he was taking only Russian oil three times a day. When seen a year later the bowels were still moving well. He had continued to do his exercises and said that he felt much better, only occasionally having a little pain in the stomach (see Figure Vb).

The last case shows where the treatment of these mechanical conditions should begin (see Figure VI). This little girl was referred from the children's room for what was called cyclic vomiting. The condition had been somewhat helped by a careful dietary but was not entirely controlled by it. Although she was very young, she was given only some exercises and some resting positions which she was to take regularly. The mother followed the directions out most carefully and reports that there have been no attacks of vomiting since she started in with the rests and exercises.

The point that these cases bring out is not that the correction of the mechanical defects is the whole thing but that the correction of them is one of the ways to help nature compensate for the defects which may be present from heredity, environment and occupation.

THE MALNOURISHED CHILD IN THE PUBLIC SCHOOL.*

BY WILLIAM R. P. EMERSON, M.D., BOSTON,

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THE care and feeding of infants has become not only a science, but an art. Its principles are now quite generally understood in the home and good results are in evidence throughout the country. When we come to children of pre-school and school age, however, very little medical attention has been given them, especially as regards their nutrition and growth. In fact, malnutrition has not been considered a medical diagnosis.

This explains why children who are retarded in their growth from one to three years still pass through our hospital clinics unnoticed. Private physicians find their vital organs normal, recommend a tonic, and do not consider them subjects for medical care. School inspection fails to identify them as being physically unfit because the human eye cannot see through several layers of clothing, and in most states

the school physician is not allowed to examine children without clothes. Furthermore, the school doctor's work is directed chiefly to protecting the children against infectious diseases, such as scarlet fever, etc., rather than giving them individual treatment even if their state of nutrition were recognized.

The disclosure of the fact that about 30% of all our young men were found physically unfit in the draft was as much a surprise to the medical profession as to people in general. The significant point is that this unfitness did not come upon them suddenly when about to enter the army. As a matter of fact, the weighing and measuring of thousands of school children show this same percentage of unfitness in all the school grades, and extending even into the pre-school age. Until this fact is more widely recognized, we shall continue to graduate from grammar and high schools thousands of children, educated, but physically unfit for the burden of life.

This condition, which we call malnutrition, is not simply under-nutrition, but exhibits definite physical defects which can be found on a careful physical examination. These defects constitute the most frequent cause of the malnutrition, and average between five and six to each malnourished child. Accompanying them is usually a history of lack of endurance, both mental and physical, and a group of nervous symptoms which are found almost without exception as part of the clinical picture of malnutrition.

In our early study of this retarded growth in children, various theories were postulated as to the prime cause. In my own experience, the first cause considered was that of poverty. But we have found this the essential cause in less than 5% of our cases. Another cause assigned was improper food, but in our large cities food, as a rule, is well prepared, and this could not explain the prevalent condition where it was known the food was excellent. Tuberculosis was, of course, one of the assumptions, but was found as the chief cause in only the exceptional case. Hereditary syphilis could not explain the condition, as it occurs in less than 3% of the cases. Heredity was blamed in its turn until we found by our records that most of the children were perfectly well at birth, and the children who did have a poor start had usually received unusual care and therefore became well and strong beyond the average.

* Paper read before a joint meeting of the National Education Association and the American School Hygiene Association, Cleveland, Ohio, February 27, 1920.

Having thus eliminated these various theories one by one, we had still to find the active cause of this widespread malnutrition, and why, with all the child-helping organizations, national, state, and local, there seemed to be no great diminution in the percentage of cases. This afternoon I shall attempt to show some of these causes, first by a group of Cleveland children, and second by slides from our nutrition clinics in New York, Chicago, and Boston.

The group of children here on the stage are members of nutrition classes recently established by Miss Mae MacNab, secretary and chief worker of the Cleveland Nutrition Clinics, a new organization associated with our Nutrition Clinics for Delicate Children in Boston. I have not seen these children before this moment, but I am so sure they will present the same classic symptoms of malnutrition that I do not hesitate in using them as a demonstration. I am also sure of the results obtained even in the few weeks they have been attending Miss MacNab's nutrition classes that again I do not hesitate to present their record and to use their charts as illustrations.

Our method in these classes is to weigh the children once a week, and put at the head of the class the child who has gained the most in that period. These sixteen children are, therefore, arranged in this way. You will see by the chart that the first child has a gain of $2\frac{1}{2}$ pounds to his credit, and several have a gain of 2 pounds in a single week. When you realize that $2\frac{1}{2}$ pounds is 20 times the average rate of gain for a normal healthy child, you will appreciate what a remarkable response these children make to this form of treatment.

Before entering the nutrition class each child is given a thorough physical examination that his defects may be discovered and removed, so that he will be physically "free to gain." The mother is asked to report each week with the child, who is weighed in her presence, and in case there has been no gain the possible cause of the failure is discussed with both mother and child, and usually becomes apparent. With the removal of this cause the child who made no gain one week is often found at the head of the class the following week.

Each child has a weight chart, arranged in the same order, according to rate of gain. The red stars indicate that he has taken his mid-morning and mid-afternoon lunches every day during the week, and the blue stars represent

the same faithfulness with his rest periods. The gold star is given to the child making the greatest gain for the week. These charts are of great help in exciting the child's interest and enlisting his coöperation. The presence of the mothers ensures home support, and the nutrition worker advises in regard to diet and daily program.

We try to secure a modification of the school program also, and thus coöordinate the four factors which we find essential in safeguarding the child's health; namely, the Home, Medical Supervision, the School, and the Child's Own Interest. These factors may be considered a parallelogram of forces working for the child's good, and it is because most child-helping organizations are operating on only one or two sides of this parallelogram, leaving the child's health unprotected on the other two sides, that their efforts have in a great measure failed to bring permanent results.

I will also show you some of the characteristic features of malnutrition almost invariably found in these children. (Several children stand showing side view to the audience.) You will notice the prevalent fatigue posture, round shoulders, projecting shoulder blades, protruding abdomen; also the pallor and lines under the eyes. The time is so short that I will now dismiss the class without the usual discussion with the mothers present, although I am sure this would bring out some interesting points. (Dismisses class.)

In order to show concretely the results of our work, I have brought with me a set of slides showing children treated in our Boston and New York clinics. (Slides shown.)

Among the principal diagnoses found are insufficient food (not enough calories per day); fast eating; sugar habit; omission of morning and afternoon lunches; omission of mid-morning and mid-afternoon rest periods; over-fatigue from a full-day school program and from school examinations; over-fatigue due to late hours, activities outside of school, such as clubs, music and dancing lessons, etc.; too many home studies; failure to gain because of obstructions to breathing, such as adenoids, tonsils, deviated septum, etc.; the use of tea or coffee; the omission of cereals or milk from the diet.

I am showing several class groups to illustrate how surely we can depend upon the parents to do their part. Many mothers have

come to us at the Massachusetts General Hospital in Boston from cities forty miles distant, rarely missing a single class until their children became well. In a class of state charges we had a remarkable demonstration of the cooperation of even foster mothers who responded 100% in the group shown, one foster mother being present for each child in the class.

The child's own interest is, however, one of the most important factors in successful treatment, as this reacts on the home and ensures the carrying out of the program recommended. We have been asked by mothers to continue our clinics in the summer as it helped them so much in the control of their children.

The pedagogical value of the class method is very great. The child at the head of the class, who, by following directions, has shown a good gain with improved physical appearance, is a great stimulus to others who are at first fearful, but soon learn that such essentials of health as open windows, proper diet and rest, good food and health habits, can be secured in practically every home, whether among the rich or the poor, and will almost certainly bring about the desired results.

We have been able to get children even on the East side of New York, during a war year, to show a gain from 100 to 250% beyond the normal rate of growth for well children, without extra expense and in their own homes; and once the child becomes well he stays well because he has learned how to be well in his own environment,—a most important point in securing permanent results.

Besides these groups, I am showing you many individual cases, because this is an individual problem which must be studied with reference to the needs of each child, and cannot be met by a broadside directed against a large group. The diagnosis of malnutrition is just as individual as any other medical diagnosis. For example, if we make a diagnosis of pneumonia or typhoid fever, each case will require its own treatment appropriate to the individual conditions. In the case of malnutrition the cause must be determined in each case and removed before the child gets well.

Among the charts shown are some of our early cases, where children were under observation for a period of 20 to 40 weeks with practically not a single pound gain in weight, even though some of them were taking between 3000 and 4000 calories of food per day and we

were doing everything we could to help them. However, until we made a definite diagnosis of the cause of their failure to gain, which might be any one of the causes previously mentioned, we could not produce results.

These children represent exactly the same problem as the 30% among the pupils in our schools who, by weighing and measuring, are shown to be physically unfit to carry the work of a school program that is planned for the normal child. Under the present system the stress of the school burden is increased for these undernourished children, because the efficiency of the teachers is measured by their ability to force them through the grades, and this frequently imposes extra home work or additional tasks upon the already overburdened shoulders of the malnourished child.

The remedy for this condition lies in separating the malnourished group from the well children and adapting the school program to their strength. This can best be accomplished by providing scales in every school, and at the beginning of each term weighing and measuring every child, and selecting those who are 7% or more under weight for special treatment. This group should be relieved temporarily from the pressure of the full program, and the worst cases should be put in open air, or at least open-window rooms. The great majority, however, can continue in their grade if they are excused at 10.30 so that they may go home for a mid-morning lunch and a rest period, returning after the noonday meal for the regular afternoon session. Where this is not possible because of distance, the children should be provided with a morning lunch and given a place to rest in the school building, with an army cot and a blanket.

A malnourished child is not capable of doing more than an hour or an hour and a half of concentrated work without overfatigue. But many of these children actually do better school work on a shortened program than the average child of their grade. This modified school program is being taken up by a number of cities and towns on the ground that health is more than education, and that malnutrition should be completely eliminated.

In a class of 14 children selected from a group of 600 in Boston, an average period of ten weeks only was needed for their recovery. However, this was in an institution where we had control of their activities the entire 24

hours. In any case there need be no serious interference with the work of the school, and as a matter of fact the over-fatigue incident to the malnourished child's efforts to keep up with the full schedule is in itself an obstacle to practical efficiency. If his condition is not recognized he will be a drag on his class throughout the grades, and he finally graduates, educated it may be, but physically unfit.

To sum up, the five principal causes of malnutrition, named in order, are: Physical defects, lack of home control, over-fatigue, improper food habits, improper health habits. These causes can be removed and the child made well in his own home. This is the work of our nutrition clinics and classes. So much demand has arisen for information in regard to the operation of these classes that we have formed an organization called *Nutrition Clinics for Delicate Children*, with headquarters at 44 Dwight Street, Boston, where reprints and further information may be obtained by addressing the Secretary, Miss Mabel Skilton. Information can be secured also from Miss Mae MacNab, Secretary, Cleveland Nutrition Clinics, Williamson Building, Cleveland, and from Mrs. Ira Couch Wood, Director Elizabeth McCormick Memorial Fund, 6 North Michigan Avenue, Chicago. These organizations are associated with us in this work.

COMPARATIVE STATISTICS ON PHYSICAL EXAMINATIONS OF PUPILS OF THE BOSTON PUBLIC SCHOOLS FROM DECEMBER 1, 1915, TO MARCH 1, 1920, AND REMARKS, WITH ESPECIAL REFERENCE TO MALNUTRITION.

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The steady decrease in cervical glands continues, and, as stated last year, this is *partly due* to the fact that school physicians have been instructed not to report slightly palpable cervical glands when secondary to adenoids, tonsils, carious teeth, pediculosis, or other allied condition. These cases are kept under observation, and only the primary causes reported.

Pulmonary tuberculosis shows a steady decrease.

Cardiac disease remains practically the same for reasons which have been stated in previous reports.

The principal causes of malnutrition in school children are: insufficient and improperly prepared food; impaired digestion due to imperfect mastication, bolting of food, use of tea and coffee, over-indulgence of ice cream and candy; late hours, lack of fresh air and proper exercise.

The first, insufficient food, is a social problem, the others, medical. The latter should be corrected by training the child to take the properly balanced diet, or substitutes; to masticate the food thoroughly; by instructing mothers on the selection and preparation of food, the value of exercise, fresh air, and other hygienic measures.

The Public Schools of Boston are doing much to combat malnutrition. Commencing in 1909, the pupils in the first grades were weighed and measured. These children were weighed and measured annually until 1919. The data from these records are in the hands of Dr. William T. Porter of Harvard Medical School. It is expected that his deductions will be published at an early date.

The present status of weighing and measuring is as follows: Nurses weigh and measure the children in open-air classes every month. All cases of malnutrition are weighed and measured every month. To this is the added requirement that all children in the following districts be weighed and measured annually by nurse: Blackinton-John Cheverus, Washington, Thomas Gardner, and John A. Andrew.

Beginning September, 1920, all children will be weighed and measured at the time of physical examination. These data will be recorded on Physical Examination Record Card.

All open-air class pupils, and malnourished children not in open-air classes, are reexamined physically in January of each year. They receive proper hygienic instruction from physician and follow-up visits to homes are made by nurses.

Commencing five years ago (1915-16) statistics show that 2.12%, or one in every 47 was malnourished; in 1916-17, 1.64%, or one in every 61; in 1917-18, 1.99%, or one in every 50; in 1918-19, 2.34%, or one in every 43; and for the present year 2.02%, or one in every 44.