girls with poor teeth of corresponding ages, there being twenty groups in all. The children with good teeth surpassed children with poor teeth in weight in fifteen out of twenty groups.

"Combining the averages of children with good teeth for all ages and the averages of children with poor teeth for all ages, the children with good teeth surpassed the children with poor teeth in weight by an average of 2.7 pounds per child."

I also wish to call attention to an article published in the *Deutsche Monatsschrift für Zahnheilkunde* 6 March, 1901, by Dr. Ernst Jessen, in which he describes the system established in the city of Strassburg, Germany, by which 16,000 of the school children of that city had a yearly dental examination and were treated in the dental department of the University of Strassburg. Of this article I wrote a synopsis and it was printed in the *International Dental Journal*, July, 1901.

There are several conclusions which I would make in regard to this work.

1. I believe it is very desirable that once a year the teeth of all children in grammar schools be examined and their condition reported to parents with appropriate advice.

2. This examination should, preferably, be made in the fall of the year soon after the opening of school. At this time the infirmaries of the Dental Schools can best take care of such pupils whose circumstances do not allow them to consult a dentist at his office.

3. Short, practical talks to school children would help much to increase their intelligence as to the value of good teeth in promoting nutrition and general health, and would interest them in the condition of their own mouths. These talks should be given by a dentist, but much supplementary work of the same sort could well be given by the teacher.

A REPORT ON THE EXAMINATION OF THE EYES OF 420 SCHOOL CHILDREN IN THE TOWN OF BROOKLINE.*

BY ROBERT G. LORING, M.D.,

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I HAVE to present a report on my examinations of the eyes of some of the school children in the town of Brookline. My work was done at the Pierce School, and I examined four hundred and twenty children, including all grades above the primary. The object of this examination was to find out the number of children with defective eyesight, how many of these could be helped, and how many were, therefore, in need of further examination and treatment. Incidentally, some interesting data were collected with reference to the relation between poor eyesight and poor scholarship in school children.

The work was done necessarily under some difficulties, as more apparatus is required for the most certain results than ordinarily can be

carried and set up in the schoolhouse. For the careful determination of refractive errors in children, relaxation of the accommodation is of course necessary, and sometimes it is only with a mydriatic that any errors of refraction can be demonstrated. Nevertheless, in the majority of cases all marked degrees of farsightedness, nearsightedness, or astigmatism can be readily discovered, and careful questioning of the child will show the presence or absence of symptoms pointing to eye strain.

The method pursued was as follows: Each child was carefully tested for vision with the ordinary vision card for his ability to read small letters across the room, and was questioned as to the presence of headache, pain in the eyes, or discomfort during or after study. The teacher was asked to state whether the child held the book too near in reading or made any complaint about his eyes. Ability to read the small letters across the room is not, however, a proof that the eyes are normal. Each child was, therefore, examined by the electric retinoscope in a darkened room. This has not been used up to now in the examination of school children, so far as I know, but it has the great advantage of being a purely objective method, by which the refraction of the eye is measured without relying at all upon the statements of the child. Cards for each child were printed, and on these was written the name and age, the vision, the estimated refraction and such symptoms as were found present, and later the child's mark in scholarship.

In general, I found the children in the Pierce School free from the chronic inflammatory diseases, such as conjunctivitis and blepharitis, which are so commonly found in our large city schools filled with children from the tenement districts where the hygienic conditions are bad. There was no trachoma, no phlyctenular disease, and almost no follicular catarrh and only one case of keratitis.

But of course the point of special interest was the question of refraction, *i. e.*, the frequency of far- and near-sightedness and astigmatism. I found that 19 out of the 420 children were already wearing glasses, but it appeared from the examination that many more were in urgent need of some relief, either from poor sight or from pains in the eyes and headache.

The children ranged in age from eight to sixteen years, were boys and girls, and included all the grades above the primary. The results were naturally rather hard to tabulate, but in order to make the statistics of practical value, I divided the children into three main classes. In the first class I put all those who saw perfectly on the test card across the room, *i. e.*, who had technically 20-20 of vision, who showed no errors of refraction by the retinoscope, and were not suffering from any symptoms from the use of their eyes. These I called the perfect children, and the first interesting fact was that these were not by any means a majority, in fact less than one half qualified for this class, *i. e.*, only 167 out of the 420 children. The remainder

* Read before the Brookline Medical Club Nov. 7, 1906.

had either more or less imperfect vision or some symptoms of eye strain, but many had only slightly imperfect eyes or slight symptoms. I therefore divided them into two classes, first those having only slight amounts of farsightedness, nearsightedness or astigmatism, which I call class two; and lastly those having quite defective vision or really troublesome symptoms, which I put in class three. Those in class two, with only slightly imperfect eyes, numbered 155, and were therefore nearly as many as those who passed as perfect; while those with really defective sight or troublesome symptoms numbered 98, or 23%. I tried to exclude all cases not rightly belonging in this class. Some uncertainty must be admitted in the vision test in lazy or inattentive children, and there is even more uncertainty about a child's statements regarding pain and headache in the use of the eyes. Making, however, allowance for errors on my part, fully 20% of all the children had evidently poor vision, or showed by the retinoscope a marked refractive trouble, or gave a clear history of eye strain.

These cases in class three of really defective eyes were in detail as follows:

Thirteen were aggravated cases of mixed astigmatism and were in urgent need of relief, the vision being greatly reduced.

Eight were high degrees of nearsightedness, over two diopters, and were in equally bad condition as regards seeing, and five more had lesser degrees of nearsightedness, also with poor sight in the distance.

Nine had high degrees of farsightedness, over two diopters, of which four gave very definite histories of headaches in school during study, and three the history of blurring and pain in the eyes in study.

Eighteen had evident degrees of farsightedness of at least between one and two diopters. The vision was generally fairly good, but not normal, and eight of them had frequent headache in school or at night when studying by gas light.

Ten had evident farsightedness with astigmatism, and all gave a history of eye strain or had diminished vision.

Nineteen had less than half vision, technically 20-40 or less, and generally some refractive error tested with the retinoscope and some symptoms of eye strain.

Twenty-one had nearly perfect vision when tested by the ordinary card, but showed with the retinoscope farsightedness or astigmatism, and gave marked history of eye strain, that is, headache in school or at home when reading at night, watering of the eyes at study, or pain or redness in the eyes on close application, and these cases were all referred for careful treatment.

These children were, in my opinion, in decided need of furthermore careful examination of their eyes under a mydriatic for the relief of their symptoms. What their treatment would be would depend on the results of the exact examination and should be decided for each case individually, with due regard to the conditions

in each case. Where the eyes show the effects of strain, less study and book work, more exercise, more sleep and better hygiene generally are the remedies *par excellence*; but in the majority of cases there is a refractive error at the bottom of the trouble, and the child is, in consequence, under a real physical handicap in doing his work, and should have carefully adjusted glasses, at least for study. Such children may see well enough when tested by the vision card alone, but they are in reality using up an extra amount of nervous force, and they show, in consequence, the typical symptoms of eye strain, namely, headache or pains in the eyes after or during study, or often merely a general nervousness or restlessness in school, or the inability to hold the attention on any task requiring the fine use of the eyes. Such children are often called dull or stupid. For instance, suppose a child has three diopters of farsightedness, not an uncommon amount. He can and generally does see clearly in the distance, but in order to do so makes the same effort every waking minute of the day that a normal child would make if he were required to hold a printed page at thirteen inches from the eye and keep it clearly focussed. It is easy to imagine the nervous wear and tear after a few weeks or months. The wearing of properly fitted glasses removes this strain, and the headache and pain disappear and the child does his school work with comfort and without wasteful and unnecessary nervous effort. The treatment of these defective children is not, however, the point of special interest here. My object is only to make clear the usual symptoms of eye strain, and show their frequency among a large number of average school children.

One point in this subject of the eyes of school children interested me especially, *viz.*, the relation between refractive errors in children and their standing in scholarship. In order to get some data on this point, I sent the record cards of each child to its teacher and asked her to indicate its mark in scholarship. I found the children were marked with one of five grades: excellent, good, fair, unsatisfactory and poor. Dividing the children again into my three divisions, first those with normal eyes, secondly those with little refractive error and fairly good sight, and thirdly those with large refractive errors, poor vision, or troublesome symptoms, I found that a great majority of the good students belonged to the first two classes, especially the first, and that a majority of the poor students belonged to the third class. For instance, out of all the children, 86 reached the grade of excellent, and 43, or one half, belonged to the class with perfect eyes, while the third class of defectives furnished only 12; or in other words, 50% of the excellent had normal eyes, and only 14% of the excellent came from class three with defective eyes. In the middle grades of scholarship the figures were less striking, but as before the majority of the good scholars came from the first two classes with perfect or nearly perfect eyes. For instance, among 137 marked good in scholarship, more than two

thirds came from the first two classes, and less than one third from the third class. In the same way among those marked fair, 52 of the normal reached this grade against 28 from the deficient. On the other hand, in the lowest grades of scholarship, the defective eyes were the majority. Among 38 marked unsatisfactory, only 4 were normal as to vision, and 15 were from the third class; and in the lowest grade of poor, 42 in all, twice as many had deficient eyes as were normal.

Of course, many allowances must be made in these results for the individual variations in the children in industry and intelligence, but I think these figures strongly suggest that refractive errors and the latent symptoms of eye strain do account for a large part of poor scholarship, and that a large number of poor scholars are probably suffering from defective eyes, though often having good vision. This is a matter of everyday experience to the oculist. Children are constantly being brought who have good enough vision when tested in the ordinary way, but complain of difficulty in doing their school work, and on examination with a mydriatic are found to be suffering with marked degrees of farsightedness or astigmatism, and with proper glasses return to their work without further trouble. Even adults often suffer from marked symptoms of eye strain without being conscious that their eyes are the things chiefly at fault, and this is much more common among children. In this connection it should be understood that the recent act passed by the legislature,¹ providing for the examination of the vision only of school children by the *teachers*, while a step in the right direction, will in itself be quite inadequate as a means of finding out all those who are in reality suffering from eye strain.

I found in comparing the results from the lowest to the highest grades that the proportion of the normal children gradually fell off; for instance, in the fourth grade, one half of the children qualified for class one, that is, had normal eyes and complained of no symptoms, while in the highest grade the majority belonged to the second or slightly defective class, and the number in rather urgent need of further examination and treatment equalled the number that were perfect. This coincides with the results of other examinations that have been made among school children, namely, that with advancing education the proportion of normal eyes steadily diminishes and we find an increasing number of nearsighted and astigmatic children. Cohn found in the examination of several thousand children in the schools in Breslau that the normal or model eye was rare, that the farsighted and nearsighted were in the large majority, and that nearsightedness especially tended to increase. In the elementary schools, 6% were nearsighted, in the Latin schools 26%, and in the university 59% of all the students. And similar results have been found here, though the average was much better. Among my cases 3% were nearsighted, and 3% had mixed astigmatism.

¹ Acts and Resolves of the Legislature of 1906. An act relative to the appointment of school physicians, chap. 502, sections 5 and 6.

To sum up my results: Among 420 children, 167 were classed by me as normal, having perfect vision, no ocular symptoms, and no perceptible refractive errors; 155 had little refractive error, good vision and slight symptoms not sufficient to need treatment; 98 had either less than half vision, troublesome symptoms or marked refractive errors, and were mostly referred for further examination.

I found an increasing number of defective eyes in the higher grades, and a majority of normal eyes among the good students, and a majority of defective eyes among the poor students.

AURAL AND NASAL EXAMINATIONS OF SCHOOL CHILDREN.*

BY D. HAROLD WALKER, M.D., BOSTON,

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THE importance of the examination of the hearing of school children has been recognized in this country only for the last few years, and but recently has it received the consideration it deserves.

In Germany, through the work of Bezold published in 1885 and also that of Kafemann in 1890, the subject was brought to the attention of the public and since then a great deal of investigation has been carried on.

The importance of perfect breathing, which means full development of the nasal fossæ and perfect ventilation of the accessory sinuses and of the middle ear, has been appreciated for some time, but the effect on the scholarship of children suffering from adenoids or nasal obstruction has been more or less overlooked.

In the average public school, there is always a certain number of children who seem inattentive or are considered stupid. There is also a certain number who must be placed in the front row, and every physician who serves in a large aural clinic has seen children who have been sent to the hospital by an observant teacher, who had noticed that the child watched the teacher's lips or had a discharging and foul-smelling ear.

Considering the above facts, it was thought advisable to make an experiment in order to gather data and, if possible, form some idea as to the best methods for a systematic aural and nasal examination. Therefore the School Board and the Committee on Hygiene in the town of Brookline decided to undertake an experimental examination of the public school children, and for that purpose the Pierce School was chosen.

The children of the upper grade were selected because of their ability to give intelligent answers. The method employed was as follows. The large laboratory was used, the floor being marked in foot spaces up to twenty-five feet. The child was placed in a revolving chair at the first space. The drum membranes, the nose and throat were examined and the condition noted. The hearing was tested by a whispered voice which could be heard by the average normal ear at a distance of

* Read before the Brookline Medical Club, Nov. 7, 1906.