subjects.

It is of interest to note the incidence of anaemia in pregnancy in various parts of this country and in America. The following tabulated paragraphs summarise the literature on this subject.

(32)

(a) Galloway, of Chicago, in a series of 382 pregnant women drawn from private practice "in a fairly characteristic residential community" found the average haemoglobin value was 65% by the Sahli haemoglobinometer.

(10)

(b) Bland, Goldstein and First in a series of 1000 pregnant American women "from the tenements of the city

and enjoying none of the advantages of luxury and wealth" found that a haemoglobin value of 70% or less occurred in two-thirds of them. They used the Dare haemoglobinometer but no standard was given.

(33)
 (c) Moore in 300 consecutive pregnant women (American) from private obstetrical practice found that the average haemoglobin value was 79%.

(34)
 (d) Mackay, in London, found that the average haemoglobin value of unmarried pregnant women on admission to a Home was 78%. A Haldane haemoglobinometer was used and so standardised that 100% on the scale corresponded to 13.8 gms. of haemoglobin per 100 ccs.

(35)
 (e) McGeorge, in New Zealand, in a series of 100 unselected, consecutive, working class pregnant women found that the incidence of anaemia was low - 83% of the patients having 75% haemoglobin throughout pregnancy.

(36)
 (f) Davidson, Fullerton and Campbell in a "cross section of the poorest classes of the community" in Aberdeen and north east of Scotland, found that in 819 pregnant women the average haemoglobin value was 78%. The Haldane haemoglobinometer was used and standardised so that 100% on the scale was the equivalent of 13.8gms of haemoglobin and had an oxygen-carrying capacity of 18.5 volumes per cent.

(37)
 (g) Toland, in America, using the Sahli haemoglobin-

ometer (no standard given) found that, of 670 pregnant women attending the outpatient department, only 63 had a haemoglobin estimation below 65%.

(5)
 (h) Boycott, in a series of 222 unselected pregnant women, attending the ante-natal department of University College Hospital, London, found that 78% had haemoglobin values over 80%. Again Haldane's haemoglobinometer was used and standardised so that 100% on the scale was equivalent to 13.8 gms. of haemoglobin per 100 ccs. of blood or an oxygen-carrying capacity of 18.5 volumes per cent.

(38)
 (i) Corrigan and Strauss, in a series of 200 pregnant women in America, found that the average haemoglobin estimation was 74% at the beginning of treatment. The haemoglobinometer was standardised such that 100% on the scale was equivalent of 15.6 gms. of haemoglobin per cent.

(39)
 (j) Reid and Mackintosh, in 1108 unselected pregnant women attending the ante-natal dispensary at Stockport, found that 46% had over 86% of haemoglobin. Haldane's haemoglobinometer was used.

(27)
 Haemolytic anaemia is rare during pregnancy. Evans, in a series of 4,000 deliveries in London, did not find one case. Beckmann, quoted by Witts, (15) has described 6 cases in 60,000 births

Of the pseudo-pernicious anaemia, two cases have
 (27)
 been described by Evans, three by Petersen, Field and
 (25) Morgan, (26) and one by Studdiford. Toland did not find
 any cases of "primary" anaemia in 670 anaemic pregnant
 women.

Briefly, hypochromic anaemia seems, from the liter-
 ature, to be very common whilst the more dangerous types
 are fortunately not only relatively, but actually in-
 frequent.

Section II.

PRESENT INVESTIGATION.

The material for the present investigation was obtained during the writer's term of office as Casualty Officer at Selly Oak Hospital, Birmingham.

Under the working conditions obtaining there, necessitating at times inability to attend the ante-natal clinic because of other duties, it was impossible to adopt a regular sequence of case selection. The latter was therefore somewhat haphazard and the results cannot be taken as being in the nature of a statistical survey. Ideally, all the patients attending should have been examined and in fact this was carried out whenever possible. In the absence of the writer any woman who appeared to the Sister in Charge to be anaemic was referred for special attention, and it is reasonably certain that no case of anaemia of any severity, either inpatient or outpatient, occurring in the six-month period escaped examination.

A further obstacle to the completeness of the work was that many of the patients could not be examined either regularly or completely since they not only attended as outpatients but were in many instances delivered in their own homes by the Outdoor Staff. The report

covers 110 cases.

The enquiry was nevertheless considered worth while as no figures have been published relative to the subject of anaemia in the population of Birmingham.

Methods.

A history was taken in each case with reference to age, number of pregnancies, complaints during pregnancy and previous obstetrical history with regard to blood loss at menses and at delivery. An attempt was made to determine the nature of the diet, particularly regarding the amount of meat protein, fruit and eggs taken and the frequency with which they were included in the weekly dietary. The weekly incomes were also assessed and the majority of these were checked from official records, which the writer was, for this purpose, allowed to consult.

Each patient was fully examined on her first appearance at the clinic. Blood counts and haemoglobin estimations were done only on some of the subsequent visits, usually about one month apart, but during the last month estimations were made more frequently. A special effort was made to obtain data within ten days of delivery, and again four to six weeks after parturition.

Haemoglobin Estimations. The majority of the estimations were made between 11 a.m. and 2 p.m. The Sahli

Leitz haemoglobinometer was used and the blood was matched against the same background on each occasion. The instrument was checked at intervals and it was found that 100% on the scale corresponded to 14.7 gms. of haemoglobin per 100 ccs. of blood which is equivalent to an oxygen-carrying capacity of 19.6 volumes per cent.

Red Cell Estimations. The pipettes used were of the standard pattern. The counting chamber was of the Buerker type with double Neubauer rulings.

Gastric Analysis. Most of the gastric analyses were performed on such out-patients as could be persuaded to attend for a fractional test meal. The method employed was to draw off all the fasting juice, to give the gruel of strained oatmeal porridge and take specimens every fifteen minutes for 2½ to 3 hours. At the end of this period all the remaining contents of the stomach were withdrawn and 0.5 mg. of histamine was injected subcutaneously. Twenty minutes later a specimen of the gastric secretion was withdrawn. The injection of histamine at the end of the test meal avoided the repetition of the meal in the event of free hydrochloric acid being very low or absent in the ordinary test meal. It was not deemed advisable to give all the out-patients histamine because of the upset which sometimes followed.

Other Investigations. Reticulocyte estimations

were made by counting the number of reticulocytes observed in a field of 300 red blood corpuscles. Price Jones curves were done on 26 patients. In each case 600-800 red blood corpuscles were measured in two diameters. Haematocrit readings were performed in a few cases: for this purpose a drop of blood was mixed with heparin and drawn into graduated capillary tubes, which were centrifuged for 20 minutes at 2,500 revs. per minute. From this was obtained the volume of packed red cells.

The information obtained from these enquiries will be examined in detail immediately. Thereafter two cases of special clinical and haematological interest will be discussed separately (Appendices I and II), etc. etc.

Section III.

A. GENERAL CONSIDERATIONS.Grouping of Clinical Material.

From haemoglobin estimations obtained in nulliparous females between the ages of 18-29 years and in parous women between the ages of 15 and 44 years, Davidson, Fullerton and Campbell⁽³⁶⁾ suggested that anaemia tends to appear, irrespective of pregnancy, as age advances, but that the incidence of anaemia is greater in women who have borne children. They also found in a series of pregnant women between the ages of 15 and 44 years that the average haemoglobin value was lower and the incidence of anaemia higher than in the non-pregnant women of the same age group. Since all the subjects of the present enquiry were pregnant women, it was decided to separate the 110 patients into four groups according to parity. This was found to be the most suitable classification, as the older women naturally are those with more pregnancies, are nearest to the menopause, and are generally comparable with one another but not with the younger individuals. Adoption of this form of subdivision gave the following:

34	1st pregnancy	(average age 24.5 years)
27	2nd "	(average age 28 years)
20	3rd "	(average age 28 years)
29	4th or subsequent pregnancy	(aver. age 35 yrs.).

Since individual blood observations varied greatly from case to case and from time to time in the same patient, it was decided that some method of simplification must be devised before the estimations could be discussed collectively. The patients were therefore classified according to their degree of anaemia. For this purpose it was decided that the patients whose lowest haemoglobin value during pregnancy was -

100%	had	no anaemia	(5)*
between 81-99%	"	1st degree anaemia	(43)
" 61-80%	"	2nd " "	(41)
" 41-60%	"	3rd " "	(19)
" 21-40%	"	4th " "	(1)
less than 20%	"	5th " "	(1)
			<hr style="width: 10%; margin-left: auto; margin-right: 0;"/> (110)

*The figures in brackets indicate the number of patients.

B. PARITY and DEGREE of ANAEMIA.

The relationship between parity and degree of anaemia in pregnant women has been fairly fully investigated. Galloway⁽³²⁾ has shown that there is no difference in the tendency to anaemia between primiparae and multiparae, as judged by the haemoglobin values. Bland,⁽⁴⁰⁾ Goldstein and First appear to confirm his findings, as⁽⁶⁾ do also the researches of Castle and Strauss. In contra-⁽³⁵⁾ distinction to these is the work of McGeorge who found that, in a group of pregnant multiparae, 64% of those with

normal haemoglobin values had one or two children while 75% of the anaemic group had two or three children.

(41)
Fullerton, too, pointed out that the average percentage haemoglobin of pregnant women with five or more previous pregnancies was lower than those with none or two previous pregnancies. He noted however that the average age in the former group was 35 years while in the second group it was only 25 years. Accordingly, he divided the pregnant patients into age groups. Each age group contained women during their third (or less) pregnancy and women in their fourth (or more) pregnancy. In a series of 376 pregnant women he found that the haemoglobin levels in the same age group were higher for women with four or more previous pregnancies than in women with three or fewer previous pregnancies. Reid and Mackintosh (39) state that "multiparity in good social circumstances appears to begin to exercise a definite effect on the haemoglobin value only when the women have had five (or more) previous children." In poor circumstances multiparity and anaemia were closely associated.

(32) (40) (6)
Galloway, Bland, Goldstein and First, Castle and Strauss, (41)
and Fullerton found there was no increasing liability to anaemia with increasing parity. In contradistinction to this McGeorge, Reid and Mackintosh, (35) (39) observed that the incidence of anaemia was greater with increasing parity.

This, however, is not the general opinion which favours the view that increasing parity has no bearing on the incidence of anaemia.

In the following table (Table I) are given the averages of the lowest haemoglobin values in the various groups found at any time during pregnancy in the present investigation.

Table I.

	No. of Cases.	Average age in years.	Average of lowest Hb values.	Average of corresponding R.B.Cs.
Primiparae	34	24.5	75.7	3.73
Para 2	27	28	77.6	3.77
Para 3	20	28	72.0	3.58
Para 4+	29	35	76.0	3.86

From the above table it appears that there is little or no difference in the average red cell count or haemoglobin estimation between the primiparae, the para 2 and para 4+ groups. The 3 para group is slightly lower than the others because of the inclusion of two cases of very severe anaemia which will be discussed later.

It was thought, however, that the frequency of severe anaemia might be greater in some groups. Therefore, in Table II the patients were grouped according to

degree of anaemia.

Table II.

Para-group	No. of cases	Degree of Anaemia						Below 60% Hb.	
		0	1	2	3	4	5	No.	%
1	34	-	14	16	4	-	-	4	12
2	27	2	11	10	4	-	-	4	15
3	20	-	9	5	5	-	1	6	30
4+	29	3	9	10	6	1	-	7	22
Totals	110	5	43	41	19	1	1	21	19

It is apparent that 21 patients or 19% of the series had a haemoglobin value of less than 60%. These represent 12% of the primiparae, 15% of the para 2, 30% of the para 3, and 22% of the para 4+ groups respectively. The incidence of the more severe degrees of anaemia is apparently greater in the para 3 and para 4+ groups. There are, however, five cases with no anaemia, of which three are found in the para 4+ group.

G. AGE and DEGREE of ANAEMIA.

(40)
Bland, Goldstein and First in a series of 200
(10)
pregnant women and again in another group of 1000 pregnant women found no relationship between age and degree of anaemia. In a series of pregnant women, Castle and
(6)
Strauss observed that the average haemoglobin and red cell estimations were the same above and below the age

of 26 years. The results of McGeorge⁽³⁵⁾ are in agree-
ment with those of the above workers. Boycott⁽⁵⁾ in a
report of 222 pregnant women, did not feel confident
of any relationship between age and the severity of the
anaemia. It is clear, however, that he considered the
data highly suggestive of such a relationship.

In the present series (Table I) there is no apparent
relationship between the age groups and the degree of
anaemia, the youngest having a mean of 75% Hb. as against
76% in the oldest group. The difference in ages was
10½ years, which should be sufficient to allow of the
demonstration of any decline in the haemoglobin level as
age advances.

Section IV.

STAGE of PREGNANCY and its RELATIONSHIP to ANAEMIA.

As hydraemia is least marked in the first trimester and becomes more marked as term approaches, it can be readily understood that variations in haemoglobin values and red cell estimations of any individual will occur during pregnancy. With the recession of the hydraemia at delivery, further changes in the haemoglobin and red cell estimations in the direction of a return to normal might be expected to occur. The results of investigations by other workers on the haemoglobin and red cell estimations during pregnancy and the puerperium are recorded below and tabulated at the end of this section.

(32)

Galloway in a series of 382 anaemic pregnant women, some of whom received treatment during gestation, found that there was a fall in the average haemoglobin and red cell estimations during the second and third trimesters. Within three days after delivery, an increase in haemoglobin and red cells occurred. Eight weeks post partum, however, a fall in haemoglobin was observed.

In a series of 200 pregnant women, Bland, Goldstein
(40)
and First observed that 33% had a red cell estimation below 3,500,000 per c.mm. in the first six months of

pregnancy; that 55% gave estimations below this figure in the third trimester and only 26% had estimations below this figure during labour. They also in another communication demonstrated that of 94 gravid women with "normal" counts during pregnancy (i.e. over 3,500,000 red blood corpuscles per c.mm.) 73.4% showed a reduction after labour. They observed, in a series of women who were anaemic during pregnancy, that while 16% had a further reduction within 2 days of delivery 58% showed a marked rise. In another group of 100 selected patients, who had anaemia during pregnancy, they noted that 61 patients had normal counts between the second and the sixth months of the puerperium, 95 patients having an increase of at least 10% haemoglobin in the same period. They attributed the fall in red blood corpuscles and haemoglobin after labour to blood loss, and the increase during the puerperium to the activity of the blood forming organs.

The same workers⁽⁴⁰⁾ in a series of 29 pregnant women with red cell estimations below four million per c.mm. at the eighth month of pregnancy, observed that seven showed no change at term, in thirteen there was an increase and in nine a decrease.

⁽³⁴⁾
 Mackay in 39 untreated anaemic pregnant women, nearly all of whom were primiparae, found that a slight

increase in haemoglobin occurred before delivery but that the rise six months post partum was negligible.

A slight fall in haemoglobin and red blood corpuscles (6) was observed by Castle and Strauss towards the end of the second trimester in a series of 22 pregnant women. Thereafter the figures remained stationary or showed a slight rise with further increase after delivery.

In a group of 45 normal pregnant women Davies and (7) Shelley observed a decrease in the Hb., varying from 8 to 17%, and in the red blood corpuscles which diminished by 280 to 800 thousand per c.mm. during the third trimester. After delivery an immediate improvement occurred in both but it was not material till two months after confinement.

(42)
Davis and Walker recorded a fall in haemoglobin and red blood corpuscles during the second and third trimesters. They noted, within 24 hours of delivery, an improvement which continued till the end of the second week of the puerperium. Six weeks after delivery a fall occurred, possibly, the authors suggested, due to recommencement of work.

A progressive fall in haemoglobin and red blood corpuscles in successive months of pregnancy, the haemoglobin falling more than red cells, was observed in a

series of anaemic pregnant women by Richter, Meyer and
(4)
Bennett. They also showed that the haemoglobin and
red blood corpuscles rose to a peak eight days after
delivery. Thereafter the figures fell gradually through-
out the following five weeks, to recover slowly later.

(8)
Dieckmann and Wegner found that no reduction of
red blood corpuscles was observed during the first tri-
mester. A fall however occurred during the 26th to the
35th weeks of pregnancy after which there was an in-
crease till delivery. Within the first week after
delivery a fall occurred but at the end of the third
week of the puerperium the red cell estimations were the
same as those observed at the beginning of pregnancy.
Observations on the haemoglobin level revealed a fall
during the first trimester, followed by a more marked
fall between the 26th and 35th weeks of pregnancy. From
this point until delivery an increase occurred, to be
followed by a reduction subsequent to the birth. This
lowered figure they found to persist at least till the
end of the second week after delivery. (They do not
give estimations beyond this period.)

In one hundred consecutive unselected pregnant
women, McGeorge (35) observed there was a slight fall of
the average haemoglobin value during the second tri-

mester with a slight rise towards the end of the third trimester. A further increase was present three days after delivery and was quite appreciable at the end of the first week of the puerperium.

(43)

Fullerton in a series of pregnant women demonstrated a fall in haemoglobin in the third trimester, in the last week of which however there was slight increase. A progressive rise in the haemoglobin level continued from the second day of the puerperium for twelve months.

From observations made on an unselected group of pregnant women, Boycott demonstrated a slight rise in the mean haemoglobin value before delivery.

Table III.

Haemoglobin level in pregnancy and puerperium.

Ref. no.	PREGNANCY			Within 1 week of delivery		After delivery		
	Trimesters			before	after	6wks	2mths	6mths
	first	second	third					
4	progressive	fall			rise	fall	grad.	rise
8	progressive	fall*						
32		progress.fall			rise			marked rise
42		fall	fall		rise	fall		
6		fall	ISQ.	rise	contd.			
35		sl.fall	sl.rise	sl.rise	fall or rise			
7			fall		rise		marked rise	
43			fall	rise	rise			marked rise
5				rise	contd.			
34				sl.rise	stationary for 6 months.			

* rise 4 wks before delivery.

It is obvious from the above that most workers have found a fall in the Hb. level during the second and third trimesters, some being of opinion that the fall is progressive. Six references are made to a rise before delivery, the time of increase being generally put within the preceding week. It is of interest to note that this terminal rise has been recorded by one of the investigations which showed a progressive fall up to that point throughout the period of gestation.

After delivery the Hb. values rise, though apparently not to any great extent even when followed for six months.

Table IV.

Red cell counts during pregnancy and puerperium.

Ref. no.	Pregnancy			Within 1 week of delivery		After delivery		
	trimesters			before	after	6wks	2mths	6mths
	first	second	third					
4	progressive fall				rise	fall	gradual	rise
8	normal	progress.fall*		rise	fall	normal		
32		"	"		rise		stat.	rise
42		fall	fall		"	fall		
6		"	ISQ.	rise	"			
7			fall		"		marked	rise
40			"	rise	rise or			
10			"		fall		marked	rise
					rise		rise	

* rise 4 weeks before delivery.

The red cell counts varied, in most studies, in a manner almost parallel to the haemoglobin estimations. Agreement is shown as to a fall, progressive or not, in the cell count especially in the later months of pregnancy. Again a terminal rise has been noted in three studies.

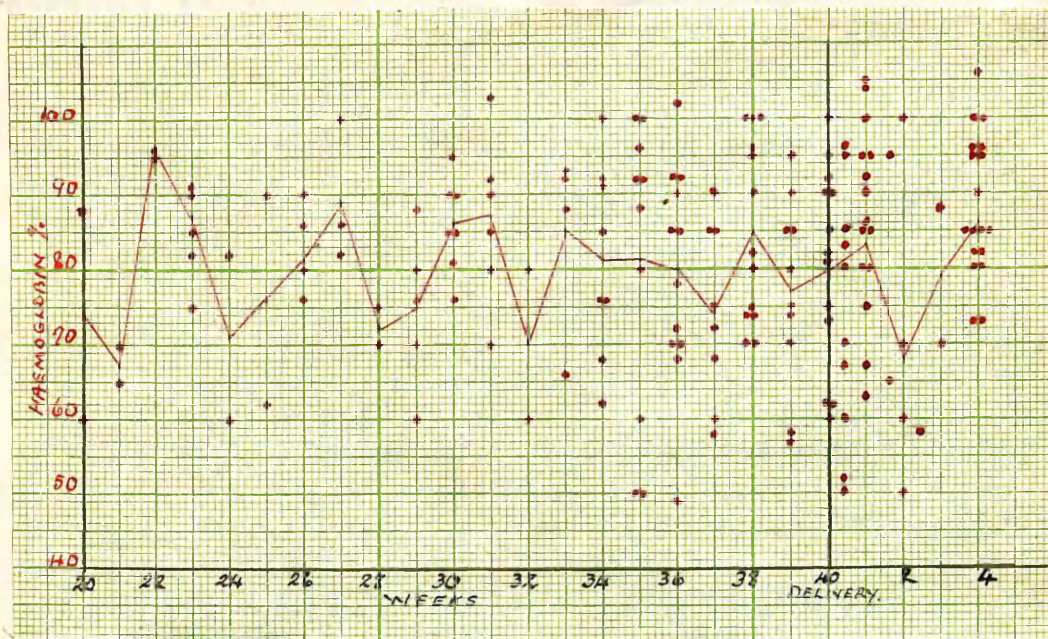
The variations following confinement do not seem to be quite decided. Four reports mention the possibility of a fall in the cell count at various times, even when an increase had been noted within a week of delivery, and the period required for complete restoration of the normal level is, so far as can be ascertained, indefinite.

In the present investigation an attempt was made to study the behaviour of the haemoglobin and red cells during pregnancy. Since the material was drawn from an outpatient clinic, at which attendances in the early months of gestation were infrequent, the number of estimations is rather small to allow of the consideration of individuals. The readings for the different groups have therefore been amalgamated and the composite curves thus obtained are given below.

A. Haemoglobin.

In Chart I are plotted the individual haemoglobin readings of the 34 primiparae at various stages of pregnancy.

Chart I.



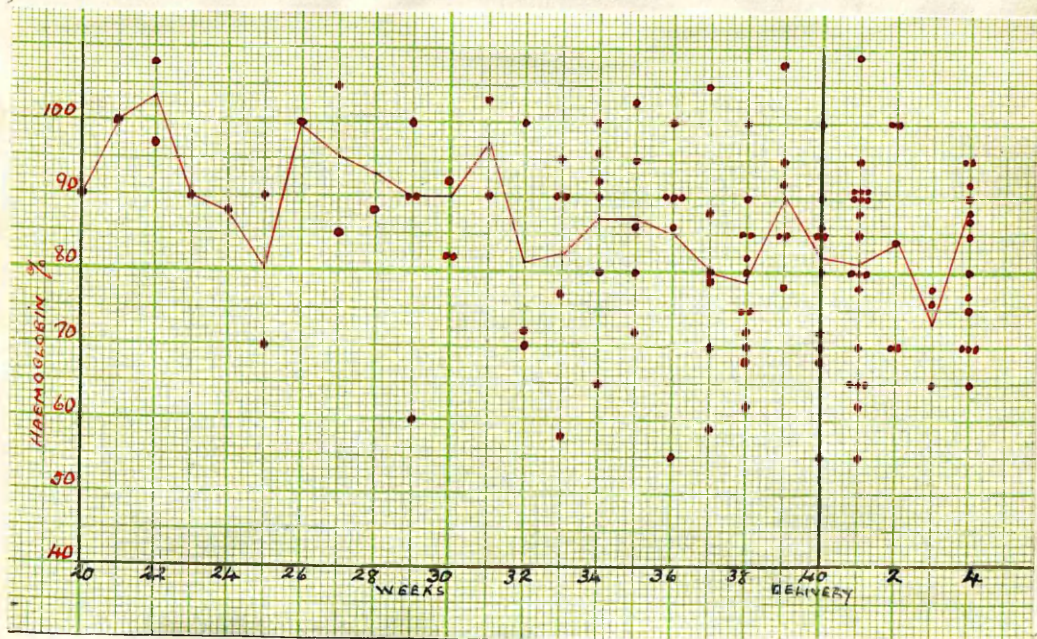
It will be seen that the majority of these estimations lie between 70 and 95%. Ten readings of 100% or more, and 13 readings of 60% or less, make up the extremes. One week and four weeks after delivery there are equal numbers above and below 80%. The composite curve oscillates above and below 80% throughout the period of study - 20th to 40th weeks - and there is no apparent lowering of the level in the later stages. The slight terminal rise is negligible, amounting to 3% Hb. in the last week.

In the puerperium there is no dramatic return to normal. In fact the number of readings below 80% is quite considerable, and the composite curve fails to rise above 85% even after an interval of four weeks. As these post partum observations were all made on patients in

hospital this is somewhat remarkable. Under hospital conditions the opportunities for "recovery" - in every sense of the word - are much greater than elsewhere, and the patients admitted were not by any means restricted to those with abnormalities. Many were entirely "normal" and the reason for the persistence of a low haemoglobin level is not apparent.

In Chart II the individual haemoglobin readings of the 27 patients in the 2 para group are recorded at various stages of pregnancy and the puerperium.

Chart II.

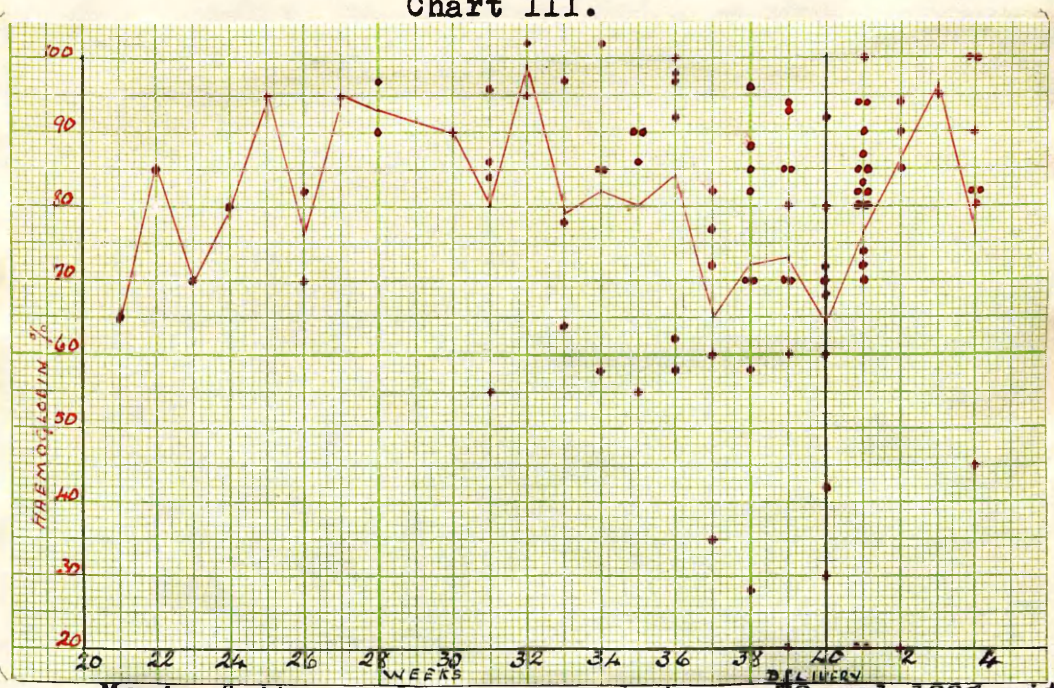


It can be seen that the majority of the readings are in the region between 80 and 95%. There are 14 estimations of 100% or more and only five of 60% or below. There

are equal numbers above and below 80% one week and four weeks after delivery. The composite haemoglobin curve of this group runs just above the 80% level and shows a distinct downward tendency. Before delivery a rise occurs, but thereafter, as in the primiparae, there is only a slight rise in the next four weeks.

The individual haemoglobin readings are similarly dealt with for 3 parous women in Chart III.

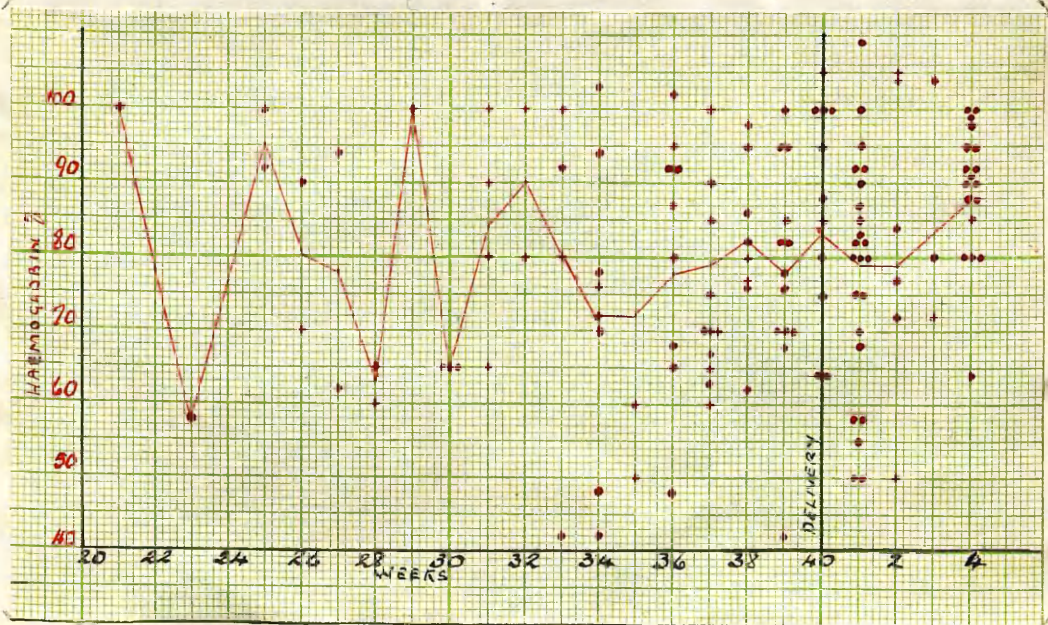
Chart III.



Most of the readings range between 70 and 100% with three above the latter figure. There is a well-defined group between 55 and 65% while a few isolated readings occur below 30% as term approaches. Most of the estimations one week after delivery lie between 80 and 90%. Very

few observations are recorded 4 weeks after delivery. The composite curve of the 3 para group shows a fall from the 36th week of pregnancy till term, probably due to the inclusion at the end of this group of two of the most severe anaemias in the entire series. A rise occurs in the first week after delivery with a further rise two weeks later, and it is obvious that the mere bearing of three children has not seriously lowered the haemoglobin level in the majority of cases. The two severe anaemias will be discussed later. The individual haemoglobin readings of twenty-nine women during the fourth or subsequent pregnancy are shown in Chart IV.

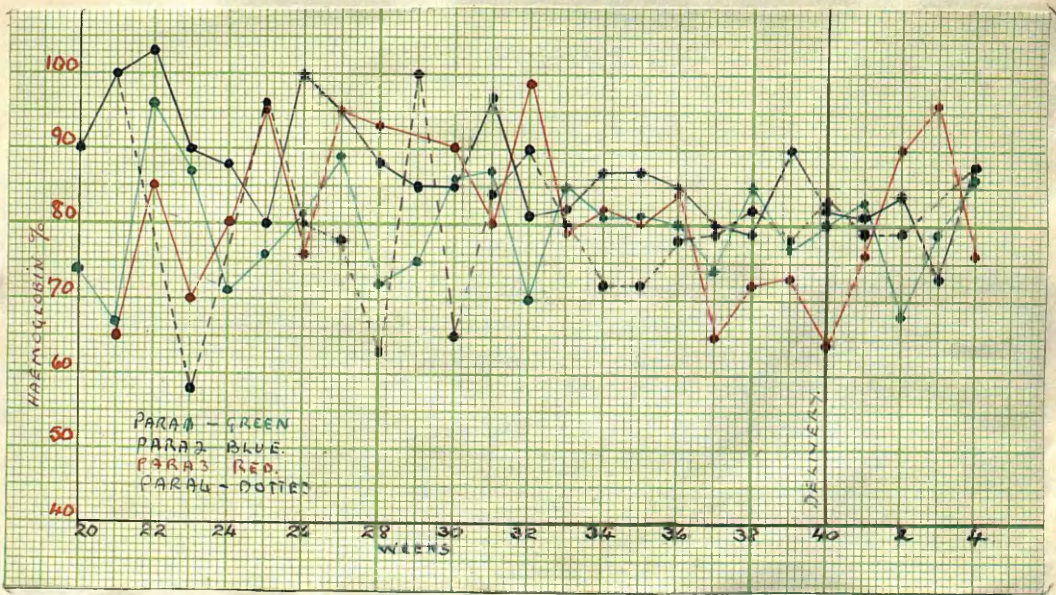
Chart IV.



The readings are equally distributed between 60 and

100%. Fourteen readings occur above 100% and six below 50%. In the first week of the puerperium most of the readings are above 80%, and definitely above 90% three weeks later. The composite haemoglobin curve of the group rises about the 35th week of pregnancy from 72% to 80% where it remains till delivery. A fall occurs one week after delivery followed by a marked rise three weeks later.

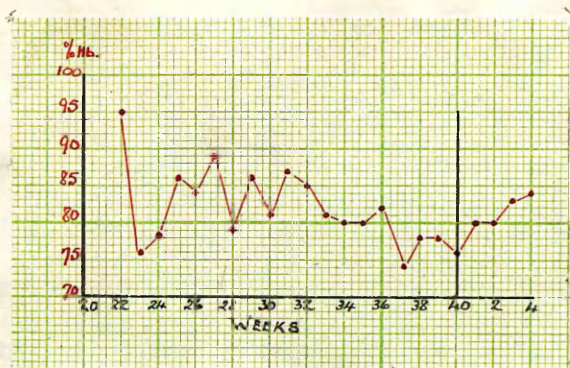
Chart V.



The net result of all these observations is shown in Chart V, in which the four composite curves have been superimposed, and if the whole mass of figures is reduced to one single curve (Chart VI) it is apparent that there is a gradual fall from about 85% in the 24-32 week period to 77% at delivery. The rise in the puerperium is quite

distinct but does not quite restore the level to 85%, and even that figure must be regarded as a very low normal for a healthy woman.

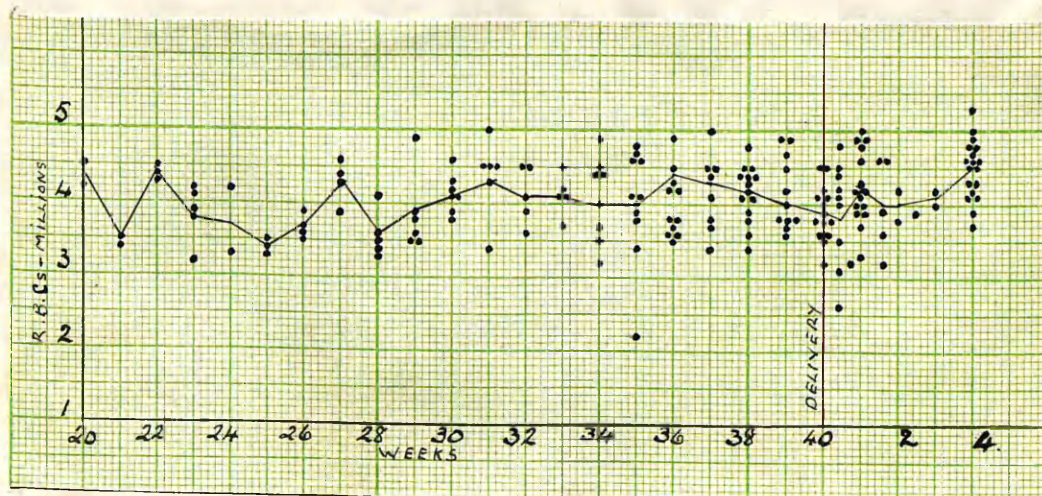
Chart VI.



B. Red Blood Corpuscles.

In Chart VII are plotted the individual red cell estimations of the primiparae at various stages.

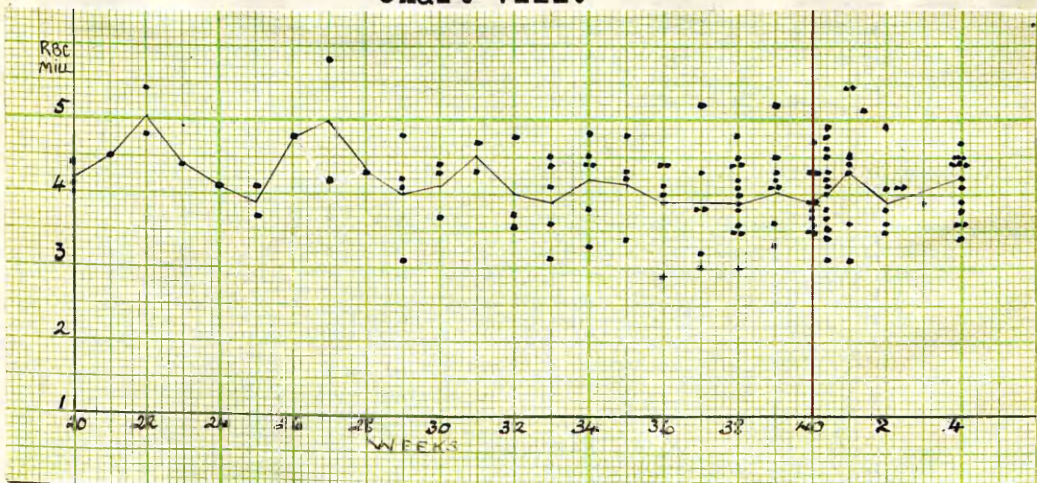
Chart VII.



During pregnancy most of the readings lie between 3.5 and 4.5 millions per c.mm. Only two readings occur over 5 millions per c.mm. At the end of the first week of the puerperium the majority of the estimations are about 4 millions, while four weeks after delivery almost all range between 4 and 5 millions. The composite red cell curve shows a rise beginning in the 35th week of pregnancy, reaching a peak on the 36th week. From this point until delivery, there is a steady decline; but after delivery there is a slight rise followed by a marked increase at the end of the fourth week of the puerperium.

The red cell estimations of the 2 para group are given in Chart VIII.

Chart VIII.

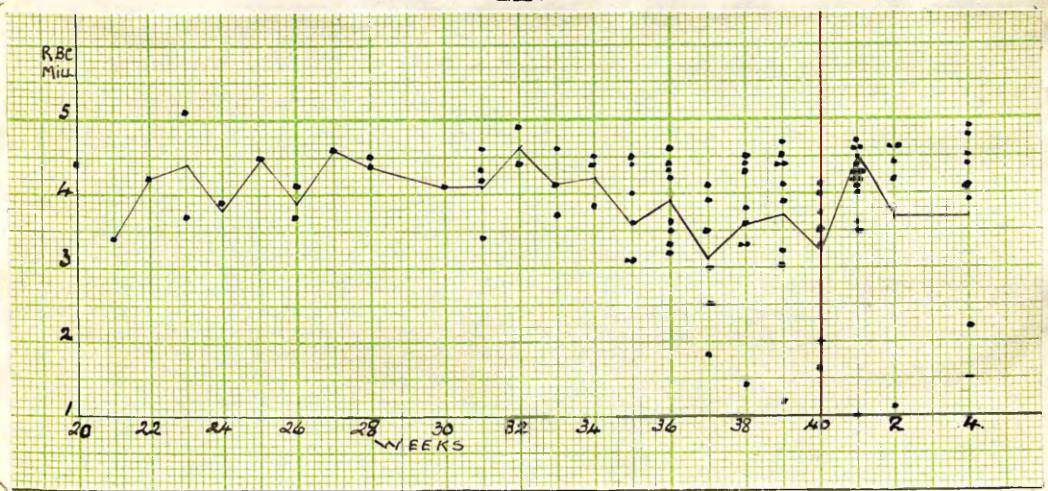


The readings range between 3.5 and 4.5 millions per c.mm. Four days after delivery the values range between 3.5 and 5 millions, while 4 weeks after delivery the

majority fall between 3.5 and 4.5 millions. The composite curve of this group shows a fall at the 34th week of pregnancy, after which it runs at a level just below the 4 million mark till delivery. One week after delivery a slight rise occurs which is maintained in the 4th week of the puerperium.

In Chart IX are shown the individual red cell estimations of the 3 para group.

Chart IX.

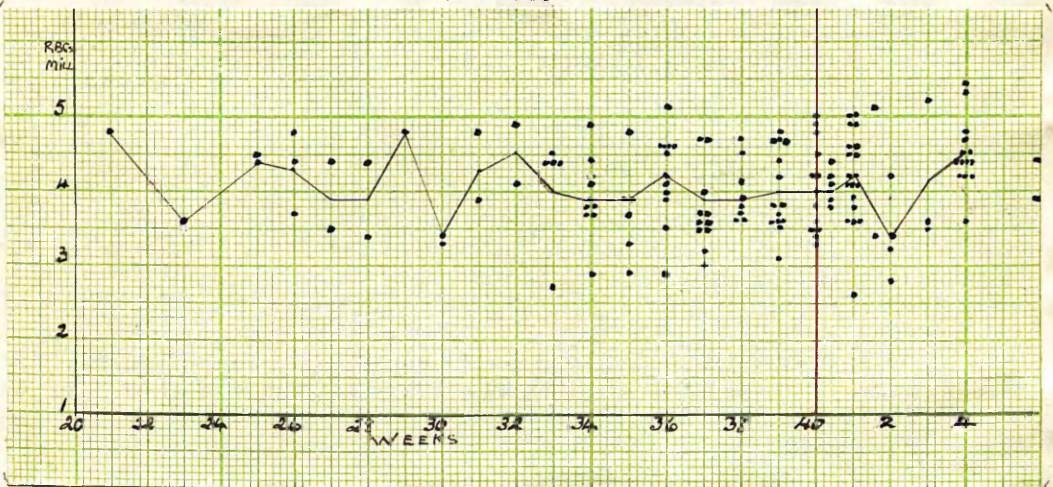


The majority of the red cell counts lie between 3 and 4½ millions but a few were less than two millions. One week after delivery most of the estimations lie between 4 and 4½ millions per c.mm. Few readings are recorded 4 weeks after delivery. The composite red cell curve of this group shows a progressive fall from the 32nd week of pregnancy, most marked four weeks before delivery. This is undoubtedly due to the inclusion of the two severe

anaemias previously mentioned. A marked rise occurs within the first week of the puerperium but is not maintained three weeks later.

The individual counts of the para 4 (or more) group are graphed in Chart X.

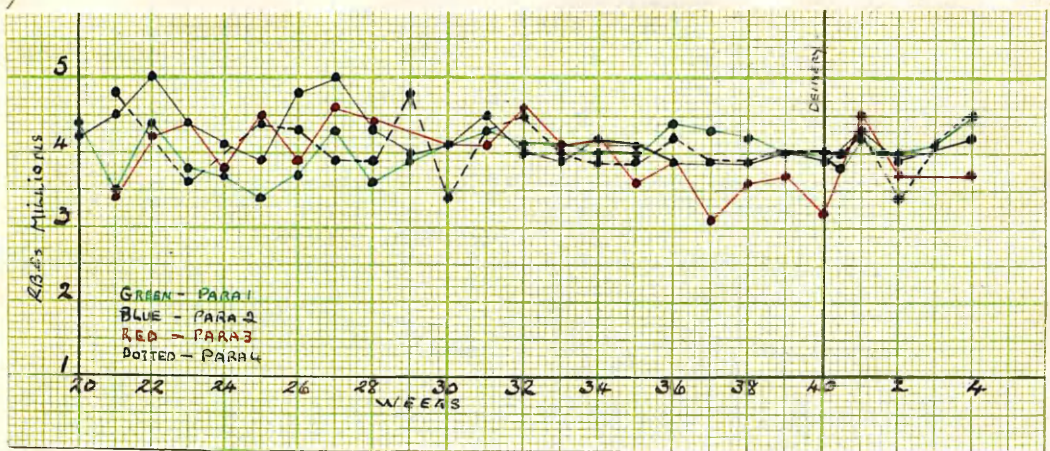
Chart X.



The majority of the readings lie between 3.5 and 4.7 millions per c.mm. One week after delivery there is a distinct massing of the counts between 3.6 and 5 millions, and 3 weeks later between 4.2 and 4.8 millions. The composite curve of this group shows a fall at the 32nd week of pregnancy and runs horizontally to term, with an interrupted rise after delivery.

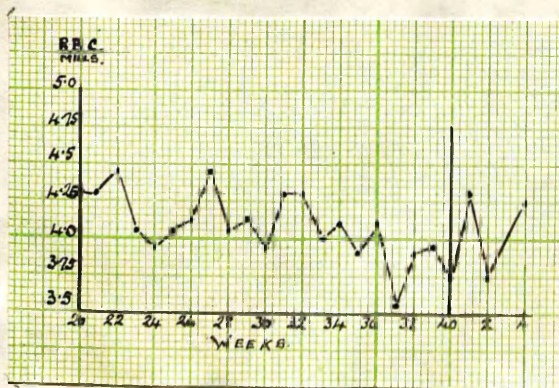
To facilitate comparison of the various groups and to obtain an idea of the general trend of red cell counts, the composite curves have been superimposed in Chart XI,

Chart XI.



and the result of the entire series is shown in Chart XII. There is a distinct downward tendency in the last nine weeks of pregnancy, a sharp rise immediately after delivery, but no further progress in the subsequent four weeks. Again, the last recorded average - 4,200,000 - must be regarded as a very low level for a normal woman.

Chart XII.



C. Haemoglobin and red cells after delivery.

Since the literature, previously quoted, and the examination of figures just concluded are in agreement that there is no dramatic resolution of the anaemic state following parturition, it may be of value to review the post partum estimations in more detail. Table V shows the number and percentage of patients who showed an increase, no change or a fall in haemoglobin immediately following delivery.

Table No.V.
Haemoglobin level within 10 days of parturition.

Parity and no. of each.	INCREASE		STATIONARY.	DECREASE		Not recorded.	Total recorded.
	No. of cases recorded.	% of observations	No. of cases recorded.	No. of cases recorded.	% of observations		
1(34)	12	40	5	13	43	4	30
2(27)	14	58	2	8	33	3	24
3(20)	8	47	0	19	53	3	17
4+(29)	14	50	1	13	46	1	28
(110)	48	48	8	43	44	11	99

Of the 110 patients, 11 had no estimation performed immediately after delivery, for various reasons - death, delivery at home, etc. - outwith the writer's control. Taking the remaining 99 patients, 48% showed an increase in haemoglobin, 44% had a fall in haemoglobin and in the remainder - 8%,

there was no appreciable change. It can be seen that 40%, 58%, 47% and 50% of the para 1, para 2, para 3 and para 4+(or more) groups respectively showed an increase in haemoglobin within 10 days of delivery. It may be noted that the primiparous group has the smallest percentage of cases showing improvement within this period and the para 2 group the greatest number. There is really no appreciable difference between the para 3 and para 4+ groups.

The results of haemoglobin estimations done four to six weeks after delivery are recorded in Table VI.

Table VI.

Haemoglobin level 4-6 weeks after delivery.

Parity and no. of each.	INCREASE		STATIONARY.	DECREASE		Not recorded.	Total recorded.
	No. of cases recorded.	% of observations		No. of cases recorded.	% of observations		
1(34)	16	80	0	4	20	14	20
2(27)	6	43	2	6	43	13	14
3(20)	7	100	0	0	0	13	7
4+(29)	14	77	1	3	17	11	18
(110)	43	73	3 (5%)	13	22	51	59

Of these patients who had haemoglobin estimations performed 4-6 weeks after delivery 73% showed an increase, 5% showed no appreciable change and in 22% a decrease occurred. It is unfortunate that about 50 patients did not attend for

blood counts although persistently written for. Eighty per cent of the primiparae who had counts done showed an increase in haemoglobin and this compares favourably with the para 4+ group. All of the small number of patients in the para 3 group who had estimations done at this time showed an increase. In only 43% of the para 2 group was an increase in haemoglobin found.

Similarly, the effect of delivery on the red cell count was observed after corresponding intervals. The results are shown in Table VII.

Table VII.

Red cell estimations within 10 days of parturition.

Parity and no. of each.	INCREASE		STATIONARY	DECREASE		Not re- cord- ed.	Total re- cord- ed.
	No. of cases record- ed.	% of obser- vations.		No. of cases record- ed.	No. of cases record- ed.		
1(34)	16	53	1	13	43	4	30
2(27)	16	58	2	6	25	3	24
3(20)	10	59	0	7	41	3	17
4+(29)	17	60	3	8	29	1	28
(110)	59	59	6	34	34	11	99

59% of all patients in whom estimations were made showed an increase in red blood corpuscles within 10 days of delivery. There was no appreciable difference in the

percentage of cases in the various groups showing an immediate increase. The primiparae, however, provided the lowest figure.

The effect of delivery on the red cell estimation 4-6 weeks after parturition is shown in Table VIII.

Table VIII.
Red cell level 4-6 weeks after delivery.

Parity and no. of each.	INCREASE		STATIONARY	DECREASE		Not recorded.	Total recorded.
	No. of cases recorded.	% of observations.	No. of cases recorded.	No. of cases recorded.	% of observations.		
1(34)	17	85	2	1	5	14	20
2(27)	7	47	0	8	53	12	15
3(20)	6	75	0	2	25	12	8
4+(29)	14	82	1	2	12	12	17
Totals	44	73	3	13	22	50	60

This demonstrates that 73% of those examined showed an increase in the red blood corpuscles at that time. This appears to be most marked in the primiparae and in women who have had four or more previous pregnancies, and least marked in the para 2 group.

Taken as a whole the results, both as regards haemoglobin and red cells, show a very slow return to normal. The speed of return does not seem to be related to the number of pregnancies and the possible bearing of other factors on

this feature of the haematological picture will be referred to later. Meantime it is sufficient to note that there is delay in regaining the accepted normal levels and this has an obvious relationship to the adequate care of the mother on termination of pregnancy.

D. Colour Index.

(30)
Price Jones gives the limits of normality as .91 to 1.07 in a series of 200 healthy men and women.

(44)
Dieckmann and Wegner find, in normal pregnancy, that a small increase occurs in the average colour index, with a lowering at term and a further increase post partum. The range is between .8 and 1.44. The averages for the various stages of pregnancy are, however, within normal limits (.9 to 1.1).

In the present investigation, the colour index for each patient was determined from the lowest haemoglobin value recorded, with the corresponding red blood cell count.

The colour indices for the patients in the various groups are tabulated below. (Table IX).

It will be seen that 14 (or 13%) had a colour index of 1.1+. About half of these were found in primiparae and all of these patients were found to have first or second degree anaemias, ten being of the first degree (80-99% Hb.). Colour indices of .9 - 1.09 accounted for 79 (or 72%), i.e.

Table IX.
Colour index during pregnancy.

Parity	Degree of anaemia	COLOUR INDEX			No. of cases.
		< .89	.9 - 1.09	1.1+	
1	first	1	10	3	14) 16) 4) 34
	second	1	12	3	
	third	4	-	-	
2	none	-	2	-	2) 11) 10) 4) 27
	first	-	8	3	
	second	-	10	-	
	third	1	3	-	
3	first	-	7	2	9) 5) 5) -) 1) 20
	second	1	4	-	
	third	2	3	-	
	fourth	-	-	-	
	fifth	1	-	-	
4+	none	-	3	-	3) 10) 9) 6) 1) 29
	first	1	7	2	
	second	-	8	1	
	third	4	2	-	
	fourth	1	-	-	
TOTALS,		17	79	14	110

these were within the normal limits for non-pregnant women. Seventeen patients (or 15%) had a colour index less than .89 and therefore below the normal limits. These colour indices were distributed equally amongst the para 1, 3 and 4+ groups. Eleven were found in patients with 3rd degree anaemia (41-60% Hb.), one in a 4th degree anaemia (21-40%

Hb.), and one with a 5th degree anaemia (under 20% Hb.).

Briefly, 87% of the series showed a normal or sub-normal colour index, i.e. had a hypochromic anaemia. This is in accord with the rarity of occurrence of the pernicious type of blood dyscrasia, but it is surprising to find the colour indices above unity mostly in the mildest cases. Taken to elementary principles it seems to point to an inability of the mechanism for cell production to utilise all the available haemoglobin in 13% of the series. This will be referred to again when the reticulocyte counts are considered.

E. Price Jones Curves.

Price Jones Curves were done in 26 patients during pregnancy. Price Jones⁽⁴⁵⁾ gives the average diameter of the red blood corpuscle in healthy women as 7.2μ , with a range from $6.686 - 7.718\mu$.

Dieckmann and Wegner⁽⁴⁴⁾ showed that there is a definite increase in the size of the erythrocytes during pregnancy reaching a maximum between the 26th and 35th weeks. A slight decrease in size begins just before term and is continued into the puerperium. The changes they observed were, however, within normal limits.

In the following table (Table X) the average red cell diameter, and in some cases the haematocrit readings and

cell volume indices are recorded. (The actual Price Jones curves are attached to the respective case histories in Appendix III). The haemoglobin and red cell estimations are those performed on the same day as the haematocrit readings were taken.

Table X.

Red cell diameter, haematocrit, cell-volume index in pregnancy.

	AGE yrs.	Hb%	R.B.Cs millions.	RED CELL DIAMETERS			% Haematocrit	Cell. Volume Index	
				.Low	Normal	High			
Primip. (5cases)	31	60	3.80	6.45	7.09	7.74	28	.84	
	18	100	4.40				37	1.00	
	28	81	4.10				-	-	
	17	92	4.32				36	1.00	
	?	75	3.20		-	-			
2 Para (4cases)	27	60	3.12		7.09	7.74	29	1.07	
	23	62	3.10		7.09		-	-	
	28	88	4.12		7.09		34	.99	
	23	85	4.32		-		31	.86	
3 Para. (5cases)	27	70	4.68	{ 6.45- 6.77 6.5	7.42	7.74	-	-	
	27	20	1.15				-	-	
	38	70	3.60				-	-	
	27	80	4.00				-	-	
	29	62	3.12				-	-	
Para 4+ (11cases)	34	40	3.60	6.45	6.77	7.74	-	-	
	37	50	3.33				6.45	23	.83
	33	58	3.68				6.45	25	.80
	34	60	3.40				-	-	
	37	100	4.90				-	-	
	43	80	4.20				-	-	
	37	100	4.20				-	32	.91
	32	60	2.90				{ 7.09 7.42	-	-
	38	64	3.03				7.09	-	-
	35	78	3.94				7.42	-	-
	29	66	3.32				-	-	29
TOTALS,				6	15	4	10	10	

Of 25 cases in which Price-Jones curves were done, 15 had an average red cell diameter within the normal range. Six cases were definitely microcytic and four were macrocytic. That is, the vast majority (21 out of 25) were within or below the normal limits. There does not seem to be any relationship between the average size of the cell and the haemoglobin estimation, e.g. a 60% haemoglobin was found in all three categories of red cell size, low, normal and high - the colour index in each of these instances being below unity.

F. The Cell Volume Index.

(44)

Dieckmann and Wegner in "standard blood" give the volume of the packed red cells as 43 ccs. per 100 ccs. of blood, and the normal cell volume index as ranging between 0.9 and 1.1. They observe that the average for the cell volume index in healthy pregnant women indicates an increase, within the normal range, in the size of the cell during pregnancy. They note also that a decrease occurs before term which is continued into the puerperium. Win-

(31)

trobe in a group of normal healthy women gives the volume of packed red cells as 42, while Haden in a group of healthy subjects finds this value to be 46 volumes per 100 ccs. of blood and the normal cell volume index to fall between 0.9 and 1.1.

(46)

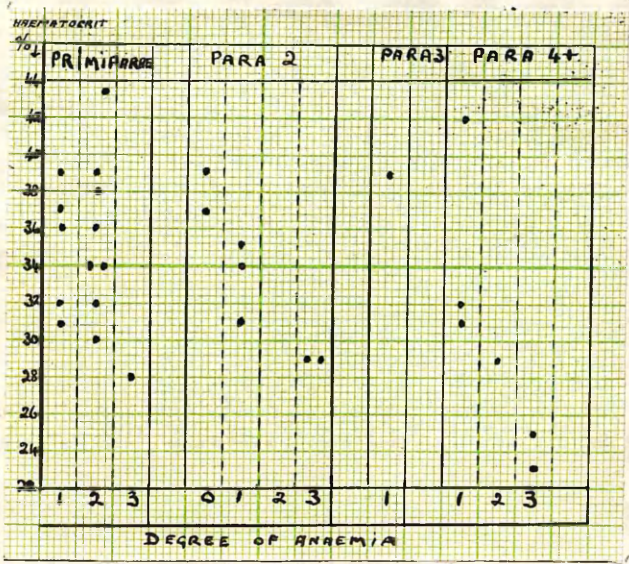
Haematocrit readings were taken in 27 patients during pregnancy. These readings together with the corresponding cell volume indices are recorded in Table XI. In the present investigation 42 ccs. of packed red cells for each 100 ccs. of blood was taken as the standard of normality and the normal cell volume index as ranging between 0.9 and 1.1.

Table XI.

	Degree of anaemia	% Haematocrit	Cell volume Index.
Primiparae	First	37	1.00
	"	36	.96
	"	31	1.01
	"	32	.93
	"	39	1.03
	Second	36	1.00
	"	38	.98
	"	32	.87
	"	30	.82
	"	34	.93
	"	34	1.12
	"	39	1.04
	Third	28	.84
Para 2.	None	37	.97
	"	39	1.05
	First	31	.86
	"	34	.99
	"	35	.87
	Third	29	1.07
	"	29	.94
Para 3.	First	39	.96
Para 4+.	First	32	.91
	"	42	1.01
	"	31	.77
	Second	29	.89
	Third	25	.80
	"	23	.83

Only in one instance did the mass of centrifuged cells reach the normal level. The remaining twenty-six gave readings down to 23 volumes per cent., in a third degree anaemia of the most fecund group (Chart XIII).

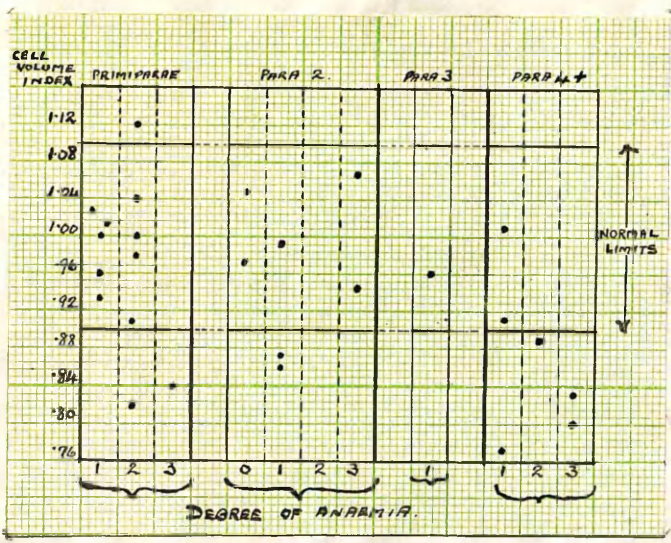
Chart XIII.



The lowest readings were found in the more severe degrees of anaemia, irrespective of parity, although the opposite was not necessarily true.

As regards cell volume index, it is apparent that the majority were within normal range. In nine cases there was a subnormal figure, indicating a microcytosis, to a quite appreciable degree - 0.77 in place of the normal minimum of 0.9 (Chart XIV). The low index was found to

Chart XIV.



be equally distributed among the anaemias of first, second and third degrees, no difference was noted as to frequency in association with multiple pregnancies or vice versa. Reference to Table X shows that there was no constant relationship of the cell volume index to either of the other associated features of cellular structure - haematocrit reading, or mean diameter - nor to the erythrocyte count.

G. Reticulocyte Counts.

It has previously been pointed out that absence of reticulocytes after delivery was reported by Richter, Meyer and Bennett ⁽⁴⁾ and by Boycott ⁽⁵⁾ in women, and by Van Donk, ⁽²⁾ Feldman and Steenbock in rats. During the course

of this work, reticulocyte counts were done as part of the routine blood examination. It was found that, irrespective of the degree of the anaemia, reticulocytosis was absent during pregnancy, the counts invariably showing less than one per cent. Similarly, after delivery there was no reticulocytosis even in the presence of an increasing red cell count. It seemed that no advantage was to be gained by pursuing this routine and thereafter reticulocyte counts were done only in special circumstances. In case No. 94, for instance, iron was given on the 35th week of pregnancy. Within 14 days, there was an increase of haemoglobin and red blood corpuscles and a reticulocytosis ranging from 2.8 to 6.8%. In three other patients, receiving iron therapy reticulocyte counts were done from the day of delivery onwards. Before the commencement of iron, the reticulocyte count in each case was less than one per cent. One patient had a reticulocytosis of 2% in the presence of an increasing red cell count. In another, a reticulocytosis of 2% occurred with a slight fall in number of red blood cells, while in the third patient, the reticulocytes rose to 4.8%.

These examples serve to show that there is no general defect in the bone marrow but that the stimulus to reticu-

cyte formation is lacking in the majority of pregnant women. Hence the absence of any attempt at repair of the deficiency in erythrocytes. The high colour index already noted in some 13% of the present series, mostly in cases of milder degrees of anaemia, together with the absence of reticulocytosis shows that the missing link is not in the nature of iron deficiency, and the possible causes fall to be considered later.

Section V.

GASTRIC ANALYSES.

Achlorhydria and its bearing on low haemoglobin values, and the relationship between the gastric secretion and anaemia have already been discussed (page 7).

(19)

Castle and Strauss in a series of 24 apparently normal healthy pregnant women performed monthly test meals during pregnancy. In each case the alcohol test meal was used. They accepted Carlson's standard of normality whereby normal human gastric juice is taken to be one containing 40-50 ccs. of N/10 hydrochloric acid per 100 ccs. of gastric juice.

18 acidity below normal
 (3 post-hist. anacidity
 { 7 < 10ccs. N/10 HCl.
 { 8 < 20ccs " "

6 acidity normal.

24 cases examined.

They observed that 18 of the 24 apparently normal pregnant women had a gastric secretion below normal. Of these eighteen, three patients had post-histamine gastric anacidity. Seven patients had less than 10 ccs. of N/10 hydrochloric acid and eight had a concentration of less than 20 ccs. of N/10 hydrochloric acid per 100 ccs. of gastric juice. In a composite curve of the monthly test

meals of 21 of these apparently normal pregnant women, they found a 50% decline in the maximum free acidity from the 3rd to the 6th month of gestation with increase in the last month to the level observed at the third month.

These findings may be compared with the results of Davies and Shelley⁽⁷⁾ working on a group of 45 normal pregnant women each of whom had test meals performed in the first and third trimesters and in the puerperium. They found there was a marked fall in the free hydrochloric acid content of the stomach in the last trimester with a rise in the puerperium. The following are their figures for the average maximum amount of free hydrochloric acid in the ordinary test meal.

During first trimester,	30 ccs. N/10 HCl.
" third " ,	15 " " "
puerperium,	42 " " "

It should be noted that in this group no case of achlorhydria was found. From these reports it would appear that in apparently normal healthy women a fall in the hydrochloric acid content of the stomach occurs in the second half of pregnancy.

In three patients with "chlorotic" anaemia of pregnancy Strauss⁽⁴⁷⁾ found that post-histamine gastric anacidity was universal.

In another series of 36 pregnant women with haemo-

globin values below 45%, including six macrocytic anaemias, (16) Castle and Strauss found that a little over half of the number were quite unable to secrete free hydrochloric acid in the gastric juice even after delivery. Roughly one-third more secreted small but appreciable amounts of acid, and the remaining three had a perfectly normal secretion after delivery.

(12)

Davidson, Fullerton, Howie, Croll, Orr and Godden examined 24 patients with a haemoglobin value of less than 70% who gave a history of severe menorrhagia, pregnancy, miscarriage or childbirth within one year of examination. They found that thirteen had achlorhydria after histamine, eight had hypoacidity, two had normal curves and one had hyperacidity.

In a series of 26 pregnant women with haemoglobin values below 80% (5) Boycott found that hypochlorhydria or achlorhydria, even after histamine, was present in all the patients who had test meals performed.

The possibility that hydrochloric acid secretion diminishes with increasing age was proposed by Witts. (20) In his investigation of unexplained secondary anaemia in 38 patients, almost all of whom were women (? non pregnant), he found that 30 had achlorhydria and eight had normal test meals. He commented on the fact that the majority (of those with hypoacidity) were between 30 and 40 years of

age. The incidence of achlorhydria in the non-pregnant population observed by Hartfall and Bennett and Ryle has been referred to earlier in this work (page 8).

To summarise - it seems that the gastric acidity in healthy pregnant women is normally much reduced and there may be complete absence of free hydrochloric acid even after injection of histamine. The normal level is regained in the puerperium, from which one must conclude that the abnormal acidity is due directly to the influence of the gravid uterus.

When the patient is not only pregnant but also anaemic, complete absence of acid from the stomach becomes relatively much more frequent, and the greater the degree of anaemia the commoner it is to find anacidity. It has been noted also that, in the presence of severe anaemia, the normal restoration of acid secretion during the puerperium is absent. And, finally, a suggestion has been made that increasing age has some influence on the functioning of the stomach.

In Table XII are shown the observations made on 47 pregnant women in the course of the present investigation. All the tests were done between the 20th and 40th weeks of pregnancy. It was found that once a test meal had been done there was a unanimous refusal to have it repeated later, and many of the patients declined to subject themselves to the

test at all. There are, therefore, no repeated curves of gastric acidity in the whole series. The more detailed readings are included in the case records (Appendix III).

Table XII.

Age, gastric acidity, degree of anaemia, and diet.

Case No.	AGE yrs.	Degree of Anaemia	Max. Gastric Acid ccs. N/10 HCl. Test Meal After Hist.		Diet
<u>Primip.:</u>					
7	18	first	40	N.H.G.	G.
9	21	"	15	44	G.
11	24	"	40	20	P.
8	27	"	0	N.H.G.	G.
6	28	"	38	53	G.
18	17	second	28	30	G.
29	20	"	25	8	?
19	21	"	43	25	G.
28	22	"	20	(no Spec.)	P.
17	26	"	32	50	G.
25	28	"	35	0	G.
15	31	"	20	35	G.
34	26	third	0	N.H.G.	P.
33	31	"	0	95	P.
<hr/>					
<u>Para 2:</u>					
41	25	none	23	N.H.G.	G.
47	23	first	0	0	G.
36	28	"	30	45	G.
46	28	"	30	32	P.
57	35	"	25	35	G.
35	36	"	40	60	P.
48	23	second	23	0	G.
51	27	"	20	40	G.
50	30	"	30	(no Spec.)	P.
58	33	"	38	0	P.
49	33	"	42	20	G.
42	27	third	20	N.H.G.	G.
43	27	"	0	0	G.

Table XII (contd.)

Case No.	AGE yrs.	Degree of Anaemia	Max. Gastric Acid		Diet
			ccs. N/10 HCl. Test Meal	After Hist.	
Para 3:					
67	23	first	48	N.H.G.	P.
77	27	second	39	N.H.G.	G.
74	27	"	42	N.H.G.	P.
76	29	"	24	N.H.G.	G.
78	38	"	35	60	G.
70	30	third	38	60	P.
APP. II	40	"	0	0	P.
Para 4+:					
88	37	none	0	0	?
92	34	first	0	0	P.
93	35	"	18	54	P.
89	36	"	30	35	G.
99	29	second	32	72	G.
105	35	"	0	0	G.
107	36	"	40	0	P.
106	38	"	0	0	G.
101	43	"	30	58	?
81	32	third	33	11	P.
82	33	"	0	0	G.
80	34	"	0	0	P.
94	37	"	0	0	P.

N.H.G. = no histamine given.
P. = poor diet.
G. = good diet.

The test meal findings were studied in relationship to age and degree of anaemia in the various groups, classified according to parity, and for ease of reference the material has been analysed in Table XIII.

Table XIII.

Age, degree of anaemia, and gastric acidity.

Parity	Av. age of group yrs.	No. of cases	DEGREE OF ANAEMIA				GASTRIC ACIDITY			No free HCl with Histamine. %
			0	1	2	3	Normal	Low	None	
1	25	14	-	5	7	2	10	1*	3 ^{(1*} (2)	?
2	29	13	1	5	5	2	11	-	2	15
3	31	7	-	1	4	2	6	-	1	14
4+	35	13	1	3	5	4	5	1*	7	54
TOTALS,		47	2	14	21	10	32	2	13 [⊙]	

- * = good response to histamine.
- ⊙ = 2 were not given histamine.
- Low = max. free HCl < 20 ccs.

It is seen that 32 (or 68%) of the patients subjected to test meals had free hydrochloric acid in normal quantities in the stomach at the time of testing. In Only two patients was hypochlorhydria present and both responded well to histamine injection. Thirteen patients showed achlorhydria in the ordinary test meal and eleven of them were given histamine subcutaneously. Of these, only one gave any response (95 ccs. of N/10 HCl being found in the post-histamine specimen). The remaining two cases were not given histamine, since, as has been pointed out previously (page 19), it was not deemed advisable to give all outpatients this drug in case of shock. It would appear, therefore, that at least 10 (or 21%) of the women subjected to test

meals had a persistent achlorhydria.

Since achlorhydria is frequently found when there is a very low blood haemoglobin it is of some importance to investigate the degree of anaemia occurring in the 10 patients with persistent achlorhydria. (Table XIV).

Table XIV.
Achlorhydria and degree of anaemia.

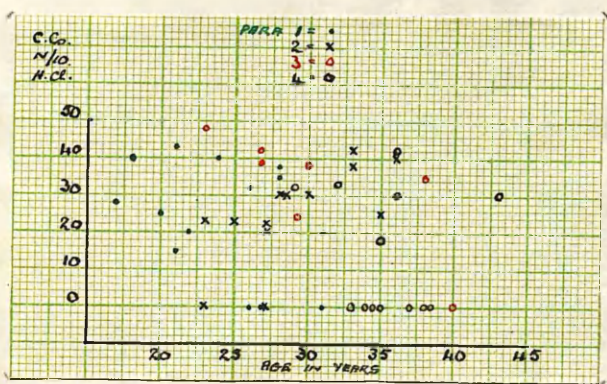
Degree of anaemia	First	Second	Third
Achlorhydria - 10	2	2	6

It appears that there is a preponderance of patients with a third degree anaemia (Hb. of 60% or less) which suggests that the low gastric pH prevents the absorption of iron in suitable amounts and is of vital importance in the production of the anaemia in these individuals.

An attempt was made to determine the incidence of persistent achlorhydria in the various degree of parity (Table XIII). This could not be determined in the primiparae as two of the cases did not receive histamine and the only other case gave a good histamine response. In the 2 para, 3 para and para 4+ groups it was found that 15%, 14% and 54% respectively had persistent achlorhydria. From these figures it would appear that the incidence of achlorhydria increased notably in the multiparae, but the age factor has also to be taken into account here. - Chart XV. shows that

a distinctly greater incidence was met with as age advanced but that when acid was present in the older patients the amount was considerable.

Chart XV.



Previous references by the author to the work of Castle and Strauss and Davies and Shelley have shown that there is a progressive fall in the hydrochloric acid content of the stomach as pregnancy advances. In the absence of a supply of repeated observations in the same patient, it was decided to compare the findings in those who had test meals done before the 20th week, three in number, with those fifteen done between the 21st and 30th weeks, and the twenty-nine got between the 31st and 40th weeks of pregnancy. This comparison is outlined in Table XV which gives the number of cases with achlorhydria, hypoacidity and normal secretion at the various periods of pregnancy.

Table XV.

Gastric acidity at various stages of pregnancy.
ccs.N/10 HCl.

Time of test weeks.	No. of cases	ACHLORHYDRIA		LOW < 20ccs.	NORMAL 20cc+	
		No.	%	No.	No.	%
Before 20th	3	-	-	-	3	100
21st to 30th	15	3+1*	20	1*	10	66
31st to 40th	29	7+2 [⊙]	25	1*	19	65

* = good histamine response.
⊙ = no histamine given.

It will be seen that 20% of the patients having test meals between the 21st and 30th weeks of pregnancy had persistent achlorhydria, while 25%(app.) of those with test meals between the 31st and 40th weeks had persistent achlorhydria. Sixty-six per cent. of the patients having test meals between the 21st and 30th weeks of pregnancy and between the 31st and 40th weeks secreted normal quantities of free hydrochloric acid.

So far as can be judged from these collective figures, it appears that the incidence of achlorhydria and of the secretion of normal amounts of free hydrochloric acid do not vary materially with the stage of the pregnancy.

It was next decided to compare the maximum amounts of free hydrochloric acid secreted in the various stages of pregnancy (Table XVI). From this table all cases of achlorhydria have been excluded.

Table XVI.

Maximum amounts of free HCl in ccs N/10.

Time of test. weeks.	No. of cases	Less than 20 ccs	More than 20 ccs	Average
Before 20th	3	-	23, 40, 42	35
21st to 30th	11	15	48, 42, 24 30, 30, 30 32, 32, 40, 32	32
31st to 40th	20	18	36, 39, 38 35, 38, 30 22, 20, 23 25, 20, 42 30, 40, 38 32, 30, 40 30.	31.3

It appears that there is no general diminution of note in the amount of free hydrochloric acid in the later months of pregnancy, although no deduction can be drawn from this which can properly be applied to any individual case. In general, the unexpected conclusion must be made from these figures that, whilst approximately 30% of this series had no free acid at all, the remainder had a fairly adequate quantity, not only in the earlier months but also later in pregnancy. It follows that whatever be the cause of the anaemia of pregnancy, in about 70% of cases the stomach is not seriously at fault.

Section VI.

DIET and INCOME.

A. Diet.

The immediate source of haematopoietic substances being the person's food it can be readily understood how even a mildly deficient diet continued over a long time, quite apart from any question of pregnancy, may lead to anaemia. Observations made by various workers on the diet of pregnant women will be reviewed first. The information derived from the present enquiry will then be examined.

(48)

Jones and Tocantins suggest as a suitable diet in pregnancy, one moderate in protein, low in fat and of a high vitamin content. Green-Armytage thinks that the pregnant woman should have a diet of food stuffs which contain iron, copper and manganese with vitamins A, B, C, D and E. He suggests that the menu should include eggs, beef, liver, cheese, vegetables, mentioning in particular potatoes, peas, carrots, asparagus and prunes.

(49)

The League of Nations Commission (Principles of Diets by Hutchison and Mottram) recommend at least one litre of milk; 4 ozs. of meat, fish or poultry; one egg; one ounce of cheese; 4 ounces of green leafy vegetables; 8 ozs. of potatoes and 1/3rd oz. of dried legumes with one drachm of cod liver oil per day.

(6)

Castle and Strauss, for the purpose of classification,

regard the provision of meat, fruit and vegetables less than three times a week as a poor diet during pregnancy.

(50)

Irving, in a series of 60 pregnant women drawn from private practice studied the effect of altering the diet. These women were anaemic but otherwise normal, and the food given them was a diet of meat, fruit, eggs and milk daily. He divided them into several groups including a control section and one which received iron therapy. Only the treated group showed any increase in haemoglobin during pregnancy. From this he concluded that diet alone did not provide enough of these anti-anaemic substances.

(35)

In another series of pregnant women McGeorge found that only 8.3% of those with a haemoglobin above 75% ate no meat while 14.3% of those with a haemoglobin value between 60 and 75% ate no meat, i.e. a more severe degree of anaemia was found in the more "vegetarian" patients.

It is a difficult matter to decide what criteria to adopt for the assessment of a diet. As has been indicated, most workers have stressed the importance of a number of foods, some commonly used, some rarely, e.g. asparagus. The manuals of dietetics give the following list which purports to grade its contents in decreasing order, from the standpoint of value as a source of iron supply:- green vegetables; yolk of egg; beef; apples; lentils, peas, beans; strawberries; white of egg; wheat; potato; milk. A statement of the

quantities consumed by any individual is most unreliable unless one can be given at the same time an idea of the weight of the portion eaten. Beef, being high in the list of sources of iron, and in addition being bought by weight, was therefore taken as an index of the adequacy or deficiency of the diet. A "good" diet is, for the present purpose, taken to be one containing meat more than three times per week; a "poor" diet - less than this.

The details relative to diet are included in the case histories (Appendix III). Below is presented the relationship of poor and good diets to the degree of anaemia found, (Table XVII).

Table XVII.
Meat content of diet in pregnancy.

Diet	No. of cases	Degree of anaemia					
		0	1	2	3	4	5
Poor	52	3	19	19	10	1	-
Good	50	1	21	20	7	-	1
No record	8	1	3	2	2	-	-

In the whole series, there appears to be an equal number on a poor and on a good diet. From these figures it is not evident that there is any relationship between the degree of anaemia and the food intake. If anything, there are more patients with a third degree or worse anaemia on a poor than on a good diet.

It was thought that there might be some relationship

between parity and diet, since with increase in the number of children in the family it is common knowledge that the mother may deprive herself of essentials - e.g. meat, eggs, etc. - in order to feed a family which is really beyond her economic ability. Table XVIII gives the distribution of the diet according to parity.

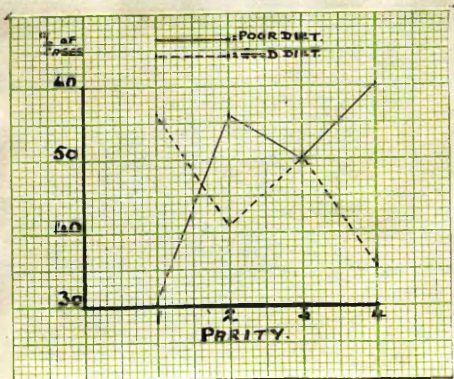
Table XVIII.

Diet in relation to number of children.

Parity	No. of cases	POOR DIET		GOOD DIET		No record
		No.	%	No.	%	
1	34	10	29.5	19	55.8	5
2	27	15	55.5	11	40.8	1
3	20	10	50	10	50	-
4+	29	17	60	10	34.5	2
TOTALS,	110	52		50		8

From the above table it is seen that 56% of the primiparae and 50% of the para 3 groups were on a good diet while only 41% of the para 2 and 35% of the para 4+ fell into this category. These results are graphed in Chart XVI.

Chart XVI.



There is no doubt that the frequency of meat ingestion, and probably the intake of iron, are diminished with increasing number of pregnancies over the para 3 group. This obviously demands an examination of the status of dietary sufficiency in relation not only to parity but also to degree of anaemia (Table XIX).

Table XIX.

Diet - parity - degree of anaemia.

Degree of anaemia	PRIMIP.		PARA 2.		PARA 3.		PARA 4+		TOTAL.	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Poor
0	-	-	-	2	-	-	1	1	1	3
1	9	2	4	7	5	4	3	6	21	19
2	9	6	5	5	3	2	3	6	20	19
3	1	2	2	1	1	4	3	3	7	10
4	-	-	-	-	-	-	-	1	-	1
5	-	-	-	-	1	-	-	-	1	-
No record	5		1		-		2		50	52

Of the 19 patients with a haemoglobin value below 60% i.e. third, fourth and fifth degrees of anaemia, 11 were having poor and 8 a good diet. In the primiparae and para 2 of this group (of 19 patients) there were equal numbers on each of the two types of feeding, while of the para 3 and para 4+ groups there was a preponderance of poor diets in the proportion of eight to five good. These numbers, though small, suggest that in actual fact dietary insufficiency is not only found more often with multiparity, but is

very probably intimately connected with the severe degrees of anaemia found therewith.

Although many of the diets were deficient in meat the following table (Table XX) shows that 65 patients had fruit more than four times a week - many having fruit daily. It is, however, remarkable that eggs appear so infrequently in the diet of many of the patients.

Table XX.
Weekly frequency of fruit and egg intake.

Parity	MORE THAN 3 TIMES		OCCASIONALLY		NONE		NO RECORD	
	fruit	eggs	fruit	eggs	fruit	eggs	fruit	eggs
1	19	4	6	13	4	10	5	7
2	20	2	4	14	2	9	1	2
3	12	1	2	9	5	8	1	2
4+	14	5	8	12	5	10	2	2
TOTALS,	65	12	20	48	16	37	9	13

The possible association of a poor diet and hypoacidity or achlorhydria was next investigated. In Table XII the class of diet is indicated along with the test meal analysis. It appears that even on a poor diet, a patient with normal acidity has one of the lesser degrees of anaemia, whilst on a poor diet with anacidity the anaemia is a severe one - 60% Hb or less. The diet of the 10 cases of achlorhydria (even after histamine injection) was investigated and it was found that five were classed as "good", four as "poor"

and one was not noted. When the degrees of anaemia for these cases are contrasted, it appears that two of the "good" class and 3 of the "poor" had third degree anaemia, indicating that achlorhydria with a third degree anaemia may occur in the presence of a "poor" or "good" diet, suggesting that primarily the gastric secretion is at fault.

Table XXI.
 Poor diet - gastric acidity - anaemia.

GASTRIC ACIDITY	DEGREE OF ANAEMIA			
	1	2	3	
Normal	4	4	2	10
Low	1	1	-	2
Nil	1	-	5	6
TOTALS,	6	5	7	18

From Table XXI it is clear that the association of a poor diet and achlorhydria results in a preponderance of very severe anaemias, whereas when the gastric acidity is normal or even low the reduction in haemoglobin is much less serious.

(16)

Castle and Strauss in a series of 30 pregnant women suffering from severe hypochromia/anaemia found that more than 50% had post-histamine anacidity, one half being on a diet rich in iron while the other half were on an iron-poor diet. They therefore suggested that defective gastric secretion or deficiency of iron-containing foods or both caused the anaemia.

If these observations are summarised, it seems that there is widespread deficiency in food intake in the class of patient studied. Further, increasing size of family and the more serious degrees of anaemia, as well as persistent achlorhydria, are shown to be interrelated. The means to be adopted for the correction of these faults will be discussed later.

B. Income.

It can easily be appreciated that if the anaemia is due to a restricted intake of iron, which is closely associated with the ingestion of first class protein (meat, milk, eggs) then it might be expected to increase proportionately with a fall in the "spending capacity" per head of the family. As there are very few references dealing with exact income and its relationship to anaemia in pregnant women, it was decided to compare the incidence of anaemia in pregnant women drawn from private obstetrical practice with that found in patients attending the antenatal dispensary.

(41)

Fullerton in a representative cross section of the poorer classes in Aberdeen, performed haemoglobin estimations in a series of 332 pregnant women attending the antenatal clinics of the city. He found that one-fifth of those with incomes less than 15/- weekly per "man value" had a haemoglobin percentage below 70, while only one-seventh with

incomes of more than 15/- weekly per "man value" had haemoglobin below that figure.

At the Stockport Corporation antenatal clinics, Reid and Macintosh (39) investigated a series of 1108 pregnant women. The patients were divided into two groups, according to whether the spending capacity was above or below 12/- per head per week, after rent had been deducted. They found that 13% of those with a spending capacity of under 12/- per week had less than 70% haemoglobin, while only 5% of the more affluent group could be so classified.

That working class pregnant women need not necessarily be anaemic has been demonstrated by McGeorge (35) in New Zealand. Taking 100 unselected consecutive pregnant women he found that 78 had more than 75% haemoglobin. Between the 60 and 75% values he found 14 patients.

In a series of private patients, Bland, Goldstein and First (40) found that 62% of them had a haemoglobin value below 75%, while among pregnant women in the hospital wards 80% fell below that standard. Red blood cell estimations revealed that only 26% of the private patients had less than three and a half million erythrocytes per cubic millimetre, whilst 52% of the poorer ward patients were below that figure.

In distinction to this Galloway (32) points out that hypochromic anaemia need not be confined to the poorer

classes. Recording the haemoglobin estimations of 222 private patients "in a fairly characteristic residential community - Chicago's North Shore suburbs" - he found that 65% had a haemoglobin value below 65% and a red cell count below four millions per cubic millimetre.

(33)
Moore found, in a series of 300 consecutive pregnant women taken from private practice, that the average haemoglobin value was 79% and the average erythrocyte count was 4,342,610 per cubic millimetre.

Table XXII.
Income relative to anaemia.

Author	Total no. of cases.	Spending capacity per H. per wk.	Haemoglobin	Erythrocyte count in mill./c.mm.
Fullerton	332 (164 168)	- 15/- + 15/-	32 under 70% 24 " "	- -
Reid & Mackintosh	1108	- 12/- + 12/-	144 " " 50 " "	- -
McGeorge,	100	"working class"	75 over 75% 14 under "	- -
Bland, Goldstein & First	200 100	"hospital" "private"	160 " " 62 " "	52%) under 26%) 3½
Galloway	222	"private"	144 " 65%	65% below 4.
Moore	300	"private"	average 79%	av. 4.342.
Present series	95 (65 30)	- 15/- + 15/-	28 under 80% 22 " "	

Table No.XXII gives a brief summary of the investigations of the above workers on the relationships between income and the severity of the anaemia. The last line represents the writer's findings in course of the present investigation, from which it transpired that 65 had more and 30 less than 15/- weekly to devote to "living". The spending capacity was obtained by taking the total weekly income, subtracting the rent and dividing the remainder by the number of persons in the household.

In Table XXIII is shown a more detailed comparison of the financial status and the various grades of anaemia.

Table XXIII.
Weekly spending capacity and anaemia.

Weekly spending capacity p. head.	DEGREE OF ANAEMIA						Totals
	0	1	2	3	4	5	
2/6-4/11	1	2) 32	2) 15	2) 11	-	-	7
5/0-7/5	2	6) or	4) or	2) or	1	-	15
7/6-9/11	-	7) 80%	2) 44%	4) 80%	-	-	13
10/0-14/11	2	17)	7)	3)	-	1	30
15/- +	-	8	19	3	-	-	30
TOTALS,	5	40	34	14	1	1	95

(There is no record of the weekly spending capacity per head in 15 cases.)

It is observed that 11 (or 80%) of the patients with third degree anaemia and 32 (or 80%) of the patients with

a first degree anaemia had a spending capacity below 15/- per head per week. Comparing the number of patients with 1st degree anaemia with the number of patients in the second and third degrees of anaemia combined, it is found that up to and including a spending capacity per head per week of 9/11, the groups are fairly well balanced. In the 10/- to 14/11d. section there is a preponderance of patients with first degree of anaemia, while in those with more than 15/- there is a striking rise in the lower haemoglobin values.

It cannot be stated definitely that this extraordinary occurrence is due to the increased social obligations of the patients with the largest incomes but no other explanation can be advanced. The better-off patients would naturally spend more than the others, and possibly a disproportionate amount, on clothes and overhead household expenses. If this is correct, then those patients with haemoglobin values less than 80% and spending capacities of more than 15/- per head per week have an anaemia not primarily attributable to poverty but nevertheless in all probability arising from inadequate feeding.

Section VII.

CLINICAL FEATURES.

Since anaemia has been shown to be common in pregnancy it might be anticipated that many patients would complain of the symptoms usually associated with the so-called secondary anaemia,—fatigue, palpitation, breathlessness, giddiness, loss of appetite, headaches, faintness, etc. In pursuit of this assumption an investigation was made of the recorded complaints during attendance at the clinic. The relevant data are grouped according to the parity of the subject in Table (XXIV).

It is obvious that in only 61 out of the 110 patients was there a complaint of any sort, and in 54 instances it was of the type usually attributed to the gastric upset of pregnancy. In seven there did seem to be symptomatic evidence of anaemia and this occurred more often in the more severe forms of the latter, whereas the digestive disorders showed a preponderance in the milder degrees of anaemia. From 40-60% of all women making a complaint were upset by the digestive abnormality. In short, it would appear that anaemia of pregnancy is practically symptomless.

The physical signs of abnormality noted on clinical

Table XXIV.
Complaints during pregnancy.

	Primip.		Para 2				Para 3				Para 4+				Totals	
Total no. in each group.	34		27				20				29				110	
No. with complaints.	15		13				14				19				61	
Degree of anaemia.	1	2	0	1	2	3	1	2	3	5	0	1	2	3	4	
Giddiness	1															1)
Headaches				1												1)
Poor appetite.					1								1			2) 7
Lassitude and weakness.								1	1			1				3)
(Heartburn, (heaviness, (pains p.c.	7	7	1	4*	5	1	6	3	3	-	1	8	3	4	1	54
(ditto as % of (complainers,	41		39				60				55					

* including one with sore tongue and dysphagia.

examination of the patients in this series are recorded in Table XXV.

Table XXV.

Parity	Degree of anaemia	No. of cases	Clinical Signs.
Primip.	1	1	Hyperpiesia and albuminuria.
	2	2	1 - dental caries 1 - spleen palpable.
	3	1	Hyperpiesia and albuminuria.
Para 2	3	1	Chronic nephritis.
Para 3.	2	2	1 - papillae disappearing. 1 - dental caries.
	3	2	1 - Koilonychia, hoarseness, glossitis. 1 - Raynaud's disease.
	5	1	Slight icterus, splenic enlargement.
Para 4+	1	3	Papillae disappearing.
	2	1 1 1	Dental caries Papillae disappearing Glossitis and brittle nails.
	3	1	Brittle striated nails, hoarseness.

It appears that the signs associated with anaemia such as glossitis, koilonychia, hoarseness etc. were not encountered in the primiparae nor the para 2 women but only in the para 3 and para 4+ groups. Very few patients

had gross dental caries. Two patients, both primiparae, developed a raised blood pressure and albuminuria towards the end of pregnancy. The lowest haemoglobin values recorded in these two cases were 88% and 48%.

Whether any relationship exists between anaemia and toxæmia of pregnancy is doubtful but Davies and Walker⁽⁴²⁾ observed, in a series of treated and untreated anaemic pregnant women with a haemoglobin value below 70%, that there was in the untreated group double the number of patients with elevated blood pressure, most of whom were pre-eclamptic. Moore and Pillman-Williams⁽⁵¹⁾ noted that toxæmia during pregnancy occurred in only one of a group of anaemic women who were receiving iron therapy, while in a control group of the same size not receiving iron, six developed a toxæmia.

Table XXVI.

Parity	Excessive Loss during Menses*	Loss during pregnancy.
1	6 (1,3,2,1,2,1)	-
2	3 (1, 2, 1)	-
3	4 (5, 2, 1, 1)	-
4+	<u>3</u> (2, 1, 2)	1 (3)
	16	

* figs. in brackets indicate degrees of anaemia in these cases.

The anaemia found during pregnancy might, of course, have had its origin in some purely obstetrical or gynaecological condition, e.g. menorrhagia, bleeding during pregnancy, excessive loss at previous deliveries, eclampsia - actual or threatened - pyelitis, etc. Enquiries directed towards elucidating these points showed (Tables XXVI & XXVII) that sixteen women gave a history of excessive menstrual loss and only one had haemorrhage during pregnancy. The menstrual loss was judged on a quantity basis, irrespective of the duration.

Complications arising during the pregnancy or at delivery are recorded in Table No. XXVII. Seventeen patients were found to have some form of complication.

Table XXVII.

Parity.	DEGREE of ANAEMIA in PREGNANCY.				
	0	1	2	3	5
1	-	1 - Free loss at delivery. 1 - Pyrexia. 1 - Toxaemia & albuminuria.	2 - Free loss at delivery.	1 - Toxaemia with albuminuria.	-
2	1 - Free loss at delivery.	1 - twins and sepsis.	1 - twins.	1 - nephritis.	-
3	-	-	-	1 - sepsis.	(special case)
4+	-	1 - twins.	1-free loss 1 - sepsis	2 - Free loss.	-
Totals	1	5	5	5	1

The character of the latter varied widely. In seven there was free loss of blood at delivery; two suffered from toxæmia; three from sepsis; one from nephritis; three women had twin pregnancies; and in two instances there was long continued fever. In one case there was a combination of abnormalities - twins and sepsis. Scrutiny of the table shows that there was no tendency for association of any one degree of anaemia and any special complication, nor could any predisposition of the parous groups towards any coupling of anaemia and one of the abnormalities be traced.

Section VIII.

TREATMENT.

It has been amply shown that anaemia, especially of a mild degree, is of common occurrence during pregnancy even in otherwise apparently healthy women. The question of the re-establishment of a normal blood picture, i.e. of the treatment to be employed, and the effect of such measures as have been adopted to this end fall next to be discussed.

(34)

Mackay in a study of 83 pregnant women - chiefly primiparae - whose average haemoglobin was 78%, administered iron and ammonium citrate in doses of 10 to 30 grains daily to alternate cases. In both groups (treated and untreated) a slight rise in haemoglobin occurred before confinement. Six months after delivery, however, the treated and untreated groups showed a rise of haemoglobin amounting to 12% and 3% respectively. The beneficial effect of iron therapy in hypochromic anaemia of pregnancy has been pointed out also by Jones and Tocantins.

(48)

In their studies of nutritional anaemia of pregnant rats Beard and Myers demonstrated that a diet of liver and yeast did not prevent a fall in haemoglobin during pregnancy. Iron therapy, however, did lessen the fall in haemoglobin content. On the other hand, van Donk, Feldman and Steen-

(9)

(2)
bock pointed out that anaemia developed in pregnant rats whether or not the diet was supplemented by iron, copper, manganese and other salts, beef, liver, yeast or cod liver oil.

(42)
Davis and Walker found that the administration of ventriculin and iron in hypochromic anaemia of pregnancy stopped the downward trend of haemoglobin during the 3rd to the 9th month of gestation and that there was a more rapid recovery after delivery than in the untreated cases. Investigating 100 patients with hypochromic anaemia of pregnancy

(4)
Richter, Meyer and Bennett found that a mixture of liver, iron and haemoglobin produced a progressive increase in haemoglobin and red blood corpuscles during pregnancy. They observed also that the haemoglobin and red blood corpuscles in treated and untreated patients rose to a peak eight days after delivery and gradually fell till the sixth week of the puerperium, when another increase occurred. The treated cases, however, showed a more rapid replacement of haemoglobin.

(35)
In New Zealand, McGeorge found that with slight degrees of anaemia in pregnant women, treatment directed to improving the blood condition appeared to have little effect; the untreated and treated progressing equally well. In severe anaemia, however, he recorded consistent improvement under treatment.

(37)

Toland, in America, found that administration of ferrous sulphate or iron and ammonium citrate to anaemic women produced an increase in haemoglobin and red blood corpuscles during pregnancy.

(38)

The effect of iron therapy in a series of 200 unselected anaemic pregnant women was studied by Corrigan and Strauss. Every alternate case acted as a control, and the average initial haemoglobin value was the same in both groups of patients. The treated cases, who received 7½ grains of ferrous sulphate daily during pregnancy, had one week after delivery an increase of 12% over their pre-treatment haemoglobin value, while the control (untreated) group remained unaltered.

(50)

Irving in a series of 60 pregnant women, including controls, with hypochromic anaemia observed that the patients given iron and copper gradually improved during pregnancy. At University College Hospital, London, Boycott also found that anaemic pregnant women responded to the iron therapy during gestation.

(5)

From an entirely clinical point of view, with no ulterior motives of research in mind, it was considered advisable to give to 14 women of the present series some form of iron treatment. The preparation selected was iron and ammonium citrate grs. 30 t.d.s. The week of commencement of therapy was noted and administration was continued till the fourth week of the puerperium. Two cases, which will be described

in detail later had, in addition, Campolon and blood transfusions. Accordingly, there are 12 cases on which to base discussion of the value of iron in treatment of anaemia of pregnancy. The following table (XXVIII) gives the results recorded.

Table XXVIII.
Administration of Iron during pregnancy.

Para.	Case No.	Test Meal	Treatment begun	Haemaglobin %			
				Start of Treatment.	Before Delivery.	Post 10 Days	Partum + 4 weeks.
1	27	No Meal	36th wk.	74	80	75	96
1	34	0 - 0	36 " "	48	60	60	85
2	52	No Meal	34 " "	80	70	86	88
3	70	37 - 60	34 " "	50	72	80	82
C "	APP. I	0 - NHG.	37 " "	28	30	20	45
"	76	24 - 30	21st "	65	80	-	100
C "	APP. II	0 - 0	37th "	60	42	18	28
"	79	No Meal	33rd "	64	80	85	88
4	80	0 - 0	28th "	60	64	68	80
5	94	0 - 0	33rd "	42	62	55	50
"	84	No Meal	36th "	48	88	72	88
"	81	32 - 11	35th "	60	75	50	-
7	99	No Meal	30 " "	66	78	93	90
"	82	0 - 0	31st "	65	70	58	-

0 - 0 = no response to histamine.
 0 - NHG = no histamine given.
 C - Campolon

The majority of women began to take the iron between the 30th and 36th week of pregnancy. In deciding to ad-

minister treatment no attention was given to parity, the indications for therapy being the clinical appearance and the haematological findings. On the above regime, 8 women showed an increase in haemoglobin of 12-40% before delivery. Three cases showed an increase of 4, 5 and 6% respectively. One of the latter patients who had a poor diet and also post histamine achlorhydria admitted to having taken the "iron" mixture at irregular intervals. When, however, the necessity of taking iron in the puerperium was impressed upon her she showed an increase of 20% haemoglobin four weeks after delivery. The remaining patient had a fall of 10% haemoglobin which could not be explained.

Within 10 days after delivery, five of the 12 women had a further increase in haemoglobin. Of the remaining seven cases, five showed a fall of which three might be accounted for by loss of blood at delivery: of the remaining two cases it might be mentioned that one had albuminuria and complete achlorhydria after histamine, and in the other no observation was made.

Within four to six weeks after delivery 10 of these 12 patients receiving iron therapy in the puerperium had haemoglobin and red cell estimations performed. It was found that relative to the haemoglobin estimation immediately after delivery:-

4 showed an increase of 12-25% haemoglobin.

4 were stationary.

1 had lost 5%.

1 who had no estimation immediately after delivery had an increase of 20% haemoglobin over the last estimation during pregnancy.

Six patients were given iron only in the puerperium. The result is shown in Table XXIX.

Table XXIX .

Administration of Iron in the puerperium only.

Para	Case No.	Test Meal cc N/10 HCl	Haemoglobin %		
			Before delivery.	10 days post.part.	4-6 weeks post.part.
1	3	No meal	85	70	82
"	33	0 - 95	62	45	82
"	17	32 - 50	62	52	55
"	26	No meal	70	65	80
3	77	39 - 12	67	65	96
8	85	No meal	40	50	-

Of these patients who had treatment only in the puerperium, four showed an increase in haemoglobin ranging from 12-37% four weeks after delivery. Of the remaining two patients, one had no increase and in the other no observation was made. The patient who had an increase of 37% was delivered of a stillborn infant, so that the absence of lactation probably helped to produce this very marked rise in haemoglobin.

It is evident that the average increase in haemoglobin of these cases having iron therapy during pregnancy was 12% before delivery. The average increase in the patients having iron therapy beginning in the puerperium was 19.6% between the 4th and 6th week after delivery.

But, on the whole, administration of iron during pregnancy gave disappointing results in this series. It may be that the doses given were not large enough for the combined maternal and foetal demands, or that the absorption of iron was inadequate.

DISCUSSION and CONCLUSIONS.

The literature discussed in the first section showed that previous workers had found anaemia in pregnancy to be extremely frequent. If, for the sake of generalisation, a woman is not considered anaemic unless her haemoglobin is under 80%, then it appears from the publications that the only groups reported, which have had an average above this figure, have been drawn from London and Stockport. Even the latter were balanced to some extent by the inclusion of a fair number of low readings.

In the present series, 56% of the patients were found to have a haemoglobin of less than 80%. This leaves 44% with relatively minor reductions, but, in fact, only five were really normal, with 100% Hb. Criticism might be directed to the standardisation of the haemoglobinometer in that, if a sufficiently high standard is set, the readings obtained will appear to be low. To meet this, and it is one of the difficulties in interpreting other people's work, the standard has been compared with that of Price Jones. The latter quoted a normal figure of 98% for a series of non-pregnant women in London. The scale used by him is somewhat lower than the present one, but the difference only amounts to 4%

at the 80% level - i.e. 80% on this scale means 84% on that of Price Jones.

It follows that anaemia is extraordinarily common in the hospital class of patient in Birmingham. The subjects studied were mostly wives of artisans in employment, and it is probable that a similar investigation elsewhere would lead to a comparable conclusion.

The work detailed in this thesis failed to demonstrate any interrelationship between the severity of the anaemia and either the age of the subject or the number of her previous pregnancies. This is in keeping with previous reports which are almost equally divided in their opinions on these points. It was somewhat surprising to note that in a quite considerable group of women, each of whom had already borne at least three children, the total losses of blood at menstruation and delivery, and the general strain of childbearing had not produced any more severe anaemia than was found, just as frequently, in the primiparae. Even when very large families - 10 or 11 children - had been produced, there was no accentuation of the fall in haemoglobin.

Coming next to the detailed consideration of the features of anaemia in pregnancy, it was shown that the majority of previous work indicated a considerable decrease in both haemoglobin and red cells during and es-

pecially towards the later months of gestation. The present series is concerned only with the latter half of the period, and the composite curves confirm the above comments. While the downward tendency in haemoglobin was of long duration, the red cells showed a more notable decrease in the last nine weeks. Delivery was followed by varying degrees of improvement, but the final averages, obtained 4-6 weeks after confinement, were only 85% Hb. and 4.2 million erythrocytes. The standard of a normal healthy woman has already been shown to be 98% Hb. and Vaughan ⁽⁵²⁾ quotes the normal red cell figure as 5mills per c.mm. Comparison with these latter indicates a distinct tardiness, if not inability, of the subjects studied to restore their blood to anything like the normal level, and the logical conclusion is that the vast majority should have been assisted to do so. Further, when the multiparity was taken into account it was seen that primiparae were no better in this respect than women who had already large families.

With regard to the colour index, it was shown that in 87% of cases this was at or below the range of normality. This, in view of the frequency of anaemia, is an important observation confirming the suggestion that most of the anaemias of pregnancy are of the hypochromic type. Even in the 13% with a rather high colour index

no reticulocytosis was found, unless the patient had been receiving anti-anaemic treatment. This is also a point of note suggesting the absence of the factors, probably dietetic, essential for bone-marrow activity. There were no anaemias which might have been considered as "primary" i.e. of pernicious type, and no haemolytic anaemias.

The Price-Jones curves and cell volume indices were not illuminating, and no deductions can be made therefrom.

Gastric analysis, as recorded in the literature, has shown a subnormal acidity during pregnancy. According to some writers there is rapid improvement immediately after delivery. This is denied by others. The present series showed that 68% of test meals were satisfactory, while in 21% of the tests there was persistent achlorhydria even after histamine injection. It may be significant that almost two-thirds of the latter had a haemoglobin of less than 60%. There was noted here a distinct tendency for achlorhydria to become commoner as age advanced, but no relationship to the number of pregnancies could be traced. The general conclusion from study of the test meals seems to be that most, if not all, pregnant women would benefit from the exhibition of hydrochloric acid. If this was adopted as a routine procedure,

one possible source of anaemia would be removed and, as will be indicated below, there might well be additional benefits to be derived from this line of treatment.

When the matter of diets is considered, the literature is unconvincing. Estimations of the quality of the food intake must of necessity be based on the patients' unconfirmed testimony, and it is impossible to assess the proportion of the household food taken by each person. The standard assumed for a "good" diet in the present work does not err in the direction of an excessive demand, probably the reverse. Even so equal numbers were above and below this line. Fruit was taken with surprising frequency and eggs with equal rarity. It appeared that with increasing size of family there were more women on a "poor" diet, an argument in favour of eugenic control. Further, the combination of a poor diet and achlorhydria seemed to favour the appearance of severe grades of anaemia, another observation in favour of giving HCl.

The standard required for weekly spending capacity, to be taken as some sort of indication of the ability of the patient to buy suitable food, was not fixed, but the majority were well below fifteen shillings per head. It was shown that a surprising number of women with what appeared to be good incomes had a haemoglobin below 60%

This has also been noted by others and one must conclude that poverty is not per se a prominent cause of anaemia.

Reviewing the histories of the patients the surprising observation was made that the anaemia of pregnancy is for the most part "silent". The symptoms and signs usually attributed to anaemia, lassitude, giddiness etc., were conspicuous by their absence, the preponderance of complaints being digestive. It is not beyond the bounds of possibility that the frequency of gastric upset might be traced to hypochlorhydria and, from experimental administration of dilute HCl to pregnant women outwith this series, the writer is convinced of its efficacy. Another point of note in the clinical records was the rarity of cases of toxæmia which has been observed to develop more often in anaemic subjects. No connection could be established between complications, such as twin births or hæmorrhage at delivery, and the severity of anaemia.

Finally, only a few patients were given treatment for anaemia. Some showed marked and rapid response, others none at all. The fact that an improvement could be made is of the utmost importance since it demonstrates, in the most direct method possible, the integrity of the hæmatopoietic tissues. For those, in

whom no benefit could be seen, there are three obvious "excuses" - (1) the iron had not been taken, (2) an insufficient dose for mother and foetus had been prescribed, and (3) adequate absorption had not taken place. The usual dose was Ferri et Ammon. Cit. grs.xxx t.d.s. and it is more than likely that, had this been combined with acid administration, it would have proved sufficient.

The conclusion can hardly be avoided, in view of the figures given in this thesis, that every pregnant woman should have a haemoglobin estimation done as a part of the routine ante-natal supervision equally important with urinary and blood pressure examinations, and wherever necessary iron therapy should be instituted, preferably in combination with hydrochloric acid.

My thanks are due to Dr. Masterman for her permission to investigate the cases and for the help she gave me. I wish to thank the Sisters, for without their co-operation, this work would have been impossible.

APPENDIX I.

Case No. 164: Mrs. G.: aged 27 years, attended the antenatal clinic for the first time during the 6th month of pregnancy. Her only complaint was slight nausea. Examination then showed no pallor or serious physical abnormality. One month later she was admitted because of pallor and breathlessness.

Further questioning revealed that during the 5th month of pregnancy she had suffered from "sore throat", generalised pains, nausea, vomiting and slight cough. Between the 6th and 7th months the cough had greatly increased and breathlessness had become very marked. For years she had suffered from vague "indigestion" pains at irregular periods. She gave no history that suggested anaemia, jaundice or a tendency to bleed or bruise easily. Her (two) previous pregnancies had been uneventful. Her menstrual history revealed that the menses occurred every 3-6 weeks, lasted 7-14 days and were marked by severe blood loss. Her diet for eight weeks prior to admission had been unsatisfactory and greatly reduced in an effort to obtain relief from the indigestion. Actually it had consisted largely of toast and lemon water. Previously she had eaten meat and fruit daily.

The spending capacity was 13/- per head per week.

One sister had died of phthisis pulmonalis.

Examination and sequence of events.

When examined on her first appearance at the clinic, the findings were entirely negative.

On admission she was somewhat obese and, even in bed, a little breathless. There were bruises on her arms and a few petechiae on the abdomen and extremities. No lymphatic glands were palpable. There were slight oedema of the feet.

(a) Fever. Before admission she was afebrile, so far as can be judged by her story and the record of her first attendance. She remained without fever till two days after delivery, when the temperature rose and fluctuated between 97°F. and 101°F. for two weeks. This was succeeded by 10 days free of fever, to be in turn followed by a continuous fever lasting till her discharge, which was "on her own responsibility". During this period her temperature was 102°F. most of the time. She left hospital on the 36th day of the puerperium.

(b) Cardiovascular System. On first being seen there was no detectable abnormality. The systolic blood pressure was 110 mm. Hg. and the diastolic 80. At her admission date there was a basal systolic murmur which remained unchanged till dismissal.

(c) Respiratory System. Before admission there appeared to be no intra-thoracic abnormality. On examination after admission there was a generalised bronchitis. A radiogram then was clear. The bronchitis increased but twelve consecutive sputum examinations were negative for C.tuberculosis. A further radiogram taken 10 days before discharge was still clear. Just prior to leaving, impaired resonance at the left apex was noted.

(d) Spleen. The spleen, which was impalpable at the first examination, could readily be felt when she was admitted. There was little increase in size till about three weeks after delivery, and when she left hospital the lower pole reached the level of the umbilicus.

(e) Liver. At no time was the liver palpable. Its function appeared normal as judged by the laevulose test.

(f) Renal. There were no renal symptoms nor did the urine contain any abnormal substances before admission. When hospitalised, urobilin, urobilinogen and bile salts appeared in the urine. Six days later albumin and disintegrating white blood corpuscles were present. A culture yielded a growth of B.coli. Three weeks after delivery there were no abnormalities to be found.

(g) Obstetrical. She was delivered of a living child whose haemoglobin was 145%. She required blood trans-

fusion before, during, and after delivery. Post partum examination on several occasions negatived puerperal sepsis as a cause of the fever. Blood cultures were taken twice during periods of high fever and both were negative.

(h) Blood Tests. Van den Bergh's reaction yielded a delayed positive direct result. Wassermann's reaction for syphilis was negative.

(i) Gastro-intestinal Tract. The findings were consistently negative. The vomitus was devoid of free hydrochloric acid on three occasions.

(j) Treatment. On account of her previous poor dietary she was given full diet with one drachm of marmite t.d.s. This made her vomit and it had to be discontinued. The fall in her haemoglobin demanded the exhibition of Pil. Ferri, four, 4.i.d., commencing 16 days before delivery. Campolon 4 ccs. daily was given intra-muscularly from the 14th day before delivery till her discharge. Transfusions of 400 ccs. of citrated blood were given on the 6th and 14th days after admission, at delivery, and again 7 days after delivery.

(k) Haematological Findings.

(i) Haemaglobin. No observation was made before admission. A progressive fall in Hb. occurred from

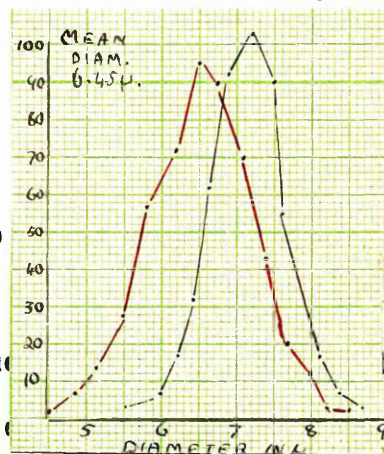
the 24th day to the 10th day before delivery. Thereafter a slight increase occurred, followed by a fall after delivery. In the 2nd week of the puerperium a progressive increase began and continued till discharge. The rise in haemoglobin was considerable 10 weeks after parturition. (Chart).

(ii) Red Blood Corpuscles. The red cell estimations followed the haemoglobin curve closely during pregnancy and the puerperium.

(iii) The colour index was always about unity.

(iv) The Price-Jones Curve showed that the average size of the R.B.Cs was below normal - 6.5 μ .

(v) Reticulocyte Counts. No reticulocytosis was observed before delivery. On the 11th day of the puerperium reticulocytes appeared, the maximum count (7.2%) being observed on the 19th day.



(vi) White Cell Count. No observation was made till after admission when a marked leucopenia was found to be present. Increase in the number of leucocytes (but no leucocytosis) was observed before delivery, with a fall early in the puerperium and a slight increase later.

(vii) The Differential Count. Ten days before

the 24th day to the 10th day before delivery. Thereafter a slight increase occurred, followed by a fall after delivery. In the 2nd week of the puerperium a progressive increase began and continued till discharge. The rise in haemoglobin was considerable 10 weeks after parturition. (Chart).

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(vi) White Cell Count. No observation was made till after admission when a marked leucopenia was found to be present. Increase in the number of leucocytes (but no leucocytosis) was observed before delivery, with a fall early in the puerperium and a slight increase later.

(vii) The Differential Count. Ten days before

delivery immature white cells of the granular series and a few nucleated red cells appeared. This was again found on the 11th day of the puerperium.

(viii) Blood Platelets were found to be normal shortly after admission.

(ix) Fragility of red blood cells was normal.

Marmite 3T t.d.s. had to be discontinued after 4 days, as has been already pointed out, because of sickness and vomiting.

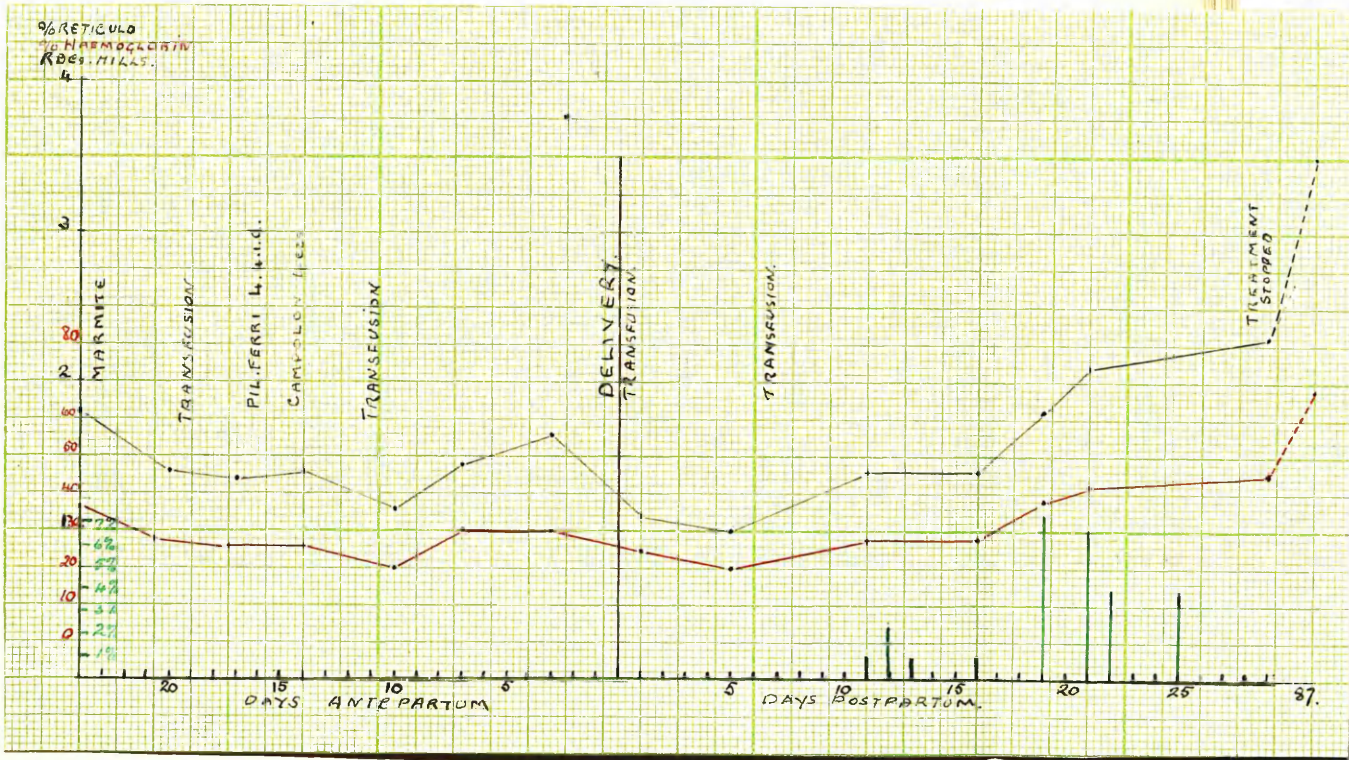
Ten days before delivery and 4 days after institution of the Campolon therapy, i.e. 6 days after commencing iron, immature red and white cells appeared in the blood stream but there were no reticulocytes. A few days later an increase in Hb and R.B.Cs occurred. This response was possibly due to Campolon as it appeared too late to be due to iron therapy. The fall immediately after delivery was possibly due to blood loss. On the 11th day of the puerperium an increase in Hb and R.B.Cs occurred, which continued till her discharge.

Improvement was maintained in spite of cessation of treatment, on return to her own home, the final observations made, by paying a special visit, being the highest recorded in the entire period of study - 3½ months.

The counts etc. are detailed in the table.

In the accompanying Chart is shown the course of the anaemia.

Chart



Result of Therapy.

Until the 37th week of pregnancy anti-anaemia therapy was withheld, to see whether or not a spontaneous recovery would occur. Bland's pill ii t.d.s. was given. On the 6th day of the puerperium, a further fall in the haemoglobin having occurred, Bland's pill iv, tds. was given. A still further decrease in the haemoglobin level on the

percentage of granular cells and a normal blood platelet estimation, also the final improvement of the patient.

(b) The extremely poor diet of the patient before admission suggested that she might be suffering from an anaemia due to absence of the extrinsic factor and iron. Unfortunately she could not take marmite which was discontinued after a few days.

(c) The severe blood loss at her menses suggested that iron deficiency might be the cause of the anaemia. It was, however, thought necessary to start Campolon without delay and the results of iron therapy could not be estimated.

(d) The severity of the anaemia suggested a haemolytic anaemia of pregnancy. The absence of reticulocytosis and of a positive indirect van den Bergh was, however, against this diagnosis.

(e) The sore throat, generalised pains and fever before admission suggested an agranulocytic angina. The leucopenia suggested this but there was no reduction in the percentage of polymorphs. It is possible, however, that the patient might have been recovering from such a condition.

(f) That the condition might be due to a toxin is suggested by the appearance of bile salts in the urine.

(g) The absence of any pelvic lesion negatives the question of puerperal sepsis.

(h) The appearance of premature white and red cells 4 days after the administration of Campolon and the subsequent increase in Hb. and R.B.Cs and W.B.Cs a few days later suggests the cause of the anaemia might be due to absence or deficiency of the extrinsic or intrinsic factors or to failure of utilisation of the combined substance. The continued improvement ^{after discharge} (without therapy) is against pernicious anaemia. The presence of fever and continued blood regeneration suggest that the case was one of pseudo-pernicious anaemia of pregnancy.

Final Diagnosis.

The sudden onset of the anaemia, the severe symptoms, accompanied later by fever in the puerperium with response to Campolon suggests a pseudo-pernicious anaemia.

APPENDIX II.

Case No. 11(sp): The patient was aged 40 years and eight months advanced in her third pregnancy. Her complaint was of severe, persistent pain in the epigastrium and heartburn. Nothing she took gave her any relief from these symptoms which had been present for several months before admission. Her appetite was poor; frequently she felt nauseated and occasionally she vomited. Her feet and ankles had been swollen for seven days before admission. Her diet was poor during pregnancy. Meat she rarely had and never more than twice a week. She enjoyed fruit daily. The spending capacity was 12/6 per head per week.

Her past history is interesting in that she had had bilateral sympathectomy performed for Raynaud's disease thirteen months prior to admission. Her menstrual and obstetrical histories were uneventful.

When she was admitted she was thin and slightly icteric. The skin of her face was thin and drawn. Both hands showed evidence of rheumatoid arthritis and the skin at the base of the nails was somewhat reddened.

(a) Fever. She remained afebrile till three days after delivery when her temperature rose and remained vacillating between 98° and 100° FOR ONE month.

(b) Cardiovascular. No abnormality was detected in

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heart. The blood pressure was 120 mms. Hg. systolic, and the diastolic pressure was 80 mms. Hg. Following a blood transfusion on the 9th day of the puerperium - occasioned by a rapid fall in haemoglobin and red blood corpuscles - she became very ill with breathlessness, vomiting and bleeding from the nose. Raynaud's disease rapidly developed affecting fingers, nose and ears.

(c) Respiratory. - No abnormality was observed.

(d) Gastro-intestinal. There was no enlargement of the liver or spleen and no abnormal mass was felt. The test meal showed persistent achlorhydria after histamine injection.

(e) Renal. The urine contained no abnormal constituents at any time.

(f) Obstetrical. She was delivered of a full time child without interference or any appreciable trouble. Examination showed no evidence of sepsis to account for the fever.

(g) Haematological. (i) The haemoglobin rapidly fell before delivery and continued to fall till 13th day of puerperium, thereafter, a progressive increase occurred till her dismissal. A further increase was observed when she was examined as an outpatient.

(ii) The red cell estimations followed the

course of the haemoglobin closely.

(iii) The colour index was about unity.

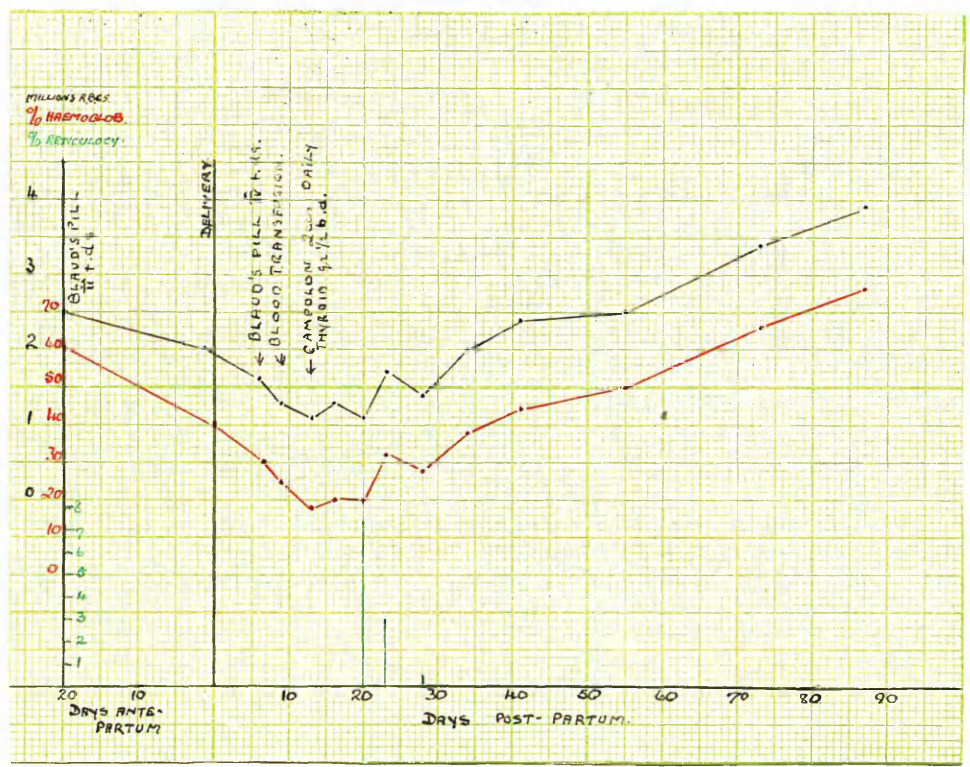
(iv) Reticulocytes. No reticulocytes were observed until the 23rd day of the puerperium when a slight reticulocytosis began, ranging from 3-6%.

(v) White cells. Only one count was performed - on the 20th day of the puerperium when it was found to be 18,200 per c.mm.

The haematological findings are tabulated below.

Days from Delivery	Hb%	RBC mills.	C.I.	W.B.C.	% Reticulo	Treatment
20	60	2.48	1.22			Blaud's pill ii tds.
1	40	2.02	1.05			
DELIVERY						
6	30	1.56	.99		nil	Blaud's pill iv t.ds. Blood transfusion, 300 ccs. Thyroid gr. $\frac{1}{2}$ b.d. Campolon 2ccs I.M. daily.
9	25	1.32	.96			
13	18	1.08	.85			
16	20	1.31	.74			
20	20	1.12	.91	18,200		
23	32	1.74	.94		3.2	
28	28	1.44	.96		6 %	
34	38	2.03	.95			
41	45	2.36	.95		1.	
55	50	2.52	1.0			
73	66	3.40	.97			Dismissed home.
87	76	3.92	.97			

Chart



Discussion.

The diagnosis is problematical. The possibilities considered were aplastic anaemia, or an anaemia attributable to vitamin B. deficiency, lack of Fe., haemolysis, an agranulocytic condition, absence of the factors of Castle, to a toxin or to sepsis.

(a) It was thought in the beginning that the severe anaemia associated with a low leucocyte count and the absence of premature cells might be due to an aplasia of the bone marrow. Against this however, was the normal

ninth day necessitated a blood transfusion of 300 ccs. This was followed by a severe attack of Raynaud's disease as already pointed out.

On the 13th day a still lower haemoglobin level was reached (18%) but owing to the upset which followed the previous blood transfusion, it was not deemed advisable to repeat this form of therapy. As a last resort, therefore, 2 ccs. of Campolon was given daily, intramuscularly, with thyroid gr. $\frac{1}{2}$ b.d. till her discharge, when all therapy was stopped. Ten days after commencement of Campolon a reticulocytosis with an increase in haemoglobin and red blood corpuscles occurred. A steady increase in haemoglobin and red blood corpuscles took place till her dismissal when all therapy was stopped. A further increase of 10% haemoglobin was observed 14 days after cessation of therapy.

From the above data it is difficult to give a definite diagnosis. The absence of reticulocytes, before therapy was begun, removes the possibility of a haemolytic anaemia.

In view of the rapid onset and severity of the anaemia, the fever, the response to Campolon and the continued improvement after cessation of therapy it would appear, in the light of the previous case, to be one of pseudo-pernicious anaemia.

APPENDIX III

PARTICULARS of INDIVIDUAL CASES.

1. Patients in their 1st pregnancy.

Case No.1: Mrs.B.

Aet 25, a primipara, had no complaint during pregnancy or puerperium. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat four times a week, eggs twice weekly and fruit daily. She was outside in fresh air daily.

The spending capacity per head was 25/- per week.

	Week	Hb.	R.B.C.	C.I.	Degree	Haemato-crit.
	23	85	4.12	1.03	1st	
	27	82	3.88	1.06		
	31	94	4.36	1.08		
	34	100	4.92	1.02		
	36	102	4.92	1.04		
Delivery:	38	95	4.47	1.06		38
1 wk.p.p.*		95	4.58	1.04		
4 wk.p.p.		105	5.26	1.0		

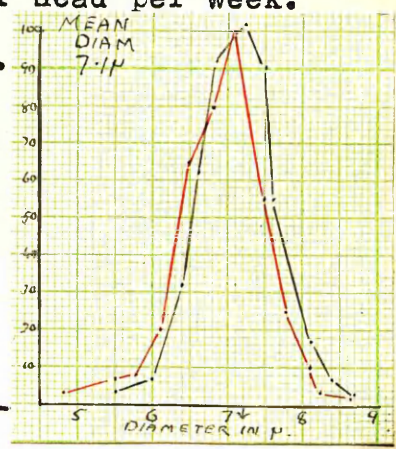
* post partum.

Case No.2: Mrs.G.

Aet 28, a primipara, had no complaints during pregnancy or puerperium. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat five times a week and fruit daily. Eggs were absent from the diet. She had daily exercise in the fresh air.

The spending capacity was 17/9 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	20	88	4.52	.97	1st
	24	82	4.20	.97	
	30	81	4.12	.97	
	35	92	4.64	.9	
	37	85	4.47	.95	
	39	95	4.72	1.01	
Delivery:	40	95	4.45	1.06	
3 days p.p.		90	4.83	.93	
4 wks. p.p.		95	4.96	.96	



Case No.3: Mrs.L.

Aet 20, primipara, had slight sickness during pregnancy. Loss at menses was excessive but loss at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat four times a week; eggs and fruit were absent from the diet. She had exercise in fresh air four times a week.

The spending capacity was 14/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	30	90	4.20	1.07	1	
	33	92	4.36	1.05		
	35	88	4.12	1.07		32
Delivery:	<u>38</u>	<u>85</u>	<u>4.08</u>	<u>1.05</u>		
2 days p.p.		70	3.93	.9	- Fe therapy begun.	
6 days p.p.		70	3.94	.9		
4 wks. p.p.		82	4.08	1.01		

Case No.4: Mrs.P.

Aet 29 years, a primipara, complained of heartburn during the last month of pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat daily and eggs three times a week. Fruit was absent from the diet. She had daily exercise in the fresh air.

The spending capacity was 14/4 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>38</u>	<u>82</u>	<u>4.33</u>	<u>.95</u>	<u>1</u>
5 days p.p.		85	4.39	.97	

Case No.5: Mrs.R.

Aet 20, a primipara, had no complaint during pregnancy. She had excessive loss at menses and at delivery. Clinical examination revealed no abnormality. Her diet contained meat six times a week, fruit daily and eggs occasionally. She had exercise in fresh air four times a week.

The spending capacity was 25/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	40	85	4.91	.86	1
7 days p.p.		85	4.14	1.03	
4 wks. p.p.		80	4.49	.9	

Case No. 6: A.T.

Aet 28 years, primipara, complained of heartburn during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormalities. Her diet contained meat three times a week and fruit three times a week. She had exercise in fresh air three times a week.

ERRATA.

Case No. 6:

Test meal done on the 36th week of pregnancy

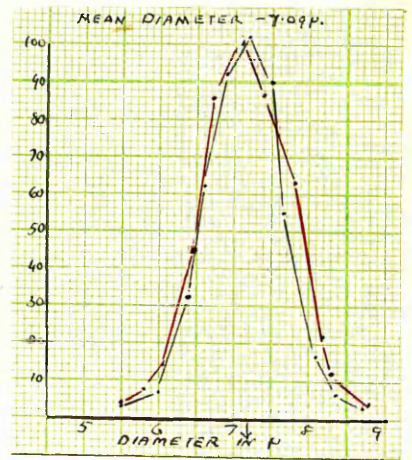
	Fast	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	
Comb. acid	35	20	5	5	25	28	13	32	28	40	50	42	68
Free HCl	23	10	0	0	12	14	0	20	15	30	38	30	53

histamine

Case No. 7: Mrs. W.

Aet 18 years, primipara, complained of slight heartburn during pregnancy. Loss at menses was excessive. Loss at delivery was normal. Clinical examination revealed no abnormalities. Her diet contained meat daily; eggs and fruit were absent from the diet. She had exercise in fresh air three times a week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	19	100	4.40	1.14	1	37
	22	95	4.26	1.11		
	23	87	3.92	1.11		
	27	100	4.60	1.04		
	31	106	5.04	1.06		
	35	92	4.13	1.12		
Delivery:	38	100	4.29	1.17		



	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	40	85	4.91	.86	1
7 days p.p.		85	4.14	1.03	
4 wks. p.p.		80	4.49	.9	

Case No.6: A.T.

Aet 28 years, primipara, complained of heartburn during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. The diet contained meat daily and eggs and fruit three times a week. She had daily exercise in the fresh air.

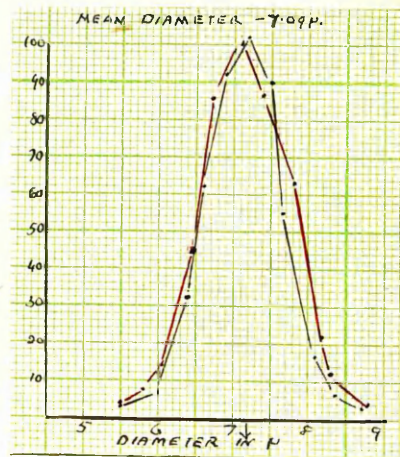
The spending capacity was not recorded.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	36	92	4.49	1.03	1	
Delivery:	38	100	4.52	1.1		39
9 days p.p.		80	3.99	1.01		
5 wks. p.p.		85	4.32	.98		
6 wks. p.p.		94	4.64	1.02		

Case No.7: Mrs.W.

Aet 18 years, primipara, complained of slight heartburn during pregnancy. Loss at menses was excessive. Loss at delivery was normal. Clinical examination revealed no abnormalities. Her diet contained meat daily; eggs and fruit were absent from the diet. She had exercise in fresh air three times a week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	19	100	4.40	1.14	1	37
	22	95	4.26	1.11		
	23	87	3.92	1.11		
	27	100	4.60	1.04		
	31	106	5.04	1.06		
	35	92	4.13	1.12		
Delivery:	38	100	4.29	1.17		



Test meal done on 24th week of pregnancy:

	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb. acid	6	15	12	22	38	42	45	45	52	52	45	45
Free HCl	0	0	0	10	25	30	30	30	35	40	32	31

Case No.8: Mrs.G.

Aet 27, a primipara, complained of heartburn throughout pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs occasionally. She had daily exercise in the fresh air. The spending capacity was 18/- per week per head.

	Week	Hb.	RBC.	C.I.
	30	95	3.96	1.2
	35	96	4.72	1.02
Delivery:	<u>40</u>	<u>92</u>	<u>4.20</u>	<u>1.09</u>
5 days p.p.	90	4.18	1.08	

Fractional test meal done on 32nd week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	
Comb. acid	8	5	8	10	12	13	13	11	No further specimens and no histamine given.
Free HCl	0	0	0	0	0	0	0	0	

Case No.9: Mrs.H.

Aet 21, a primipara, had no complaints during pregnancy. Loss at menses and at delivery was normal. She was delivered of a stillborn infant. Clinical examination revealed no abnormality. The serum Wassermann reaction was negative during pregnancy and positive after delivery. Her diet contained meat, eggs and fruit daily. She had exercise in fresh air daily. The spending capacity was 11/3 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
	23	82	3.21	1.28	1	
	26	86	3.46	1.24		
	30	85	4.32	.98		
	34	85	3.37	.97		
Delivery:	<u>40</u>	<u>90</u>	<u>4.48</u>	<u>1.01</u>		36
4 days p.p.	95	4.78	1.0			

Fractional Test Meal done on 23rd week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{2}$	
Comb.acid.	8	7	16	22	25	12	14	12	8	8	58
Free HCl	0	0	8	12	15	0	0	0	0	0	44

Histamine.

Case No.10: Mrs. C.

Aet 29 years, a primipara, complained of heartburn during pregnancy. Loss at menses and loss at delivery was normal. Clinical examination revealed no abnormality. Her diet contained eggs and fruit daily and meat once a week. She had daily exercise in fresh air. The spending capacity was 20/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	25	92	4.60	1.0	1
	30	90	4.62	.97	
Delivery:	<u>35</u>	<u>100</u>	<u>4.82</u>	<u>1.04</u>	
2 days p.p.		104	5.06	1.03	
5 wks. p.p.		85	4.06	1.05	

Case No.11: E.M.

Aet 24 years, a primipara, complained of heartburn during her pregnancy. Menstrual loss and loss at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat twice a week, fruit three times a week and eggs occasionally. She had daily exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	36	92	3.60	1.27	1	31
	38	90	4.36	1.03		
Delivery:	<u>40</u>	<u>82</u>	<u>4.08</u>	<u>1.01</u>		
18 days p.p.		88	4.20	1.04		
4 wks. p.p.		95	4.56	1.04		

Fractional Test Meal done on 35th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	
Comb.acid	25	20	22	55	35	35	32	35	30	33
Free HCl	10	0	12	40	20	20	20	25	15	20

Histamine.

Case No.12: Mrs.C.

Aet 22, a primipara, complained of heartburn during her pregnancy. Loss at menses not recorded. Loss at delivery was normal. Clinical examination revealed no abnormality. Her diet is not recorded. The spending capacity was 9/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	36	85	4.36	.97	1
Delivery:	<u>38</u>	<u>100</u>	<u>4.80</u>	<u>1.04</u>	
10 days p.p.	105	4.92	1.07		

Case No.13: Mrs.W.

Aet 30, a primipara, had no complaint during pregnancy but during labour developed eclampsia with pyrexia. Loss at menses is not recorded but loss at delivery was normal. Clinical examination revealed no abnormality in the early stages but later there was an increase in blood pressure and some albumin in the urine. Her diet is not recorded. The spending capacity was 41/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	29	88	4.80	.92	1
	34	91	4.36	.93	
	37	100	5.04	1.0	
Delivery:	<u>40</u>	<u>100</u>	<u>4.84</u>	<u>1.03</u>	
9 days p.p.	48	2.26	1.06		

Case No.14: Mrs.S.

Aet 22, a primipara, complained of slight heartburn during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet is not recorded. Spending capacity is not recorded.

	Week	Hb.	RBC.	C.I.
Delivery:	<u>40</u>	<u>90</u>	<u>3.78</u>	<u>1.2</u>
9 days p.p.	80	4.31	.93	

Case No.15: Mrs.S.

Aet 31, a primipara, had no complaints during pregnancy. Loss at menses was excessive. Loss at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat, eggs and fruit three times a week. She had exercise in fresh air three times a week. The spending capacity was 16/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
	28	75	3.32	1.16	2	
	31	80	3.52	1.12		
	39	85	4.93	.86		
Delivery:	<u>40</u>	<u>90</u>	<u>4.57</u>	<u>1.03</u>		30
3 days p.p.		85	4.08	1.05		
1 mth.p.p.		90	4.75	.94		

Fractional Test Meal done on 30th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid	32	12	10	12	8	8	18	32	20	20	20	40	47
Free HCl	20	0	0	0	0	0	0	20	12	12	12	30	37
													Histamine

Case No.16: Mrs.P.

Aet 28, a primipara, had no complaints during pregnancy or the puerperium. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat, eggs and fruit occasionally. She had daily exercise in the fresh air. The spending capacity was 35/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	29	76	3.53	1.08	2
Delivery:	<u>33</u>	<u>93</u>	<u>3.74</u>	<u>1.25</u>	
10 days p.p.		95	4.55	1.04	

Case No.17: Mrs.B.

Aet 26, a primipara, complained of irregular gastric pain. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs occasionally. She had daily exercise in the fresh air. The spending capacity was $1\frac{3}{4}$ per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	
	21	70	3.52	1.0	2	
	25	64	3.32	.97		
	28	70	3.52	1.0		
	31	70	3.60	.97		
	34	62	3.20	.96		
	36	70	4.20	.83		
Delivery:	38	65	3.38	.97		Reticulo. = less than 1%.
			Fe et ammon cit. gr. 30 t.d.s.			
2 days p.p.		52	3.06	.85		Reticulo. = 2%
6 wks p.p.		55	2.84	.98		

Test Meal done on 24th week of Pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2
Comb. acid.	10	25	38	36	15	30	60	-	-	40	42	65
Free HCl	0	12	24	22	0	18	30	-	-	22	30	50

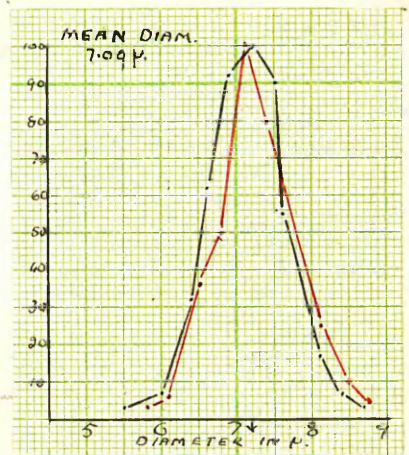
Histamine

Case No. 18: Mrs. L.

Aet 17, a primipara, complained of heartburn during pregnancy. Loss at menses was normal but there was free loss at delivery. Clinical examination revealed no abnormality. Diet contained meat and fruit four times a week and eggs once a week. She had daily exercise in the fresh air.

The spending capacity was 15/9 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
	27	86	4.4	.97	2	36
	30	85	4.13	1.03		
	34	92	4.3	1.07		
	37	90	4.36	1.03		
	39	78	3.84	1.03		
Del.:	40	75	3.64	1.04		
1 day p.p.		70	3.55	.98		
1 mth. p.p.		85	4.61	.91		



Test Meal done on 23rd week of pregnancy.

	Fast	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	13	35	24	22	38	30	28	18	20	60	30	62	55
Free HCl	0	0	0	0	10	8	7	5	8	28	15	32	30

Histamine

Case No.19: Mrs.J.

Aet 21, a primipara, had no complaints during pregnancy or the puerperium. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat 5 times a week, and fruit and eggs daily. She had daily exercise in the fresh air. The spending capacity was 26/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	29	80	3.6	1.1	2	
	33	86	4.32	1.0		33
Delivery:	<u>38</u>	<u>80</u>	<u>4.16</u>	<u>.96</u>		
3 days p.p.	96	4.50	1.06			

Test Meal done at 35th week of pregnancy.

	Fasting	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	22	22	17	18	40	48	60	56	48	-	15	10	10
Free HCl	12	0	0	0	25	34	43	40	35	-	0	0	0

Histamine

Case No.20: A.L.

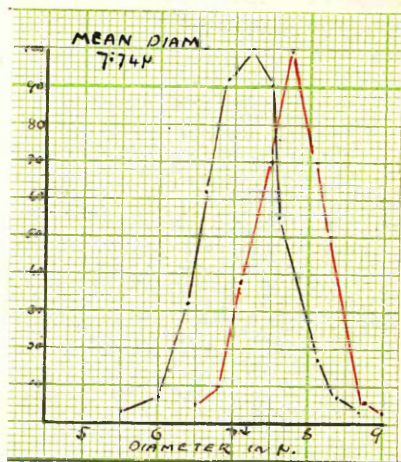
Aet 27, a primipara, complained of heartburn during pregnancy. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat five times a week, eggs occasionally and fruit three times a week. She had daily exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	31	85	3.44	1.2	2	
	33	88	4.12	1.07		
	35	80	3.40	1.16		32
	37	75	3.55	1.05		
Delivery:	39	85	4.32	.98		
3 days p.p.		85	4.02	1.06		

Case No.21: Mrs. G.

Aet? , a primipara, had no complaints during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat and fruit daily and eggs three times a week. She had daily exercise in the fresh air. The spending capacity was 18/3 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Del.	40	75	3.17	1.18	2
1 day, .pp.		83	4.23	.99	
2 mths pp.		80	4.60	.87	



Case No.22: Mrs. W.

Aet 17, a primipara, had no complaints during pregnancy. Loss at menses and at delivery was normal. Clinical examination was negative. Her diet contained meat and fruit daily, and eggs occasionally. She had no exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery		73	3.55	1.03	2
6 days p.p.		92	3.87	1.2	
1 mth. p.p.		100	4.84	1.04	

Case No.23: Mrs.O.

Aet 22, a primipara, had no complaint during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed a slightly enlarged spleen. Diet contained meat and fruit daily. Eggs were absent from the diet. She took exercise in fresh air about 3 times a week. The spending capacity was 12/6 per head per week.

	Week	Hb.	RBC.	C.I.
Delivery:	<u>40</u>	<u>64</u>	<u>3.84</u>	<u>.84</u>
6 days p.p.	65	4.03	.80.	

Case No.24: Mrs.B.

Aet 21, a primipara, complained of weakness during her pregnancy. Loss at menses and at delivery was normal. Clinically all that could be found was some pallor. The diet and spending capacity per head are unknown. She died shortly after labour. The post mortem report suggested a fibrosis of the bundle of His.

	Week	Hb.	RBC.	C.I.
Delivery:	<u>35</u>	<u>50</u>	<u>3.24</u>	<u>.78</u>
	<u>39</u>	<u>47</u>	<u>3.13</u>	<u>.75</u>

D i e d.

Case No.25: M.W.

Aet 28, a primipara, had heartburn during pregnancy. Loss at menses and at delivery was normal. Clinical examination was negative. Diet consisted of meat four or five times a week, eggs three or four times a week, and fruit daily. She had exercise in fresh air daily.

	Week	Hb.	RBC.	C.I.	Deg.
	36	78	3.90	1.0	2
	38	80	4.12	.99	
	39	75	3.64	1.04	
Delivery:	<u>40</u>	<u>82</u>	<u>4.04</u>	<u>1.02</u>	
10 days p.p.	86	4.64	.93		
4 wks. p.p.	90	4.24	1.07		
10 wks. p.p.	90	4.64	.98		

Fractional Test Meal done at 36th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Comb. acid	15	28	20	34	30	28	34	36	12	-	42	45
Free HCl	0	0	0	0	8	8	16	18	0	-	32	35

Case No.26: Mrs. Y.

Aet 36, a primipara, complaint of slight heartburn during her pregnancy. Loss at menses was excessive but loss at delivery was normal. Clinical examination was negative. Her diet contained meat and fruit daily. She did not take eggs. She had no exercise in fresh air. The spending capacity was 20/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	37	85	4.56	.93	2
	38	70	3.64	.97	
Delivery:	39	70	3.72	.94	
9 days p.p.		65	3.60	.90	
1 mth p.p.		72	3.92	.92	
2 " p.p.		80	4.18	.96	

Fe et ammon cit gr.30 tds.

Case No.27: Mrs. B.

Aet 21, a primipara, had no complaints during pregnancy or puerperium. Loss at menses was normal but there was excessive loss at delivery. Clinical examination revealed no abnormality. Diet contained meat twice weekly and fruit daily. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 12/7 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
	21	65	3.36	.97	2	
	26	74	3.58	1.04		29
		68	3.52	.97		31
	28	72	3.64	1.0		
	29	70	4.32	.8		
	32	80	4.04	1.0		
	34	76	3.84	1.0		

Fe et ammon. cit gr.30 t.d.s.

Case No.27 (cont.)

	Week	Hb.	RBC.	C.I.
	36	72	3.78	.96
	38	74	3.84	.97
	39	80	4.08	1.0
Delivery:	40	80	3.69	1.09
3 days p.p.	75	4.20	.9	
1 mth. p.p.	96	4.84	1.0	



Case No.28: A.T.

Aet 22, a primipara, had no complaints during pregnancy or the puerperium. Loss at menses and at delivery was normal. Dental caries found on examination. Diet contained meat once a week; eggs and fruit were entirely absent. She had no exercise in fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
	34	68	3.52	.97	2
	36	70	3.74	.95	
	37	72	3.76	.96	
	38	76	3.92	.97	
Delivery:	39	75	3.84	.98	
3 wks p.p.	70	3.97	.88		

Test Meal done at 35th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$
Comb.acid.	10	7	6	6	8	12	10	15	30	18	10
Free HCl.	0	0	0	0	0	0	0	0	20	0	0



Case No.29: Mrs.M.

Aet 20, a primipara, had no complaints during pregnancy or the puerperium. Loss at menses was normal. Loss at delivery is not known. Clinical examination revealed no abnormality. Diet is not recorded. The spending capacity was 12/6 per head per week.

Case No.29 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	35	75	4.03	.93	2	
	38	85	4.36	.99		32
Delivery:	<u>40</u>	<u>80</u>	<u>4.04</u>	<u>1.0</u>		
2 days p.p.		80	4.180	.96		
5 wks. p.p.		100	4.84	1.04		

Test Meal done at 39th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	3
Comb.acid.	18	16	20	36	35	40	30	35	25	15
Free HCl.	7	0	12	23	22	25	18	25	15	8

Histamine.

Case No.30: Mrs. B.

Aet 19, primipara, had pyelitis during pregnancy and some pyrexia in the puerperium. Clinical examination revealed slight tenderness in renal angles. Loss at menses and at delivery was normal. Diet contained meat three times a week, eggs once, and fruit daily. She had daily exercise in the fresh air. Spending capacity was 15/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	22	96	4.48	1.08	2	39
	30	75	3.84	.98		
	34	75	3.72	1.01		
	36	68	3.52	.97		
Delivery:	<u>38</u>	<u>94</u>	<u>4.44</u>	<u>1.06</u>		
6 days p.p.		50	2.60	.96		

Case No.31: Mrs. F.

Aet 20, a primipara, complained of heartburn during pregnancy. Loss at delivery and at menses was normal. Clinical examination revealed no abnormality. Her diet contained meat twice a week, fruit daily and eggs were absent from the diet. She had daily exercise in the fresh air.

Case No.31 (contd.)

	Week	Hb.	RBC.	C.I.	Haemato- crit.
	23	92	4.20	1.09	
	26	80	3.92	1.02	
	28	82	4.12	1.0	
	31	90	4.44	1.02	
	35	90	4.60	.97	
Delivery:	38	85	4.36	.97	
6 days p.p.		100	4.97	1.02	
1 mth. p.p.		95	4.50	1.05	

Case No.32: E.S.

Aet 27, a primipara, had no complaint during pregnancy. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat and fruit daily. Eggs were absent from the diet. She had exercise in fresh air three times a week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	40	60	3.47	.87	3
7 days p.p.		73	3.34	1.1	
10 wks p.p.		72	3.70	.97	

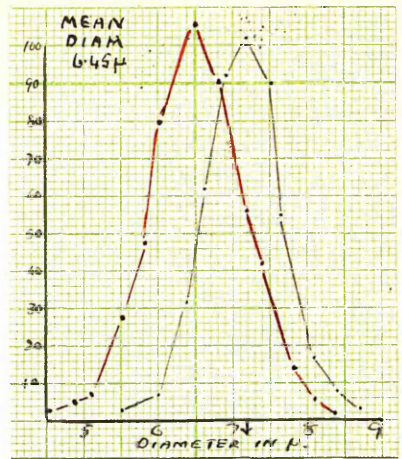
Case No.33: Mrs.P.

Aet 31, a primipara, had no complaints during pregnancy. Loss at menses was excessive. Loss at delivery was normal. Examination clinically revealed no abnormality. Her diet contained meat twice weekly, fruit three times a week and no eggs. She had no exercise in the fresh air. The spending capacity was 23/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit
	19	60	4.20	.71	3	
	24	60	3.28	.92		
	29	60	3.84	.8		
	32	60	3.88	.8		
	35	60	3.84	.8		28
	37	58	3.76	.7		
	39	58	3.97	.73		

Case No.33 (cont.)

	Week	Hb.	RBC.	C.I.
Del.:	40	62	3.82	.81
Fe et Ammon cit gr.30 tds.				
5 days pp.	45	3.72	.61	
11 " p.p.	60	3.77	.8	
1 mth. p.p.	82	4.16	.98	



Fractional Meal Test done at 25th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Comb.acid.	15	10	8	11	8	12	10	12	10	12	10	10
HCl (free)	0	0	0	0	0	0	0	0	0	0	0	0
												105*

Histamine

Case No.34: Mrs. S.

Aet 26, a primipara, had no complaints during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed some albuminuria and hyperpiesia late in pregnancy. Her diet contained meat once a week, fruit daily and eggs occasionally. She had daily exercise in the fresh air. The spending capacity was 32/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	35	50	2.86	.88	3
Fe et ammon. cit gr.30 tds.					
	36	48	3.60	.66	
Delivery:	37	60	4.04	.75	
2 days p.p.	60	3.16	.95		
14 days p.p.	70	3.90	.9		
5 wks. p.p.	85	4.25	1.0		

Fractional Test Meal done at 35 & 37 week of pregnancy. (both showed achlorhydria after histamine.)

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$
Comb.acid.	0	0	0	12	20	24	20	20	0	0
Free HCl.	0	0	0	0	0	0	0	0	0	0

Histamine.

2. Patients in their 2nd pregnancy.

Case No.35: Mrs. S.

Aet 36, in her 2nd pregnancy, complained of heart-burn, sore tongue and dysphagia. Loss at menses was excessive but loss at delivery was normal. Clinical examination revealed no abnormality. Meat and eggs were absent from the diet. She had fruit daily. She had no exercise in the fresh air. The spending capacity was $11/8$ per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	16	100	5.12	.98	1
	22	110	5.36	1.02	
	27	105	5.84	.9	
	31	103	4.70	1.1	
	35	95	4.31	1.1	
Delivery:	38	90	4.36	1.03	
8 days p.p.		78	4.00	.98	
1 mth. p.p.		80	4.12	.98	

Test Meal done at 18th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	2
Comb.acid.	10	28	38	45	50	22	35	26	24	22	26	75
Free HCl.	0	10	25	32	40	10	22	12	10	10	12	60

Histamine

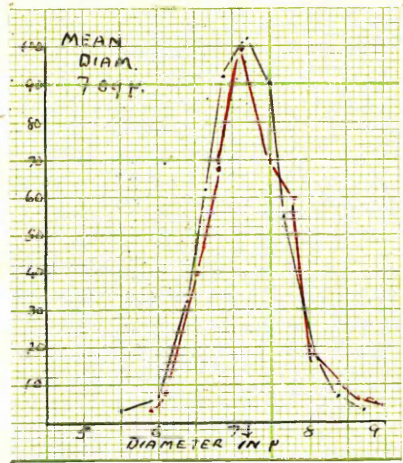
Case No.36: Mrs. W.

Aet 28, in her 2nd pregnancy, complained of heart-burn. She was delivered of twins and had puerperal sepsis. Loss at menses was excessive and loss at delivery was normal. Diet contained meat three times a week. Eggs and fruit were absent from the diet. She had exercise in fresh air three times a week. The spending capacity was $10/4$ per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
	24	88	4.12	1.07	1	34
	34	90	4.36	1.03		
Del.:	39	85	4.32	.97		

Case No. 36 (contd.)

	Hb.	RBC.	C.I.
8 days p.p.	60	3.12	.97
12 " p.p.	70	3.52	1.0
1 mth. p.p.	70	3.64	.97



Test Meal done at 27th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	
Comb. acid.	37	18	15	18	28	45	15	22	23	12	10	8	10	60
Free HCl.	20	0	0	0	15	30	8	10	10	0	0	0	0	45

Histamine.

Case No. 37: Mrs. J.

Aet 26, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained eggs twice a week and fruit daily. She never ate meat. She had exercise in fresh air three times a week. The respending capacity was 10/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
' Delivery:	40	85	4.32	.96	1
10 days p.p.		100	5.36	.93	
1 mth. p.p.		87	4.37	1.0	

Case No. 38: Mrs. T.

Aet 22, in her 2nd pregnancy, had heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat three times a week and fruit once a week. The spending capacity was 14/- per head per week.

Case No. 38 (cont.)-

	Week	Hb.	RBC.	C.I.	Deg.
	36	86	3.92	1.1	1
Delivery:	<u>39</u>	<u>92</u>	<u>4.52</u>	<u>1.02</u>	
5 days p.p.	90	4.68	.96		
10 days p.p.	90	4.68	.96		
1 mth p.p.	95	4.24	1.13		
6 wks. p.p.	92	4.37	1.05		

Case No. 39: Mrs. K.

Aet 24, in her 2nd pregnancy, complained of severe heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and eggs twice a week and fruit daily. She had exercise in fresh air three times a week. The spending capacity was 17/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	35	88	4.32	1.02	1
Delivery:	<u>38</u>	<u>85</u>	<u>4.51</u>	<u>.94</u>	
3 days p.p.	92	4.50	1.02		

Case No. 40: Mrs. W.

Aet 27, in her 2nd pregnancy, had no complaints. Loss at menses was normal but there was free loss at delivery. Clinical examination revealed no abnormality. Diet contained meat and eggs twice a week and fruit daily. She had daily exercise in the fresh air. The spending capacity was 14/3 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
Delivery:	<u>40</u>	<u>100</u>	<u>4.58</u>	<u>1.09</u>	0	37
3 days p.p.	65	3.04	1.08			
	75	3.83	.98			

Case No. 41: Mrs. C.

Aet 25, in her 2nd pregnancy, complained of severe heartburn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat three times a week. She had exercise in fresh air three times a week. The spending capacity was 10/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	32	100	4.80	1.04	0	
	34	100	4.84	1.04		
	36	100	4.44	1.13		39
Delivery:	38	100	4.84	1.04		
7 days p.p.		100	5.360	1.02		
3 mths. p.p.		85	4.40	.96		

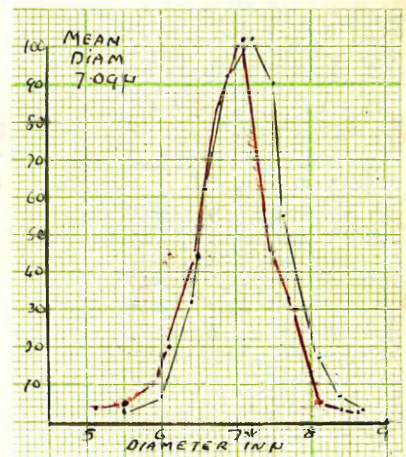
Test Meal done at 37th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$
Comb. acid.	26	25	33	30	35	30	35	20	13	13	25
Free HCl.	13	12	22	18	25	18	22	0	0	0	15

Case No. 42: Mrs. F.

Aet 27, in her 2nd pregnancy, complained of occasional pain in the epigastrium after her meals. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat, fruit and eggs daily. She had daily exercise in the fresh air. The spending capacity was 25/- per head per week.

	Week	Hb.	RBC	C.I.	Deg.	Haemato- crit.
	29	60	3.12	.96	3	29
	37	78	3.76	1.04		
Del.:	38	68	3.52	.97		
6 days p.p.		65	3.76	.86		
		65	3.44	.95		



Case No.42 (cont.)

Test Meal done at 35th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$
Comb.acid.	7	8	13	16	20	25	28	32	32	22
Free HCl.	0	0	0	8	8	15	15	20	16	10

Case No.43: Mrs. W.

Aet 22, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. The diet contained meat and fruit daily and eggs once a week. She had daily exercise in the fresh air. The spending capacity was 10/3 per head per week.

	Week	Hb.	TBC.	C.I.	Deg.	Haemato- crit.
	25	72	3.68	.97	3	
	30	82	4.36	.95		
	32	72	3.74	.97		29
	34	65	3.32	.98		
	36	55	2.88	.93		
	38	70	3.88	.88		
Delivery:	40	55	3.56	.77		
4 days p.p.		55	3.35	.82		
11 " p.p.		65	4.60	.70		
1 mth. p.p.		70	3.56	.98		

Fractional Test Meal done at 29th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$
Comb.acid.	6	12	12	10	10	8	8	10	10	12	14
Free HCl.	0	0	0	0	0	0	0	0	0	0	0

Histamine.

Case No.44: Mrs. M.

Aet 34, in her 2nd pregnancy, had no complaints. Loss at menses is not recorded. Loss at delivery was normal. Clinically she had a slightly raised blood pressure with albumin and casts in the urine. She was diagnosed as a chronic nephritis. The diet and spending capacity per head per week are not recorded.

Case No.44 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.
	37	60	3.08	.98	3
	38	75	3.52	1.07	
Delivery:	<u>40</u>	<u>70</u>	<u>3.51</u>	<u>1.0</u>	
6 days p.p.	80	3.31	1.2		
6 wks. p.p.	77	3.95	.97		

Case No.45: Mrs. O.

Aet 23, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality except pallor. Diet contained fruit daily, eggs three times a week. She had had no meat for years. She had daily exercise in the fresh air. The spending capacity was 5/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>33</u>	<u>58</u>	<u>3.12</u>	<u>.93</u>	3
6 days p.p.	65	3.68	.89		

Case No.46: Mrs. F.

Aet 28, in her 2nd pregnancy. There is no record of her complaint. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat occasionally, eggs three times a week and fruit daily. She had no exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
	19	90	4.12	1.09	1
	23	90	4.36	1.03	
	33	95	4.52	1.05	
	38	85	4.40	.96	
Delivery:	<u>39</u>	<u>78</u>	<u>4.08</u>	<u>.96</u>	
4 days p.p.	80	3.64	1.1		
1 mth. p.p.	78	4.04	.97		

Case No.46 (contd.)

Test Meal done at 25th week of pregnancy.

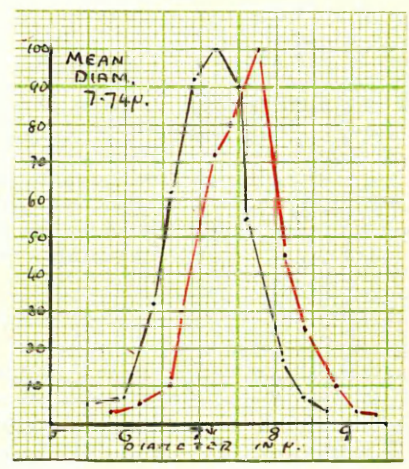
Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$		
Comb.acid.	8	15	25	35	42	38	30	25	38	38	28	28	32
Free HCl.	0	8	12	22	30	25	20	20	22	25	10	12	45

Histamine.

Case No.47: Mrs. M.

Aet 23, in her 2nd pregnancy, had no complaints during pregnancy but she gave a history of gastritis $2\frac{1}{2}$ years previously. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Her diet contained meat three times a week and fruit daily. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 8/- per head per week.

Week	Hb.	RBC.	C.I.	Deg.	Haematocrit.
27	85	4.32	.99	1	31
30	82	3.70	1.1		
34	96	4.44	1.09		
Del: 36	90	4.12	1.09		
6 days pp.	90	4.31	1.04		
2 mths. "	80	4.12	.97		



Test Meal done at 34th week of pregnancy.

Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$		
Comb.acid.	10	8	8	9	6	4	6	12	10	6	8	8
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0

Histamine

Case No.48: Mrs. H.

Aet 23, in her 2nd pregnancy, had no complaints. Loss at menses was excessive. Loss at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 4/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	33	90	4.46	1.00	2
	37	80	3.84	1.05	
Delivery:	<u>38</u>	<u>80</u>	<u>4.12</u>	<u>.97</u>	
3 days p.p.	62	3.46	.9		

Test Meal done at 36th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	2 2
Comb.acid.	50	28	18	18	35	25	15	8	5	12	10
Free HCl.	35	16	8	8	22	24	8	0	0	0	0

Histamine

Case No.49: Mrs. E.

Aet 33, in her 2nd pregnancy, complained of poor appetite. Loss at menses was normal, but loss at delivery is not known as she was delivered at home. Clinical examination was negative. Diet contained meat daily and fruit three times a week. Eggs were absent from the diet. She had no exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
	16	90	4.36	1.03	2
	21	100	4.63	1.08	
	25	90	4.12	1.1	
	29	90	4.16	1.1	
	33	77	3.58	1.08	
Delivery:	<u>38</u>	<u>82</u>	<u>3.96</u>	<u>1.04</u>	

Test Meal done at 16th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3
Comb.acid.	35	15	20	45	53	32	12	8	12	10	8	30
Free HCl.	20	0	10	30	40	20	0	0	0	0	0	20

Histamine.

Case No. 50: Mrs. O.

Aet 30, in her 2nd pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. She was delivered of normal healthy twins. Clinical examination was negative. Meat was absent from the diet. She had eggs and fruit daily. She had daily exercise in the fresh air. The spending capacity was 11/3 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	39	72	4.08	.9	2
Delivery:	<u>40</u>	<u>72</u>	<u>3.72</u>	<u>.97</u>	
4 days p.p.	70	4.52	.77		

Test Meal done at 39th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	8	7	8	32	30	22	45	35	32	42	42	20	45
Free HCl.	0	0	0	20	20	12	30	20	20	30	30	10	20



Case No. 51: Mrs. V.

Aet 27, in her 2nd pregnancy, complained of heart-burn. Menstrual loss and loss at delivery was normal. Clinical examination revealed no abnormality. The diet contained meat and fruit daily. Eggs were absent from the diet. She had no exercise in the fresh air. The spending capacity was 13/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>40</u>	<u>68</u>	<u>3.49</u>	<u>.98</u>	<u>2</u>
8 days p.p.	84	4.10	1.02		

Fractional Test Meal done at 40th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	10	12	10	18	18	25	22	25	12	14	12	20	65
Free HCl.	0	0	0	8	10	20	10	13	0	0	0	8	40

Histamine.



Case No.52: Mrs. A.

Aet 29, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 15/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	34	80	3.80	1.05	2
		Fe et Ammon.	cit.	gr.30	tds.
Delivery:	<u>37</u>	<u>70</u>	<u>3.21</u>	<u>1.09</u>	
2 days p.p.	85	4.32	.98		
1 mth. p.p.	88	4.52	.97		

Case No.53: Mrs. E.S.

Aet.29, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat six times a week, fruit daily and eggs three times a week. She had daily exercise in the fresh air. The spending capacity was 30/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	35	80	4.41	.91	2
Delivery:	<u>39</u>	<u>85</u>	<u>4.32</u>	<u>.99</u>	
10 days p.p.	92	5.13	.9		
1 mth. p.p.	85	4.36	.96		

Case No.54: Mrs. A.

Aet 28, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Dental caries was found on examination. Diet contained meat four times a week, eggs occasionally and fruit daily. She had daily exercise in the fresh air. The spending capacity per head is not recorded.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>30</u>	<u>85</u>	<u>4.06</u>	<u>1.06</u>	1
4 days p.p.	87	4.34	1.01		

Case No.55: Mrs. B.

Aet 26, in her 2nd pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat daily, eggs and fruit occasionally. She had exercise in the fresh air three times a week, The spending capacity was 13/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	31	90	4.32	1.04	1
	37	105	5.24	1.01	
	39	108	5.28	1.02	
Delivery:	40	90	4.32	1.04	
4 days p.p.		95	4.89	.98	

Case No.56: Mrs. H.

Aet 24, in her 2nd pregnancy, had no complaint. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs three times a week. She had daily exercise in the fresh air. The spending capacity was 13/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	20	100	4.84	1.04	1	35
	36	90	4.01	1.12		
Delivery:	40	86	3.72	1.16		
4 days p.p.		92	4.20	1.09		
1 mth. p.p.		92	4.69	.99		

Case No.57: Mrs. W.

Aet 35, in her 2nd pregnancy, complained of frequent headaches. Loss at menses was normal. Loss at delivery was not recorded as she was delivered at home. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs three times a week. She had exercise in the fresh air three times a week. The spending capacity was 11/- per head per week.

FRACTIONAL TEST MEAL DONE AT 19th WK. OF PREGNANCY.

Fasting.	→	1/4	1/2	3/4	1	1 1/4	1 1/2	2	2 1/4	2 1/2	2 3/4	55	
COMB. ACID	-	18	25	30	35	38	35	30	28	38	35	20	55
FREE HCL	-	0	14	18	22	24	23	20	20	25	23	10	35

HISTAMINE

Case No. 57 (contd.)

	Week	Hb.	RBC.	C.I.
	18	95	4.35	1.09
	22	97	4.77	1.02
	26	100	4.78	1.05
	30	92	4.26	1.08
	34	92	4.50	1.02
Delivery:	<u>36</u>	<u>90</u>	<u>4.40</u>	<u>1.02</u>

Case No. 58: Mrs. J.

Aet 33, in her 2nd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained fruit daily and eggs twice a week. Meat was entirely absent from the diet. She had exercise in the fresh air three times a week. The spending capacity was 29/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	38	70	3.69	.96	2
Delivery:	<u>40</u>	<u>80</u>	<u>3.94</u>	<u>1.02</u>	
3 days p.p.		95	4.81	.99	

Fractional Test Meal done at 35th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	
Comb. acid.	8	12	15	24	24	46	35	42	24	22	52	48	20	8
Free HCl.	0	0	0	13	13	32	25	28	10	10	38	34	10	0

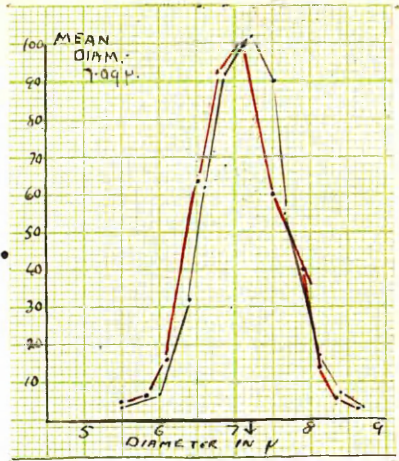
Histamine

Case No. 59: Mrs. H.

Aet 23, in her 2nd pregnancy, complained of slight heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat three times a week, eggs occasionally and fruit daily. She had daily exercise in the fresh air.

Case No.59 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.
	38	62	3.12	1.0	2
Delivery:	<u>40</u>	<u>85</u>	<u>3.92</u>	<u>1.08</u>	
4 days p.p.		80	4.08	.98	
6 wks. p.p.		76	3.92	.97	



Case No.60: Mrs. W.

Aet 31, in her 2nd pregnancy, complained of heart-burn during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat twice a week, eggs occasionally and fruit daily. She had daily exercise in the fresh air. The spending capacity was 16/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	28	88	4.32	.94	2
	29	90	4.08	1.12	
	33	90	4.08	1.12	
	37	88	4.40	1.0	
Delivery:	<u>38</u>	<u>75</u>	<u>3.83</u>	<u>.98</u>	
6 wks. p.p.		100	4.92	1.02	

Case No.61: Mrs. R.

Aet 36, in her 2nd pregnancy, complained of heart-burn during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit three times a week. Eggs were absent from the diet. She had no exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
	32	70	3.76	.93	2
Delivery:	<u>35</u>	<u>103</u>	<u>4.80</u>	<u>1.07</u>	
21 days p.p.		85	4.36	.97	

3. Patients in their 3rd pregnancy.

Case No.62: Mrs. W.

Aet 28 years, in her 3rd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs three times a week. She had no exercise in the fresh air. The spending capacity was 10/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	19	104	4.88	1.05	1
	23	110	5.12	1.08	
	27	95	4.59	1.04	
	31	96	4.62	1.04	
	35	90	4.36	1.03	
Delivery:	<u>39</u>	<u>94</u>	<u>4.52</u>	<u>1.04</u>	
4 days p.p.		100	4.70		



Case No.63: Mrs. M.

Aet 33, in her 3rd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat six times a week and eggs daily. Fruit was absent from the diet. She had daily exercise in the fresh air. The spending capacity was 14/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	32	95	4.4	1.08	1
	34	102	4.52	1.13	
Delivery:	<u>36</u>	<u>97</u>	<u>4.20</u>	<u>1.15</u>	
2 days p.p.		90	4.50	1.0	



Case No.64: Mrs. M.

Aet 20, in her 3rd pregnancy, had no complaints. Loss at menses was excessive but loss at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat daily. She never had any eggs or

Case No.64 (contd.)

fruit. She had no exercise in the fresh air. The spending capacity was 5/9 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>36</u>	92	4.4	1.04	1
3 days p.p.		95	4.55	1.04	

Case No.65: Mrs. H.

Aet 31, in her 3rd pregnancy, complained of slight heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs once a week. She had daily exercise in the fresh air. The spending capacity was 13/7 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	31	85	4.28	1.0	1
	35	90	4.04	1.12	
Delivery:	<u>39</u>	94	4.36	1.08	
7 days p.p.		95	4.54	1.05	

Case No.66: Mrs. R.

Aet 30, in her 3rd pregnancy, complained of heartburn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat five times a week and eggs twice a week. Fruit was absent from the diet. She had exercise in the fresh air daily. The spending capacity was 10/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	36	100	4.58	1.1	1
	38	96	4.28	1.13	
Delivery:	<u>40</u>	92	4.04	1.15	
4 days p.p.		80	4.23	.95	
1 mth. p.p.		100	4.50	1.11	

Case No. 67: Mrs. S.

Aet 23, in her 3rd pregnancy, had slight heartburn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat once a week; fruit and eggs were absent. She had no exercise in the fresh air. The spending capacity was 7/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	25	95	4.48	1.08	1
	31	88	4.16	1.06	
Delivery:	<u>38</u>	<u>85</u>	<u>4.40</u>	<u>.96</u>	
2 days p.p.	70	3.64	.97		

Test Meal done at 25th week of pregnancy.

	Fast.	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	
Comb. acid.	34	28	25	62	53	52	45	45	45	32	25	22
Free HCl.	20	15	12	48	40	40	32	32	32	20	15	10

Case No. 68: Mrs. B.

Aet 27, in her 3rd pregnancy, complained of slight heartburn. Loss at menses and at delivery was normal. Clinical examination was negative. Meat and eggs were absent from the diet. She had fruit daily. She had daily exercise in the fresh air. The spending capacity was 14/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato- crit.
	28	97	4.51	1.07	1	
	32	102	4.88	1.05		39
Delivery:	<u>36</u>	<u>98</u>	<u>4.32</u>	<u>1.14</u>		

Case No. 69: Mrs. C.

Aet 35, in her 3rd pregnancy, complained of slight heartburn. Loss at menses was excessive. Loss at delivery was normal. Clinical examination was negative. Diet contained meat once weekly, eggs twice a week and fruit daily. She had no exercise in the fresh air. The spending capacity was 14/8 per head per week.

Case No.69 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.
	22	85	4.27	1.0	1
	26	82	4.28	.96	
	30	90	4.08	1.1	
	34	85	4.37	.97	
Delivery:	<u>38</u>	<u>88</u>	<u>4.52</u>	<u>.98</u>	
3 days p.p.		82	4.48	.9	

Case No.70: Mrs. B.

Aet 30, in her 3rd pregnancy, complained of being easily fatigued. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat twice a week. Eggs and fruit were absent from the diet. The spending capacity was 9/7 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	Fe et	Ammon.	Citrates	gr.	30 tds.
	34	58	3.78	.77	3
	36	58	3.29	.9	
	37	72	3.00	1.2	
	38	70	3.30	1.06	
	39	70	3.90	1.1	
Delivery:	<u>40</u>	<u>72</u>	<u>3.48</u>	<u>1.04</u>	
7 days p.p.		80	4.24	.95	
3 wks. p.p.		85	4.40	.96	
1 mth. p.p.		82	3.88	1.06	

Test Meal done at 34th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb. acid.	10	12	24	26	32	42	44	45	44	50	46	50	80
Free HCl.	0	0	0	10	20	20	28	32	30	38	32	28	60

Histamine.

Case No.71: Mrs. S.

Aet 25, in her 3rd pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet

Case No.71 (contd.)

contained meat twice a week and fruit three times a week. She had no exercise in the fresh air. The spending capacity per head per week is not recorded.

	Week	Hb.	RBC.	C.I.	Deg.
	38	58	3.27	.90	3
	39	60	3.00	1.0	
Delivery:	<u>40</u>	<u>60</u>	<u>3.16</u>	<u>.9</u>	
5 days p.p.	85	4.60	.92		
12 days p.p.	90	4.60	.97		

Case No.72: Mrs.M.

Aet 24, in her 3rd pregnancy, complained of pallor, hoarseness, and sore tongue. Loss at menses and at delivery was normal. Clinical examination revealed glossitis and slight hollowing of the nails. Diet contained meat three times a week and fruit daily. The spending capacity was 5/4 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	35	55	3.04	.91	3
Delivery:	<u>40</u>	<u>70</u>	<u>3.73</u>	<u>.94</u>	

Case No.73. Mrs. P.

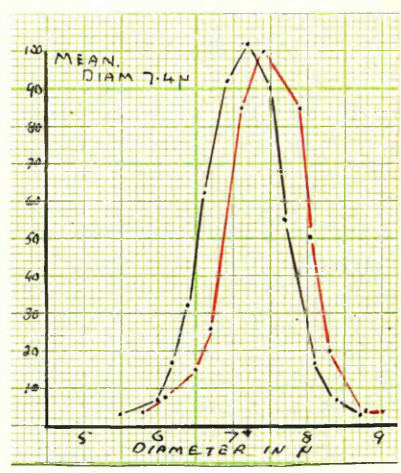
Aet 24, in her 3rd pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat once or twice a week and fruit daily. She had no exercise in the fresh air. The spending capacity was 8/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery	<u>34</u>	<u>85</u>	<u>3.59</u>	<u>1.2</u>	<u>1</u>
3 days p.p.	70	3.52	1.0		

Case No.74: Mrs. B.

Aet 27, in her 3rd pregnancy, had heartburn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat twice a week, eggs three times a week and fruit daily. She had exercise in the fresh air three times a week. The spending capacity per head per week was 10/-.

Week	Hb.	RBC.	C.I.	Deg.
24	80	4.00	1.0	2
28	90	4.52	1.0	
33	96	4.60	1.04	
35	86	4.04	1.07	
37	82	4.16	.98	
Del: 39	85	4.36	.97	
6 days pp.	82	4.04	1.02	
3 wks.pp.	82	4.20	1.0	



Test Meal done at 24th week of pregnancy.

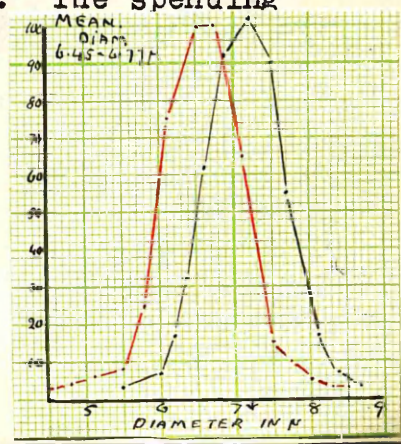
	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Comb.acid.	5	8	25	45	55	60	52	48	35
Free HCl.	0	0	15	32	40	44	38	34	22

A test meal on 30th week of pregnancy gives a similar curve.

Case No.75: Mrs. H.

Aet 27, in her 3rd pregnancy, complained of heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat three times a week and fruit daily. She had daily exercise in the fresh air. The spending capacity was 7/2 per head per week.

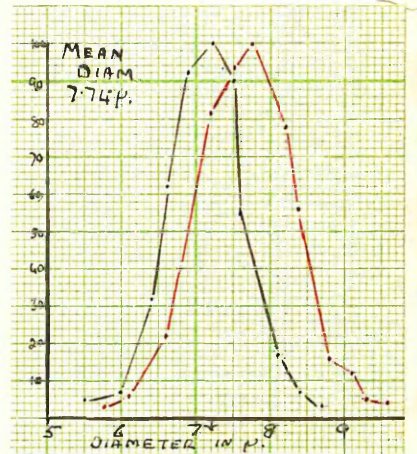
Week	Hb.	RBC.	C.I.	Deg.
Del: 39	70	4.68	.75	2
6 days pp.	75	4.20	.89	
3 mths.pp.	80	4.48	.9	



Case No.76: Mrs. H.

Aet 29, in her 3rd pregnancy, had no complaints. Loss at menses was excessive but normal at delivery. Clinical examination revealed that the papillae on the tongue were disappearing. Diet contained meat and fruit daily. The spending capacity was 7/- per head per week.

Week	Hb.	RBC.	C.I.	Deg.
Fet	Ammon	Cit.	gr.30	t.d.s.
21	65	3.40	.95	2
23	70	3.72	.94	
26	70	3.72	.94	
33	78	4.16	.94	
36	62	3.12	1.0	
37	72	3.53	1.01	
38	82	3.81	1.08	
Del.:	39	80	3.92	1.02
1 mth pp.	100	4.78	1.05	



The test meal was done at 26th week of pregnancy. All the estimations are not recorded but the highest Free HCl reading obtained during the fractional meal was 26 ccs. of N/10 HCl.

Case No.77: Mrs. C.

Aet 27, in her 3rd pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs occasionally. She had daily exercise in the fresh air. The spending capacity was 80/- per head per week.

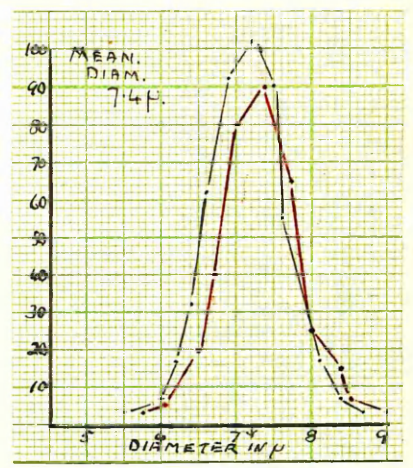
Week	Hb.	RBC.	C.I.	Deg.
Delivery:	40	67	3.36	1.
Fet	Ammon.	Cit.	gr.30	t.d.s.
1 day p.p.	65	3.01	1.09	
9 " p.p.	86	4.40	.97	
5 wks. p.p.	96	4.92	1.0	

Test Meal was done at 39th week of pregnancy but all readings are not recorded here. The highest reading for Free HCl. found in the stomach was 39 ccs. of N/10 HCl.

Case No.78: Mrs. O.

Aet 38, in her 3rd pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed dental caries. Diet contained meat daily and fruit three times a week. Eggs were partaken of occasionally. She had daily exercise in the fresh air. The spending capacity was 9/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	38	70	3.64	.97	2
Del:	39	85	4.10	1.03	
4 days pp.	90	4.45	1.01		
10 " p.p.	95	4.58	1.04		



Test Meal done at 38th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	3
Comb.acid.	5	10	15	8	8	14	22	32	31	25	25	48	50	75
Free HCl.	0	0	0	0	0	8	10	20	20	12	12	35	34	60

Histamine.

Case No.79: Mrs. M.

Aet 22 years, in her 3rd pregnancy, complained of heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat five times a week, fruit daily and eggs twice a week. The spending capacity was 7/6 per head per week.

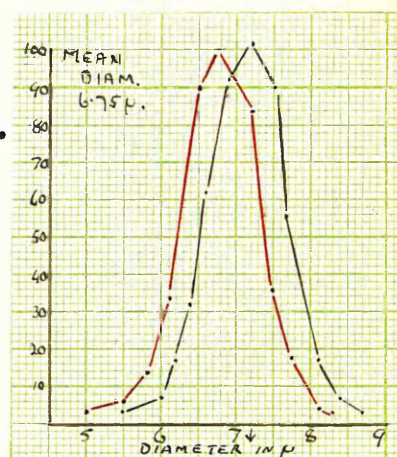
	Week	Hb.	RBC.	C.I.	Deg.
	31	55	3.44	.8	3
Fe et	Ammon.Cit.	gr.30	t.d.s.		
	33	64	3.68	.87	
	35	72	3.64	1.0	
	37	77	3.92	.98	
Delivery:	40	80	4.04	1.0	
7 days p.p.	85	4.28	1.0		
1 mth. p.p.	88	4.12	1.07		

4. Patients in their 4th (or more) pregnancy.

Case No.80: Mrs. C.

Aet 34, in her 4th pregnancy, complained of heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat three times a week, fruit once a week, and eggs occasionally. She had exercise in the fresh air once a week. The spending capacity was 8/9 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	27	62	3.52	.9	3
	28	60	3.40	.9	
	Fe et Ammon.	Cit.,	gr.30	t.d.s.	
	30	65	3.42	.95	
	32	80	4.12	.97	
	34	70	3.74	.94	
	37	70	3.78	.93	
Del.:	40	64	3.52	.9	
3 days p.p.	68	3.58	.96		
1 mth. p.p.	80	4.32	.93		



Test Meal done at 30th week of pregnancy.

	Fast.	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	1	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3		
Comb. acid.	12	10	8	8	10	8	12	12	6	8	6	10	8	8
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0	0	0

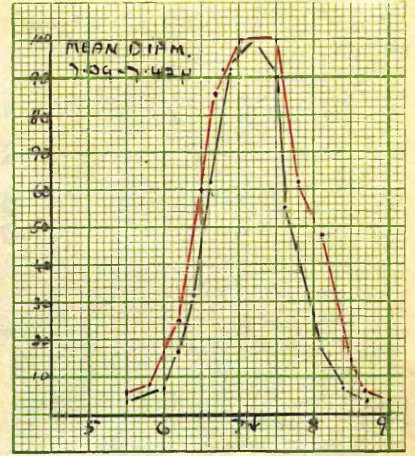
Histamine.

Case No.81: Mrs. D.

Aet. 32, in her 5th pregnancy, complained of poor appetite. Loss at menses was excessive and she had a post partum haemorrhage. Clinical examination was negative. Diet contained meat twice weekly and fruit daily. She had no exercise in the fresh air. The spending capacity was 3/3 per head per week.

Case No.81 (contd.)

Week	Hb.	RBC.	C.I.	Deg.
Fe et Ammon.	Cit.,	gr.	30	tds.
35	60	2.94	1.03	3
36	65	2.85	1.1	
38	80	3.56	1.1	
39	82	3.70	1.1	
Del.:	40	75	3.50	1.07
4 days pp.	50	2.34	1.1	
12 " p.p.	50	2.84	.9	
3 wks. pp.	72	3.52	1.0	
4 wks. pp.	86	4.16	1.03	



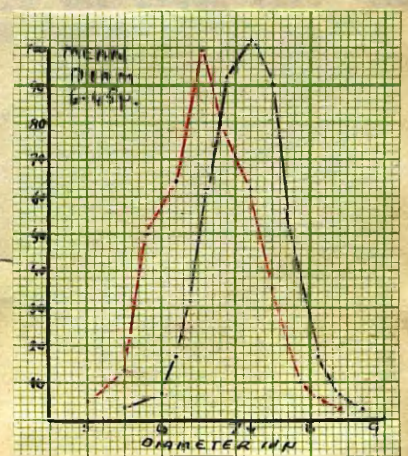
Test Meal done at 35th week of pregnancy.

Fast.	$\frac{1}{4}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3		
Comb. acid.	5	5	5	10	5	10	30	30	36	47	40	23	22
Free HCl.	0	0	0	0	0	0	12	18	26	34	28	13	12

Case 82: Mrs. H.

Aet 33, in her 7th pregnancy, complained of irregularly occurring pain in the epigastrium after food, hoarseness and brittle nails. Loss at menses was normal but there was free loss at delivery. Examination revealed longitudinal striation of the nails which were broken. Diet contained meat daily, eggs and fruit three times a week. She had daily exercise in the fresh air. The spending capacity was 10/8 per head per week.

Week.	Hb.	RBC.	C.I.	DEG.	Haematocrit.
23	58	3.68	.8	3	25
28	65	3.88	.83		
Fe et Ammon.	Cit.,	gr.	30	tds.	
31	65	3.41	.95		
34	65	3.85	.84		
Del:	39	70	3.56	.99	
4 days pp.	58	4.08	.72		



Case No.82 (contd.)

Fractional Test Meal done at 25th week of pregnancy.

	Fast.	$\frac{1}{2}$	$\frac{2}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	
Comb.acid.	12	8	6	8	8	6	6	8	12	10	8	6
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0

Histamine.

Case No.83: Mrs. W.

Aet 41, in her 5th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination was negative. Diet contained meat and fruit daily. Eggs were absent from the diet. She had exercise in the fresh air three times a week. The spending capacity per head per week was 7/6.

	Week	Hb.	RBC.	C.I.	Deg.
	30	65	3.34	.98	3
	34	72	3.76	.96	
	37	60	3.52	.85	
Delivery:	<u>39</u>	<u>70</u>	<u>3.64</u>	<u>.97</u>	
7 days p.p.	85	4.64	.92		
1 mth. p.p.	80	4.22	.95		

Case No.84: Mrs.P.

Aet 29, in her 5th pregnancy, complained of bleeding per vaginam throughout pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat 5 times a week and fruit three times a week. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 6/- per head per week.

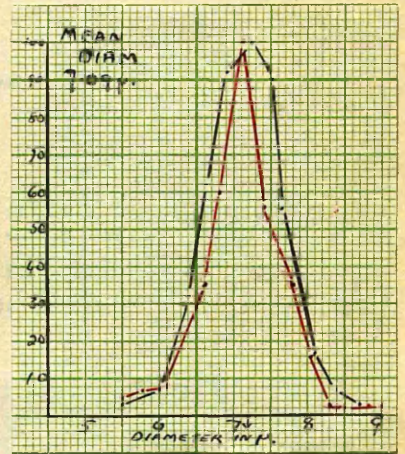
	Week	Hb.	RBC.	C.I.	Deg.
	36	48	4.08	.6	3
Del:	<u>40</u>	<u>88</u>	<u>4.52</u>	<u>.97</u>	
11 days pp.	72	3.36	1.07		
3wks pp.	88	4.44	1.0		

Case No.85: Mrs. N.

Aet 34, in her 8th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed dental caries. Diet contained meat three times a week and fruit twice a week. Eggs were absent from the diet. She had no exercise in the fresh air. The spending capacity was 5/3 per head per week.

Week	Hb.	RBC.	C.I.	Deg.	Reticulo- cyte.
34	48	3.68	.65	4	4.8% (11 days p.p.)
39	42	3.52	.6		
Del.: 40	40	3.60	.55		

	Fe et Ammon.Cit.	gr.	30 tds.
7 days pp.	50	3.55	.7
11 " pp.			

Case No.86: Mrs. G.

Aet 41, in her 11th pregnancy, had no complaint. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat once or twice a week and eggs occasionally. Fruit was entirely absent from the diet. The spending capacity was 6/6 per head per week.

Week	Hb.	RBC.	C.I.	Deg.
	112	5.36	1.05	0
Delivery:	105	5.00	1.05	

Case No.87: Mrs. O.

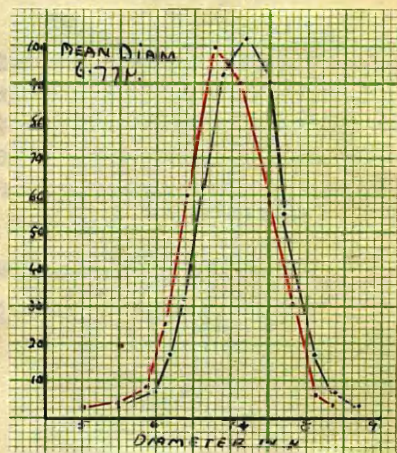
Aet 32, in her 9th pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat five times a week. Eggs and fruit were entirely absent. She had no exercise in the fresh air. The spending capacity was 4/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	32	100	4.88	1.03	0
Delivery:	<u>40</u>	<u>100</u>	<u>5.00</u>	<u>1.0</u>	
4 days pp.		80	3.92	1.02	
1 mth. p.p.		98m	4.74	1.04	

Case No.88: Mrs. P.

Aet 37, in her 9th pregnancy, complained of heartburn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet is not recorded. The spending capacity was 6/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	37	100	4.65	1.07	0
Del.:	<u>39</u>	<u>100</u>	<u>4.90</u>	<u>1.02</u>	
6days pp.		92	4.59	1.01	



Test Meal done at 37th week of pregnancy.

	Fasted	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	12	12	8	12	6	10	8	13	12	8	12	15	18
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0	0

Histamine.

Case No.89.: Mrs.-I.

Aet 36, in her 10th pregnancy, complained of heart-burn. Clinical examination revealed no abnormality. Diet contained meat and eggs five times a week and fruit daily. She had daily exercise in the fresh air. The spending capacity was 4/6 per head per week.

	Week	Hb.	R.B.C.	C.I.	Deg.
	37	90	4.68	.96	1
Delivery:	<u>38</u>	<u>98</u>	<u>4.69</u>	<u>1.05</u>	
LL DAYS P.P.	105		5.10	1.03	
1 mth. p.p.	92		4.62	1.0	

Test Meal done at 37th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	
Comb.acid.	10	35	45	40	32	20	20	10	8	10	8	8	48
Free HCl.	0	20	30	30	20	12	10	0	0	0	0	0	35

Histamine.



Case No.90: Mrs. T.

Aet 29, in her 4th pregnancy, had no complaints. Loss at menses and at delivery was normal. She was delivered of twins. Clinical examination revealed no abnormality. Diet contained meat five times a week and fruit once a week. Eggs were absent from the diet. She had daily exercise in the fresh air. The spending capacity was 8/2 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	26	106	4.84	1.1	1	31
	34	95	4.40	1.08		
	36	92	4.56	1.01		
Delivery:	<u>39</u>	<u>82</u>	<u>4.36</u>	<u>.94</u>		
5 days p.p.	75		4.62	.81		



Case No.91: Mrs. H.

Aet 39, in her 7th pregnancy, complained of heart-burn. Loss at menses was excessive, but loss at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat daily, eggs three times a week, and fruit occasionally. She had occas-

Case No.91 (contd.)

ional exercise in the fresh air.

	Week	Hb.	RBC.	C.I.	Deg.
	25	100	4.37	1.15	1
	33	100	4.40	1.13	
	36	102	4.56	1.12	
	38	95	4.48	1.06	
	39	95	4.77	1.0	
Delivery:	40	96	4.78	1.01	
4 days p.p.		105	4.96	1.06	

Case No.92: Mrs. A.

Aet 34, in her 4th pregnancy, complained of pain in epigastrium after food, and painful tongue. Loss at menses and at delivery was normal. Clinical examination revealed a very red tongue with papellae disappearing. Diet contained meat once a week, eggs occasionally. Fruit was absent from the diet. The spending capacity was 9/11 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	39	85	3.75	1.1	
1 day p.p.		90	3.83	1.18	
5 wks p.p.		90	3.69	1.23	
9 wks p.p.		90	3.88	1.16	

Fractional Test Meal done at 38th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2	2 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	
Comb.acid.	25	8	4	4	8	12	12	14	15	14	30	25	23
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0	0

Histamine.

Case 93: Mrs. P.

Aet 35, in her 4th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Examination showed that tongue was reddened and papillae were disappearing. Diet contained meat once a week and eggs and fruit daily. She had daily exercise in the fresh air. The spending capacity was 8/- per head per week.

Case No.93. (contd.)

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	31	100	4.84	1.04	1	
	33	92	4.40	1.04		
	34	104	4.96	1.05		42
Delivery:	36	95	5.08	.94		
2 days p.p.		80	3.80	1.05		

Test Meal done at 36th week of pregnancy.

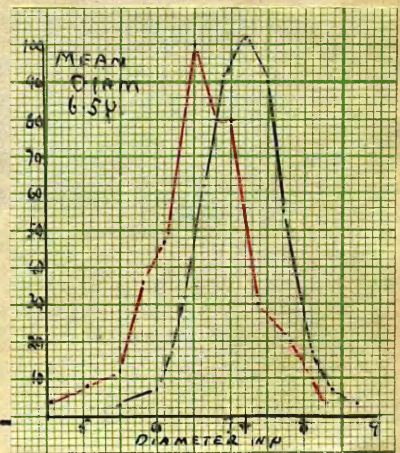
	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	
Comb.acid.	14	14	25	22	30	30	28	12	13	14	10	12	72
Free HCl.	0	0	10	10	18	18	14	0	0	0	0	0	52
													Histamine

Case No.94: Mrs. C.

Aet 37, in her 5th pregnancy, complained of fatigue, heaviness after meals, breathlessness and palpitation. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and fruit once a week. She had no exercise in the fresh air. The spending capacity was 4/2 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit	Reticulo-cyte.
	33	42	2.72	.8	3		
	34	42	2.88	.73			2.8%
	35	50	3.33	.75		23	{ 3.6%
	36	55	4.00	.70			{ 6.8%
Del.:	38	62	3.60	.83			
2 days p.p.	55	4.01	.7				
1 mth. p.p.	50	4.40	.56				

Test Meal was done at the 26th week of pregnancy. Readings are not recorded here but achlorhydria was present after histamine.



Case No.95: Mrs. R.

Aet 35, in her 5th pregnancy, complained of occasional pain in the epigastrium after meals. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat once a week and eggs and fruit daily. She had daily exercise in the fresh air. The spending capacity was 5/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>40</u>	<u>95</u>	<u>4.22</u>	<u>1.13</u>	<u>1</u>
3 days p.p.		87	4.08	1.07	
4 wks p.p.		115	5.36	1.07	

Case No.96: Mrs. P.

Aet 40, in her 8th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat and eggs three times a week. Fruit was absent from the diet. She had no exercise in the fresh air. The spending capacity was 7/6 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	<u>40</u>	<u>85</u>	<u>3.97</u>	<u>1.07</u>	<u>1</u>
6 days pp.		92	4.03	1.15	
		100	4.20	1.19	

Case No.97: Mrs. B.

Aet 28, in her 4th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat twice a week and fruit occasionally. Eggs were absent from the diet. She had exercise in the fresh air three times a week. The spending capacity was 6/9 per head per week.

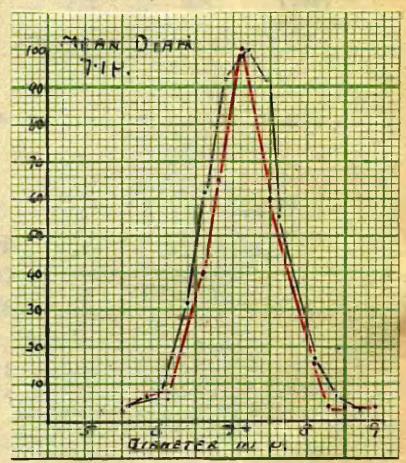
Case No. 97 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.
	26	90	4.48	1.01	1
	31	94	4.48	1.05	
	35	100	4.84	1.04	
Delivery:	40	100	4.76	1.05	
7 days p.p.		95	4.16	1.14	
1 mth. p.p.		105	5.26	1.0	

Case No.98: Mrs. I.A.

Aet 37, in her 5th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed dental caries. Diet contained meat twice a week, eggs occasionally and fruit daily. She had daily exercise in the fresh air. The spending capacity was 4/7 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	36	86	4.56	.94	1	
Del.:	40	100	4.17	1.2		32
		96	4.97	.97		



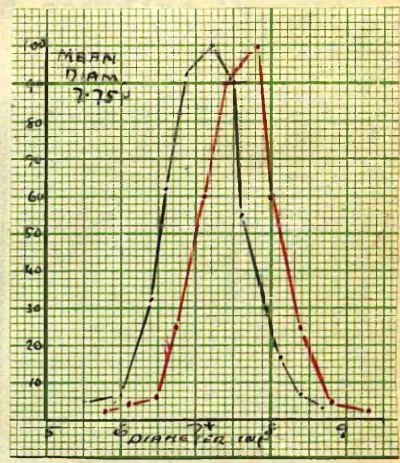
Case No.99: Mrs. M.

Aet 29, in her 7th pregnancy, complained of heart-burn. Loss at menses was excessive but loss at delivery was normal. Clinical examination revealed early dental caries. Diet contained meat and fruit daily. Eggs were absent from the diet. She had no exercise

Case No.99 (contd.)

in the fresh air. The spending capacity was 18/- per head per week.

Week	Hb.	R.B.C.	C.I.	Deg.
26	70	3.70	.94	2
Fe et Ammon.Cit.gr.30 tds.				
30	66	3.32	1.0	
34	78	3.84	1.02	
37	85	4.04	1.06	
Del:	39	78	3.78	1.04
5 days pp.	93	4.29	1.09	
4 wks p.p.	90	4.50	1.0	



Test Meal done at 26th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Comb.acid.	12	25	35	42	57	58	22	15	-	12	-	50	100
Free HCl.	0	0	13	18	28	33	12	4	-	6	-	30	70

Histamine.

Case No.100: Mrs. F.

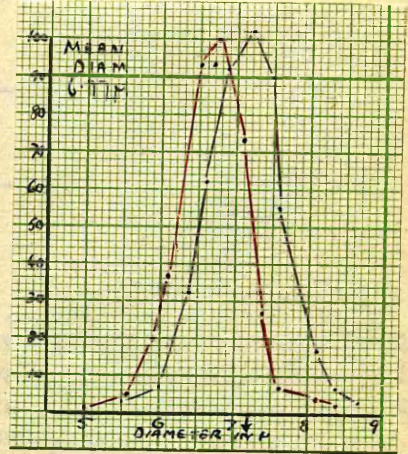
Aet 33, in her 5th pregnancy, complained of heart-burn. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat five times a week, eggs twice a week, and fruit daily. She had exercise three times a week in the fresh air. The spending capacity was 20/- per head per week.

Week	Hb.	RBC.	C.I.	Deg.
27	94	4.44	1.06	2
31	80	3.90	1.02	
36	70	3.62	.97	
Delivery:	38	80	3.92	1.02
3 days p.p.	82	4.36	.93	
5 wks. p.p.	100	4.76	1.05	

Case No.101: Mrs. K.

Aet 43, in her 7th pregnancy, had no complaints. Loss at delivery was normal. Clinical examination revealed no abnormality. Diet and spending capacity were not recorded.

	Week	Hb.	RBC.	C.I.	Deg.
	35	80	4.00	1.	2
	36	92	4.61	1.0	
Del.:	<u>39</u>	<u>95</u>	<u>4.71</u>	<u>1.01</u>	
6 days p.p.	100	4.96	1.01		



Test Meal done 36th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	
Comb. acid.	12	36	40	45	32	10	12	10	23	30	35	20	22	60
Free HCl.	0	20	30	30	20	0	0	0	10	20	20	8	12	48
														Histamine

Case No.102: Mrs. C.

Aet 44, in her 8th pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained eggs occasionally, fruit daily, and no meat. The spending capacity was not recorded.

	Week	Hb.	RBC.	C.I.	Deg.
	35	72	3.72	.97	2
	37	70	3.68	.98	
Delivery:	<u>39</u>	<u>68</u>	<u>3.14</u>	<u>1.09</u>	
6 days p.p.		82	4.6	.9	
10 days p.p.		88	5.03	.88	
6 wks p.p.		95	5.30	.9	

Case 103: Mrs. R.

Aet, 35, in her 6th pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat twice a week and fruit daily. Eggs were absent from the diet. The spending capacity was not recorded.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	37	75	3.48	1.09	2
7 days p.p.		75	4.08	.92	



Case No.104: Mrs. H.

Aet 39, in her 7th pregnancy, had no complaints. Loss at menses and at delivery was normal. Puerperal sepsis developed later. Clinical examination showed that papillae on the tongue were disappearing. Diet contained meat three times a week, fruit daily, and eggs occasionally. She had no exercise in the fresh air. The spending capacity was 6/8 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	34	77	4.06	.95	2
	35	70	4.21	.83	
	38	75	3.78	1.0	
Delivery:	39	70	4.17	.84	
9 days p.p.		55	3.25	.8	
1 mth. p.p.		65	3.50	.9	

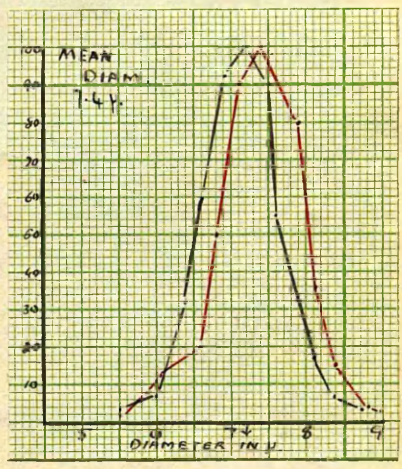


Case No.105: Mrs. Rose G.

Aet 35, in her 6th pregnancy, complained of tiredness during pregnancy. Loss at menses and at delivery was normal. Clinical examination revealed slight glossitis and brittle nails. Diet contained meat three times a week and eggs occasionally. Fruit was absent from the diet. The spending capacity was 7/2 per head per week.

Case No.105 (contd.)

	Week	Hb.	RBC.	C.I.	Deg.	Haemato-crit.
	37	72	3.61	1.0	2	
	39	75	3.60	1.04		
Del.:	40	78	3.94	1.0		29
4 days pp.	80	3.94	1.02			
3 wks. pp.	105	4.96	1.06			
4 wks. pp.	97	4.51	1.07			



Test Meal done at 35th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	
Comb.acid.	16	8	8	10	22	24	15	12	13	12	8	12	8
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0	0

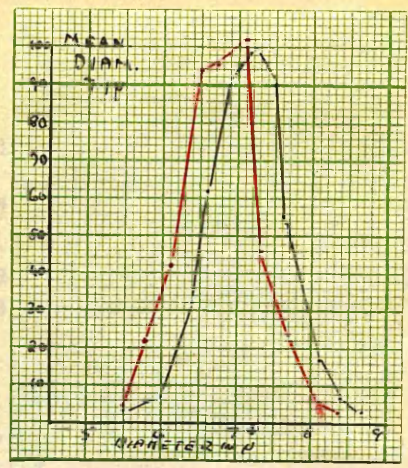
Histamine.

Case No.106: Mrs. F.

Aet 38, in her 4th pregnancy, had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat three times a week, fruit daily and eggs occasionally. She had no exercise in the fresh air. The spending capacity was 8/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	36	68	3.47	.98	2
	37	64	3.03	1.06	
	38	76	3.72	1.02	
Del.:	40	64	3.41	.94	
3 days pp.	70	3.60	.97		
2 wks. pp.	80	4.24	.95		

Case No.106_(contd.)



Test Meal done at 36th week of pregnancy.

	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Comb.acid.	10	8	8	10	6	8	5	5	5	5	5	7
Free HCl.	0	0	0	0	0	0	0	0	0	0	0	0

Histamine.

Case No.107: Mrs.W.

Aet 36, in her 10th pregnancy had no complaints. Loss at menses and at delivery was normal. Clinical examination revealed no abnormality. Diet contained meat twice a week, eggs occasionally and fruit daily. She had no exercise in the fresh air. The spending capacity was 4/- per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
Delivery:	40	80	3.31	1.21	2
9 days p.p.		83	3.43	1.22	
9 wks. p.p.		86	4.36	.99	

Test Meal done at 40th week of pregnancy.

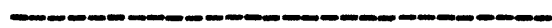
	Fast.	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Comb.acid.	15	18	16	35	52	42	35	12	12	10	12	13
Free HCl.	0	0	0	25	40	30	20	0	0	0	0	0

Histamine.

Case No.108: Mrs. R.

Aet 34, in her 4th pregnancy, complained of heart-burn. Loss at menses and at delivery was excessive. Clinical examination revealed no abnormality. Diet contained meat and fruit daily and eggs four times a week. She had daily exercise in the fresh air. The spending capacity was 16/4 per head per week.

	Week	Hb.	RBC.	C.I.	Deg.
	21	100	4.80	1.04	2
	25	92	4.36	1.05	
	29	100	4.84	1.02	
	33	80	4.38	.92	
	36	80	3.94	1.02	
Delivery:	38	86	4.08	1.06	
11 days p.p.		77	4.08	.95	
5 wks. p.p.		88	4.52	.97	



1933, 211-212, and also 1934, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

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