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YESTERDAY AND TO-MORROW IN CHILD HEALTH*

BY

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This address gives a short review in general terms of child health in the last hundred years. Although the examples and figures used in it have been drawn mainly from Scotland, the history has been much the same in England, Wales, and Ireland, and indeed far beyond these islands: it has been similar both in the measures taken to promote child health and in the results obtained. From such a historical survey we can get a perspective view of the growth of the subject and of its future progress.

The Infant Death Rates

Child health is a phrase full of meaning, but is so wide and deep in its meaning that it is difficult and perhaps impossible to define it. As an idea in the mind and as an object of human effort it is as old as the human family; and long before human records were kept the health and well-being of children must have been deeply cherished by their natural guardians, their fathers and mothers. But as a medical concept, and especially as a medico-social problem, it emerged in Britain about the middle of the last century; while the actual phrase—child health—obtained a recognized place in the medical vocabulary only about twenty years ago. It was the publication, for England and Wales in 1840, and for Scotland in 1855, of the numbers of births, deaths, and marriages, and of the population that drew attention to public health and to child mortality, for among these figures, called vital statistics, was included an infant death rate.

This infant death rate (or infant mortality rate) is the number of babies dying in the first year of life in every thousand who survive birth. These rates do not completely measure child mortality, for they omit the heavy loss of infants during birth (stillbirths), and also the considerable loss of children over 1 year of age. None the less, as these infant death rates rise and fall they fluctuate with the stillbirths and the deaths of older children; and they have long been accepted as giving in terms of death an index in reverse of the health of the child community. These infant death rates are given for the whole country and for its units of towns and country districts; so that if the infant death rates have fallen for one or over several years, we say that the state of child health in Scotland or in Glasgow is better; while if these rates have risen we feel that child

health is worse. It is impossible to exaggerate the value of the infant death rates, which have now been published each year in Scotland for nearly a hundred years. These figure-measurements first disclosed the extent of child mortality; next they gradually uncovered the sinister and formidable league of causes that was producing such a wastage of child life; and then they brought into action, with slow and painful effort, various social and medical agencies to remove these causes. And now to-day, with a good deal accomplished in the reduction of child mortality, we tend to put still wider meanings into the phrase child health.

We realize that the child cannot be isolated as a person; and as we become aware of the connexions of child health with the fundamental social realities of family and home we see that child health in this wider context is at the centre of the nation's well-being. This wide conception of child health and the vision of its future fulfilment have been gradually reached by the use of the instrument of measurement that we have in the infant death rates.

Yesterday in Child Health

Let us look back over almost a hundred years of infant death rates in Scotland, for by giving the figures at the beginning and the end of the century we shall have a simple measure of the progress of child health in that time. The infant death rates for Glasgow for the same periods are added because later I make some remarks upon Glasgow, where the problem of infant mortality was perhaps more serious and more difficult than in any other large Scottish town. The infant death rates for Scotland and Glasgow were:

	1855-60		1952	
Scotland	..	120	..	35
Glasgow	..	179	..	41

The figures speak for themselves and show a great reduction for Scotland and one relatively greater in the case of Glasgow. And the difference would be even greater if stillbirths were added; but stillbirths have been registered only in recent years. Even with incomplete figures we can see that in the last hundred years the tide of death has gone back a long, long way from the shore of infant life, or, to make a positive statement, that there has been a great gain in child health.

In running the eye over the figures in the years between the beginning and the end of the century a surprising fact becomes apparent. The great reduction over the century was not a steady downward trend

*The first G. B. Fleming Memorial Lecture, given in Glasgow on April 15, 1953. Dr. Geoffrey B. Fleming was Senior Physician at the Royal Hospital for Sick Children, Glasgow, and Professor of Child Health in the University of Glasgow from 1930 to 1947. The above address was prefaced by a tribute to his work and character.

throughout; there was nothing of the inevitability of gradualness about it. *In fact, the infant death rates in Scotland hardly moved down at all during the first fifty years of the century; they fluctuated near 120; they rose to 130 in the 1891-1900 decade; and stood again at 120 in the 1901-5 period. But during the next fifty years (1906-52) the infant death rates have gone steadily down, with an acceleration since 1941. Is there any explanation of these tides of infant mortality remaining obstinately high for the first fifty years, and of their receding steadily during the next fifty years? We can answer the question only if we know something of the efforts that were being made to remove conditions hostile to infant life during the two periods. In any case the very different behaviour of the infant death rates in Scotland from 1855 to 1905 and from 1906 to 1952 justifies the division of our chosen "yesterday" into two periods of fifty years each.*

It is interesting that in England and Wales the levels of infant death rates remained steadily high during the same 50-year period; indeed, they were at a higher level, remaining between 140 and 150. The English figures began to fall sooner than in Scotland. Presently they reached and then passed the Scottish levels, maintaining these lower levels until in 1952 the infant death rate in England and Wales was 28 and in Scotland it was 35.

The First Fifty Years: 1855-1905. Sanitation and the House

The first fifty years saw the first real beginning of sanitation as an organized community movement in Scotland; and naturally sanitary reform began in the largest towns. I take Glasgow as an example of the prevailing insanitary conditions in Scottish towns. Glasgow was first among Scottish towns for the size and density of her population, and was worst in her sanitary conditions. Her citizens were aware of these dangerous conditions; and in 1855, the first year of this first 50 years, the Loch Katrine Waterworks Act was passed which was to give Glasgow the finest water supply in the United Kingdom. This was followed by the creation of a sanitary department in 1862, and the appointment of her first medical officer of health the following year in the person of Dr. W. T. Gairdner, who was to become a distinguished physician. He was succeeded in 1872 by Dr. James Burn Russell, the second in a notable line of Glasgow medical officers of health. Before Russell took up his duties, great measures of sanitary reform had been carried out in water-supply, drainage, sewerage, removal of refuse, and paving, lighting, and cleansing of streets. The city as a whole and its streets had been cleaned up; but many thousands of its houses remained grossly insanitary. Russell held office till 1892; and he has left a record of sanitary and housing conditions in Glasgow during these 20 years, both in his official reports and in his addresses to the Glasgow Philosophical Society and other public audiences (Russell, 1905). These addresses were given to inform the citizens of what was happening in their midst, and to rouse their conscience to support official action and to engage in voluntary effort.

From the outset the new medical officer of health was convinced that further progress in Glasgow sanitation and public health would depend more than anything else on improvement of the housing conditions. He set himself to study the insanitary house. He listed the many ways in which a house could be insanitary—in structure, in sanitary conveniences, in lighting and ventilation, etc., and high on his list he placed overcrowding. He noted the effects of such houses on the men, women, and children who lived in them in terms of disease and moral degradation. He was a firm believer in the principle of measurement, and he applied it wherever he could. He was like the man in Ezekiel's prophecies: and he went into and through the houses of Glasgow "with a line of flax in his hand, and

a measuring reed"—into the many-roomed mansions of Blythswood and the one- and two-roomed houses of Bridgegate. And he counted the number of persons who lived in each house. Thus after great labour he produced a house census for the whole city in which houses were graded according to the number of their rooms, the number of persons who lived in them, and the average air space for each person; and alongside these different grades of house he placed their general death rates and the infant death rates. All this work was embodied in official reports, but the gist of it was given to the citizens of Glasgow in these public addresses already mentioned.

These popular lectures give the classic account of the insanitary house, supplying the facts and figures, and adding vivid pictures of such houses and their effects upon their inhabitants. In a famous address, "Life in One Room," he told his audience that in 1881 the population of Glasgow was 511,520, and of this total 126,000 (a quarter) lived in one room, and 228,000 (nearly a half) lived in two rooms, and gave figures showing the high general death rates and the soaring infantile mortality rates in such houses. In another address, on "Uninhabitable Houses," he takes his audience inside "a one-roomed house . . . where there is no artificial light but a glimmer of light from a handful of red ashes, and going in one hears voices but sees no one, and 'where in the innermost recesses of the apartment, the air seems a residue of all the breath that had ever been breathed into it.'"

In 1891 Russell reviewed the progress of sanitary reform in Glasgow and for Scotland for the previous 30 years; he claimed that housing conditions had improved, giving facts and figures, and in support of his claims he showed the steady fall of the general death rates. But the fall in the infant death rates was trifling and insignificant, and these were to rise sharply in the next decade. He was sensitive about Glasgow's high infant mortality, and in another address he referred to this in one of his vivid phrases. Speaking of the quinquennium 1876-80 he says: "Glasgow makes away with 147 in every thousand of her children before she has had them in her fatal arms," but he notes with a kind of sad satisfaction that the infant death rate in Liverpool at the same time was 162.

Russell was a great man, and in his fight for sanitary reform in Glasgow he was single-minded, and concentrated his thought and effort on the dwelling-house as the final end of good sanitation. This task was a gigantic one and could not be finished in a single life, and when he died in 1904 much remained to be done.

Next year, 1905, saw the completion of 50 years of infant death rates in Scotland. I have already mentioned that the infant death rates remained steady throughout this period at 120 per 1,000, with small fluctuations; while the general death rates, starting at 20.7, had steadily fallen to 17 at the end (1901-5). In terms of health, we can say that the health of the whole population of Scotland, young and old, had become better in these 50 years; while the health of infants under 1 year remained at the same poor level. We know now that of all the death rates the infant death rate is the most sensitive to insanitary conditions; and by the end of this 50-year period (1855-1905) housing conditions in Glasgow and throughout Scotland had not reached a degree of improvement that was reflected in a lowered infant mortality, and during the same time no other effective aid, medical or social, was reaching mothers in their care of children inside these insanitary houses.

The Second Fifty Years: 1906-52. Mother and Child

In 1906, at the beginning of this second period, a national conference met in London to discuss infant mortality and measures for its reduction. The significance of this was that general attention was focused on the problem of infant mortality and its urgency. Still more significant were the words of Mr. John Burns, then President of the Local Government Board in England, in his address to the Conference: "Let us concentrate on the mother. What the

mother is the children are. . . . Let us glorify, dignify, and purify motherhood by every means in our power." In these words the Minister of State concerned with public health gave his blessing and support to efforts already being made, both by municipalities and by voluntary bodies, to assist mothers in their task of child care. I shall not overload this address with details of when and where in England and in Scotland milk depots, infant clinics, and schools for mothers were begun, but these agencies were already at work before 1906, fairly extensively in England, and here and there in Scotland. They were now extended; and they were gathered into a national system in the Maternity and Child Welfare Services Act of 1918. This Act might be described as a Special Education Act for Mothers; for its main benefits were that it provided mothers with teachers who gave them simple lessons in the care of their children.

I have already spoken of Dr. Russell, of Glasgow, and how he concentrated his effort on the good house as the end of sanitation in a well-governed city, and how he showed that bad houses brought disease and death to those within it, and especially to the children. But throughout the period of 50 years in which he lived bad housing was so widespread and deep-rooted that the movement of child health and also for general health was largely occupied with improving the sanitation of the city and of its houses. And now, in 1906, John Burns, of Battersea, spoke to the representatives of four nations and urged them to deal with the problem of infant mortality by *concentrating on the mother*. This is a simple phrase, but powerful in its wide and deep implications. For the mother is the housekeeper in a double sense, keeping both the house and her children and husband. The sanitary department does not sweep and clean her house, and the doctor and nurse do not feed or wash her baby. And when John Burns added, "What the mother is, the children are," he was stating in simple words a great truth, and indeed was filling in almost the whole truth of infant and child health. The two foundation stones of child health are a good house and a good housemother. And of a good mother much is required: a good conscience, both a sanitary conscience towards her house and all its materials, and a maternal conscience towards her children; a mind that *knows* how to keep the house clean and how to feed her baby; and a strong body and capable hands.

These are the abstract principles that govern the life and health of the mother and her children; and now we can speak of practical results. This advice to concentrate on the mother has been followed out for the last 50 years; and it has given a better understanding of her problems, separating the things that must be done for her from the things that she alone can do. It has strengthened services already at work, and has brought new services into action.

The care of the mother's general health and her careful supervision in pregnancy and in her confinement have been undertaken in the new service of antenatal clinics which have strongly reinforced the work of the maternity hospitals. The combined antenatal-maternity service has reduced maternal deaths, has raised the level of health in mothers, and has also reduced infant deaths during birth and in the first month after birth.

At the same time the care of the sick child has been greatly improved by increased accommodation in children's hospitals, by the building of new hospitals and especially of fever hospitals, and by advance in knowledge of disease in children and in the power of its treatment. This better knowledge of disease in children, put at the disposal of family doctors and practised in the home, has also strengthened the general service of the sick child.

Education of the Mother in Child Care

This had begun in a feeble and scattered way before the second period of 50 years had opened; and it was firmly established only in 1918 by the inauguration of the child welfare service. This was a new and great enterprise; an attempt on a national scale to provide the mother with

education in all the tasks of child care which she alone can give. The doctors and health visitors were the teachers, giving their lessons at the infant clinics and inside the homes; but the practice of these lessons in child care rested in the instructed mind and in the strong and willing hands of the mother in her home.

The important part of this education was in the feeding of infants and in domestic sanitation. Infant-feeding had long been a subject of study in children's hospitals; and it was mainly a study of the use of clean cows' milk as a substitute for breast milk. At first cows' milk mixtures were complicated, and the instruction in their use reached mothers only indirectly or not at all. But by the time the new child welfare service was begun the use of cows' milk for infants had been much simplified, and instruction was now given by an army of teachers, and directly into the ears of mothers. For the young baby, the right use of cows' milk is a matter of life and death, and thousands of infant lives must have been saved by this national education of mothers in infant feeding.

The Children's Hospitals

The teaching children's hospitals had always had a double function—the advance of knowledge of disease and its treatment, and the study of health and the instruments that secure it; and the courses of instruction both in disease and in health were steadily extended and given to increasing numbers of medical students. Further, the establishment of chairs and departments of child health, first in Glasgow in 1924 and later in Edinburgh, Aberdeen, and St. Andrews, took place in this period and strengthened the status of the subject in all the four Scottish medical schools; while the title of child health encouraged teaching and study in the whole field of child medicine.

I have given a short account of the more important results that have followed the London Conference on Infantile Mortality in 1906, with its slogan, "Let us concentrate on the mother." Throughout this second period of almost 50 years the work of sanitation and of replacing bad houses with good ones went on. The building of new houses was seriously interrupted during the two wars; but since 1945 it has been resumed, and at a greater pace than ever before. In addition, great attention has been paid to the mother and her children; old services of hospital care for mother and child have been extended and strengthened, and the great new experiment of education of the mother in her own care of her children has had a full trial of 30 years. In short, much effort has been made both for better houses and for the betterment of the mother and children who live in them. Under this combination of effort what progress has been made in child health, measured by infant death rates? The figures for the first quinquennium of the period under review (1906–10) and for the last completed year, 1952, are given for all Scotland, and for Glasgow; and will answer the question.

		1906–10	1952
Scotland	..	112	35
Glasgow	..	130	41

This fifty-year period began with a slight improvement; and this continued steadily throughout, with an acceleration since 1940, and reached low levels in 1952. There can be no doubt that in the second 50 years there has been a great improvement in child health. While most of us will agree that improved housing, the education of mothers in child care, and the better hospital care of the mother and the sick child have each played a part in the result, there may be argument about the order of their importance.

Near the end of his work in Glasgow James Russell, still grappling with his unfinished task of improving housing conditions, made a remarkable statement, a prophetic statement, but with no date of its fulfilment. "I see nothing in the nature of things," he said, "why life in the town should not be as healthy as the country." Within 50 years of his death in 1904, his prophetic hope has been realized in the infant death rates for Edinburgh and Aberdeen, and

almost realized for Glasgow. In 1952 the infant death rate for all Scotland was 35 : for her rural areas it was 33, for Edinburgh 29, for Aberdeen 30, and for Glasgow 41. When we consider the factors of size and density of population, the presence of "heavy industries," and the legacy of insanitary houses, Glasgow's present low infant death rate entitles her to the place of honour among the larger Scottish towns.

To-morrow in Child Health

We have looked back over a hundred years of work for child health, and have noted the great progress made in the past 50 years. The ideas and the acts of this long yesterday will be carried forward into to-morrow. What are the prospects, immediate and more distant?

Let us name the list of the existing services of child care. They are communal and domestic sanitation; the antenatal, maternity, and neonatal services; the children's and fever hospitals; the child welfare service; family doctors; and, greatest of them all, the home service of mothers. This great array of agencies and their increasing efficiency will ensure in the lengthening years of to-morrow a continuing and steady reduction of the existing rates of infant deaths. A few examples will show the low levels of infant death rate that have already been reached: England and Wales (1952), 28; Holland (1951), 25; New Zealand (1951), 23; and Sweden (1951), 20. These rates do not measure the total infant loss, but this total loss can be obtained when stillbirths are added, and the total sum of infant deaths is divided into the two main groups of the early "catastrophic" deaths and the later "careless" deaths. Thus for New Zealand, in 1951, the first group of natal-neonatal deaths—that is, including stillbirths—gave a total death rate of 40, and the second group of deaths in the first year (after the first month) gave a rate of 7.

The Irreducible Minimum of Infant Deaths.—A closer examination of these record low levels of total infant loss shows that further reduction is still possible, until the irreducible minimum is reached, made up by the inevitable hazards and accidents of infant life; and we may be sure that the larger fraction of this minimum will lie in the natal-neonatal group. In 50 years' time, or longer, we might expect from one or two countries such rates of total infant loss as 20 for the natal-neonatal group, and 5 for the 11 succeeding months of the first year. But this attainable optimum will be reached only through the steady pressure and increasing efficiency of the services of child care.

I shall now give some notes upon each of these services of child care and upon their future contribution to child health.

Sanitation and Housing.—Only a few words are required on this subject. Local authorities and their medical officers of health know better than anyone else the importance of keeping general sanitation in all its aspects at the highest level, and of improving housing conditions and building new houses. Bad houses remain, but they are few in comparison with the thousands that Dr. Russell counted in Glasgow in his famous survey of 1881. Overcrowding remains, but the pace of building new houses increases year by year. And let us not forget that the fruit of good sanitation can be brought to perfection only by good houses and good housekeepers.

Antenatal, Maternity, and Neonatal Services.—This triple service is expanding in each of its branches. It grapples with difficult problems both in mother and in child, and with a high infant loss during birth and early infancy. The reduction of the maternal and infant death rates in the last two decades is the proof of its success. A further reduction in deaths from prematurity is certain to continue, both from the preventive work in the antenatal clinics and from the extending special care of premature newborn babies.

Children's and Fever Hospitals.—The future contribution of these hospitals will be mainly in curative medicine, in the diagnosis and treatment of serious illness, and in the deep study of the many problems of disease that remain

unsolved. Their teaching hospitals are well supplied with material of disease in childhood, but they lack the clinical material and experience of healthy infants and children. This lack of material can be supplied in the clinics of the child welfare service.

Future of the Child Welfare Service: Provision of Training Schools

The curative work of the service in the treatment of many kinds of minor disorder and in the diagnosis of serious illness at the clinics is of great value. But more valuable is its preventive work. This has a double aim—(1) to reduce to a minimum the number of infant and child deaths, and (2) to raise to a maximum the quality of life in the survivors—and a single method of achieving it by the education of mothers in the manifold kinds of child care and in the right use of each.

The two aims of this young child welfare service are an immense task. The first aim—the mastery of fatal disease in infants—has gone a long way towards achievement; the second aim of maximum health in childhood is only beginning, and its full accomplishment can come only in the far-distant future. Here and there suggestions are heard that, with the great reduction of the infant death rates, the personnel and work of the child welfare service may now be cut down, and that a partial demobilization in the civil war against disease in children might now take place. But there is no discharge in this war; the death rates must still be kept down, and the new campaign of raising levels of health in children is only beginning. And for this longer and more difficult campaign the child welfare service must be strengthened and given new and better weapons.

The most important work of the service is the education of mothers in the care of children. For this its doctors and nurses require better training than they now receive. There is an urgent need for the provision of training-schools in infant child health, these to be located in child welfare clinics. At present the doctors of the service get their training in child health in a children's hospital as part of the course of teaching in diseases of children. But the children's hospitals lack the essential clinical material of mothers and healthy infants and children. Such material, both for study and for training, can be provided only in a child welfare clinic, and, best of all, in one attached to a maternity hospital where the clinic has a close link with the nurseries of the newborn. I have already given the argument in favour of this proposal (McNeil, 1945) in an article "The Clinical Material of Child Health: where to obtain it; and how to use it." This argument was based on my conduct of such a clinic in Edinburgh for 17 years, and upon a teaching course in infant and child health given to medical students at the Maternity Pavilion, University of Edinburgh. This personal experience has convinced me that the most immediate and important need for the child welfare service is the provision of centres of study and schools of training in child health. These would, I believe, do for the new service what the use of hospitals for the study and teaching of disease has done for the medical practice of disease in children. The child welfare service with its own training-schools would steadily gain in power, authority, and prestige.

The Home Service of Mothers

The work of the mother for her children at home is the foundation and centre on which all the other activities of child care are built. In 1906 John Burns said: "Let us concentrate on the mother. . . . Let us glorify, dignify, and purify motherhood by all means in our power." These words set a target that is still far from being reached. But they turned the attention of medical and social reformers from the circumstantial *things* of child care—sanitation and the house—and towards the central *persons*—the mother and child at home; and they created in the child welfare service a national system of education of mothers in child care.

Fifty years later infant mortality, the subject of the London conference in 1906, has been brought under strong control in many countries, and to this massive achievement the new service of education has made an indispensable contribution. But great, difficult, and unfinished tasks of promoting the health of infants and children remain; and these tasks will lie largely in the hands of the child welfare service.

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ANAEMIA IN KWASHIORKOR

BY

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Kwashiorkor has been defined by Brock and Autret (1952) as a nutritional syndrome of African infants and children comprising retarded growth, alterations in skin and hair pigmentation, oedema, fatty infiltration, cellular necrosis or fibrosis of the liver, and frequently a variety of dermatoses. Mortality is heavy in the absence of proper dietary treatment.

The anaemia often found in kwashiorkor is usually mild in degree, normocytic or slightly macrocytic, and has responded somewhat slowly during treatment of the syndrome by high-protein diets (Altmann and Murray, 1948; Trowell *et al.*, 1952). In East Africa, where tropical infestations are common, sometimes there is hypochromia, responding to iron treatment; often there is slight macrocytosis, but megaloblastic change rarely if ever occurs (Trowell, 1949). Lehmann (1952) believes that this macrocytosis without megaloblastic change is due to the presence of reticulocytes following blood loss. In Johannesburg, where parasitic infestations are infrequent, Altmann and Murray have observed a more constant blood picture. They considered anaemia to be due to deficiency of protein. Three of their 34 cases showed macrocytosis, while others became macrocytic on high-protein diets. In the marrow smears of six cases abnormal cells were seen suggestive of lack of liver principle or folic acid, but, as Trowell has also observed, the red-cell precursors were of an intermediate type or macronormoblastic, there were some giant metamyelocytes, but true megaloblasts of Ehrlich were not seen. Walt *et al.* (1950) also record a moderate, slightly macrocytic normochromic anaemia in their cases in Durban. In three, all fatal, anaemia was severe, but there was no megaloblastic change. Macrocytosis was reported by van der Sar (1951) to be common in his 31 cases of kwashiorkor in Curaçao, but in only one was the bone marrow megaloblastic.

It is now generally accepted that the syndrome is due to deficiency of protein in the diet, and that it responds well to treatment with high-protein diets, anaemia slowly improving at the same time. It is said that the anaemia does not respond to folic acid, vitamin B₁₂, or liver extracts (Trowell *et al.*, 1952), although Piéraerts (1950) believes it will respond to these after protein replacement.

The possible relationship of this anaemia to protein deficiency, the occurrence of macrocytosis, and the reports that in the bone marrow there are features of megaloblastic change without the full picture seen in

megaloblastic anaemias have prompted the present investigation, in which haematological findings in a series of cases of kwashiorkor are described.

Clinical Material

Twenty-one cases have been studied—nineteen of African and two of Indian origin. The ages ranged from 1 to 5 years, with a mean of 2 years 3 months. Eleven were male and ten female.

In each case pitting oedema, dermatosis, and lowered plasma proteins were present. With the absence of complicating diseases these were the only criteria used in the selection of cases. Pitting oedema was always found in the legs and usually in the hands. Often facial oedema and generalized anasarca were marked. The dermatosis was similar to that described by Gillman and Gillman (1951) and by Brock and Autret (1952). Total plasma proteins ranged from 3.5 to 4.9 g.%, with a mean of 4.05 ± 0.10 g.%, and the albumin fraction from 1.2 to 2.6 g.% about a mean of 1.89 ± 0.04 g.% (see Table I).

TABLE I.—Plasma Proteins Before and After Treatment, and Plasma Bilirubin on Admission

Case No.	On Admission			After Treatment	
	Total Protein (g.%)	Albumin (g.%)	Bilirubin (mg./100 ml.)	Total Protein (g.%)	Albumin (g.%)
1	4.3	1.6	0.9		*
2	4.0	—	0.9	6.7	4.0
3	3.8	1.8	0.2		*
4	4.0	1.7	0.1	6.3	3.6
5	4.4	2.1	0.2	7.0	4.0
6	3.8	1.5	0.3	7.5	3.8
7	3.5	1.6	0.2	—	—
8	4.9	2.2	0.2	5.9	3.9
9	3.5	2.3	0.3		d
10	3.5	2.3	0.4		*
11	4.7	2.4	0.4	5.8	3.6
12	4.5	1.7	0.7	8.2	4.3
13	4.9	2.6	0.3	5.8	—
14	3.5	1.9	0.5	7.0	4.0
15	3.8	1.2	0.3		*
16	3.8	1.9	0.4		*
17	3.5	1.5	0.4		d
18	4.5	1.9	0.3	6.7	3.8
19	4.4	1.7	0.3		d
20	4.1	2.0	0.3		*
21	4.6	1.8	0.3		*
Means	4.05 ± 0.10	1.89 ± 0.04		6.70 ± 0.23	3.89 ± 0.07

d = died. * = removed from hospital before recovery complete.

No case was included without all these features, but other manifestations of the syndrome such as mental apathy, retardation of growth, and thinning of the hair with reddish pigmentation were present in varying degree. The liver was enlarged in 12 cases. In none was the spleen palpable. Abnormalities were not detected in the heart or nervous system, and lymph nodes were never enlarged. No specific changes were observed in the tongue although it was sometimes red, and there were no significant lung changes clinically or on x-ray examination except in two of the fatal cases which showed radiological evidence of bronchopneumonia.

Stools were sometimes watery and occasionally oily, but diarrhoea was not a marked feature. Stools were always examined, usually on three consecutive days. *Entamoeba histolytica* was isolated in two cases, but there was no dysentery. Ova of ascaris were observed in three cases, while in one of these there were hookworm ova, but here the test for occult blood was negative. This low incidence of parasites indicates the small chance that intestinal infestations were responsible for the anaemia in this series.

Plasma bilirubin was estimated in every case, but in none was it elevated (see Table I).

Treatment consisted of soured milk (maas) or this and a hydrolysed protein preparation ("casydrol") given in alternate feeds until convalescence, when ward diet was added.

Eleven patients made an excellent recovery, with disappearance of all symptoms, loss of oedema and skin changes,