

A Paper

ON

SIGHT-SAVING CLASSES\*

BY

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THE DIFFICULTIES OF STANDARDIZED SCHOOLS

The demand for some scheme of education suitable for children suffering from a defect of vision is a very natural one. It is bound to arise when education is made compulsory for every child; it is also bound to arise because no one scheme of education will cover all cases. The curriculum of any school is designed for the greatest good of the greatest number. Misfits must suffer because either they are incapable of taking advantage of the education provided, or the scheme would be injurious to them if their full attendance were insisted upon. This was early recognized in the case of the blind, and special education was provided. There has been no lack of generous efforts by intelligent and sympathetic people to found schools where the blind could be trained in such arts and crafts as would fit them for some place in the national life. Of work for the prevention of blindness and for the help of the unfortunate blind there has been no lack.

The duty of inspecting children in the schools for the blind maintained by the London education authority first brought home to me, however, the disabilities of those children who were neither blind nor well sighted, and for whose education and training there was no appropriate provision. They received no proper education, since they either idled in the ordinary school or were left to run the streets, or were trained in the blind school, which was equally bad for them. When I first worked out the incidence of blindness in these schools I found no less than 6 per cent. of children were myopes who were not blind, and would probably never become blind. That experience led me to voice their grievances in a paper read at the Second International Congress of School Hygiene held in London in 1907.<sup>1</sup> I protested that it was not only a waste of public money, but injurious to them that they should be taught with blind children.

By great good fortune the chairman of the Section at which the paper was read was a member of the Education Committee of the London County Council, Miss Adler. Her interest was engaged, and the next year—1908—the first experimental class was started with the backing of Dr. James Kerr, the school medical officer, and of the school teachers. The official report on the first year's working closed with the words: "It seems to be such a success as to warrant the opening of other centres for the same purpose." There are now thirty-seven classes in fifteen centres in London with a roll of 850 children; also 100 places for myopes in five schools for higher education. There are classes in nearly all the large towns in England and Scotland, in some other countries of Europe,<sup>2</sup> in Canada,<sup>3</sup> and some hundreds in the United States of America.<sup>4</sup> When in Canada in 1930 I learned how rapid had been the advance in the provision of sight-saving classes in the States and how favourable the method had become in the eyes of educationists and ophthalmic surgeons. In this paper I will survey our experience in London during the past twenty-five years, time enough to permit a fair judgement of the worth of these classes.

THE CHILDREN

Any child who can see but yet cannot see the normal average of the test types at the proper distance is short-

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sighted in the general sense of the term. Many cases of short sight can be corrected by glasses, and if the defect is not of a serious order the child will be found to be capable of joining in the ordinary school work. If the defect cannot be relieved by glasses, or when susceptible of correction is of such a serious nature that the ordinary form of class work would be injurious, then some special provision must be made. This provision is the "myope class," so called in England because most of the children in these classes are myopes. The term "sight-saving class" came from America. For a time I was dubious about its use; the succession of sibilants is unpleasing, but the chief objection lay in the claim which the term set up. Could it be justified? It confessedly had a distinct value when dealing with dubious parents: those who were inclined to demur to their child being transferred to a "myope class" readily agreed when it was called a "sight-saving class."

Examining the records of a large number of children who have been in the classes, I find that the eye defects fall into three groups, according to their nature:

Myopia	...	...	...	62.62	per-cent.
Damages due to inflammation	...	...	...	30.35	"
Congenital defects	...	...	...	7.02	"

Briefly, some two-thirds of the children are high myopes and one-third have damaged or imperfect eyes. The sight-saving classes would be wholly justified by reason of the provision which they make for the latter. Such children are under far happier conditions than in the ordinary school. The individual attention they receive enables them to make advances that are impossible when they are lost in a crowd of healthy, active children, and the care exercised is definitely beneficial to those who have suffered many relapses from keratitis. It is true that the presence of these children, and especially of those with congenital defects of the eyes, complicates the curriculum, since they are not up to the same standard of intelligence and capacity as the myopes. Also their presence reduces the popularity of the classes in the eyes of parents, who are apt to resent the association of their own children with "defectives." But these difficulties are reduced with the increase in number of the classes and the possibilities of classification.

Since the greater number of the children are high myopes the classes must be judged by the services which they render to these children. First, let it be made clear that the classes are not based on any theory of myopia; they are based upon the necessity of meeting, as satisfactorily as we can, a heavy handicap, which tells seriously against the chances of a fair start in life. Myopia may be the product of several causes—heredity, congenital defect, illness, bad social conditions, and too much close eye work. The last two we can deal with. Social conditions are definitely improving, and it is our duty to control such eye work as must be done in school. Personally I have no doubt of the injurious effects, in susceptible children, of prolonged close eye work, and that this is a cause or an aggravation of myopia. Also I am sure, on such evidence as I have, that the control of eye work is beneficial to myopes. I have observed the progress over long periods of a group of 300 children. The results have been published<sup>5</sup> and compared with those recorded by Priestley Smith.<sup>6</sup> There was some advantage for my cases, but I admit that there is, and can be, no sufficient "control" of any such observations. Much more to the point are such facts as have been recorded through school medical inspection in Sweden. In that country improvement in hygiene and in school lighting, the abolition of the old Gothic type in favour of Roman, and the increase in outdoor sports have been followed by a reduction in the incidence of myopia which is remarkable. That the regulation of close work is a material

factor in that reduction is evident, since Dr. Hogarth<sup>7</sup> states:

"There is a 20 per cent. greater decrease on the modern as compared with the classical side. Classical studies require closer attention to books, and entail the more frequent use of dictionaries, which are generally printed in small type. Greek especially presents a form of lettering entirely new to a pupil, and requires very close concentration."

The report of the oculists who served on the British Association Committee<sup>8</sup> is, I think, fully justified:

"Myopia, or short-sight, commonly depends on undue elongation of the eyeball. It is never, or hardly ever, present at birth. It is rare at 5 years of age. It usually begins during school life, and increases more or less from year to year during the period of growth. It sometimes continues to increase after growth is completed. It is not necessarily or always associated with over-use of the eyes, either in school or elsewhere, for we see it arise after illness, we meet with it in illiterates, and we know that the predisposition is strongly hereditary. But it is everywhere most frequent among the studious, and there is a mass of evidence to show that it depends very largely, both in its origin and in its progress, on over-use of the eyes in near work."

There is also evidence of the injurious effects of close work in adult life. Out of a series of 480 myopes<sup>9</sup> of over 3 D between the working ages of 20 and 60 years no less than 53 per cent. of those engaged in close work came to a time when there was an unmistakable failure of ability to carry on because of serious eyestrain, and this number included 15 per cent. who suffered damage to their eyes. When grouped according to degree of myopia the following results were obtained:

Myopia 3 to 5 D—breakdowns 33.7 per cent. ; 5 to 10 D—breakdowns 66.5 per cent. ; over 10 D—breakdowns 77.4 per cent.

Of those who were not engaged in continuous close work only 9.4 per cent. experienced a critical failure of capacity owing to eyestrain or disease. There is cumulative evidence that myopia is often started and is frequently aggravated by too much close eye work. We are therefore fully justified in checking these habits in susceptible adolescents, and in diverting their attention to ways of life that will spare their eyes.

#### STANDARDS OF VISION

The popularity of the sight-saving classes in England has led to increasing demands by parents and ophthalmic surgeons that children who are educationally blind should be admitted to them. One can sympathize with the desire to refrain from labelling a child "blind," but if the work of a sight-saving class is to be effective—that is, if it is to be carried on by teaching the children through their eyes as well as their other senses—then they must have sufficient vision for the purpose. At first the standard set was 6/18 with glasses. It was soon found, however, that many with worse vision than this could join satisfactorily in the classes. Beneficent legislation in the interests of the blind made it imperative that only children who were blind or who were likely to become blind, for economic purposes, should be admitted to the blind schools. This had its effect on the sight-saving classes; those who were excluded from the blind schools were admitted to the sight-saving classes. But when vision is less than 6/24 it is very difficult to prevent children peering and groping at their work, and the bad habits of a few will be copied by the many. I am frequently asked what degree of myopia indicates the necessity for admission to a sight-saving class. This should always be related to age; an infant of 5 years with 5 D of myopia, especially when there is evidence of increase of the defect, certainly needs special treatment. On the other hand, a child with 7 D who is 13, and shortly due to leave school, may well be left in the ordinary school under special supervision and exemptions as regards work.

#### POSITION IN THE EDUCATIONAL SCHEME

At the outset the classes were definitely linked with the ordinary schools, and, so far as possible, the myopes did some oral work with the normal children, the idea being that there should be no suggestion that the children belonged to a class of "defectives." The linkage worked well; but there have been difficulties. The fashion of teaching in the ordinary schools has changed; "individual study" is now the vogue. Children are expected to prepare work by themselves, which means much book reading. Except, therefore, for the connexion of the myopes with the communal life of the ordinary schools, the gain in the linkage has been lost. Also the natural tendency of enthusiastic teachers to think highly of their work led them to strive for classes to be grouped into definite self-contained entities or schools. Accordingly schools with several classes have been established. There were advantages in that the children could be better classified and the teachers specialized in their work. But there were disadvantages. The children were segregated, and to this the parents objected. The grouping of classes meant fewer centres geographically, so that children often had further to travel—this was bad for those with scarred eyes—and finally, the system has proved more expensive. This last drawback bids fair to cause a reversion to the original plan of having separate or, at most, two classes connected with an ordinary school.

The number of children who need this form of teaching is important. The most recent return for London shows that, out of 570,000 pupils in the elementary schools, there are 850 places in the sight-saving classes. To these should be added about 100 places in the myope classes in the higher education schools. This gives a total of 950 places, or about one sight-saving place for every 600 school children. Notwithstanding this provision, there are many high myopes retained in the ordinary schools, either because there is no sight-saving class near their homes or by reason of their age. We may therefore estimate the need as not less than one sight-saving place for every 500 school children. Estimates from the United States agree with this figure.

#### THE CLASS

The scheme of work is founded on common-sense principles. It is a return to primitive methods such as must have existed among our forefathers, when the wise one of the tribe taught the traditions of the fathers to the children, initiated them in the secrets of craftsmanship, and showed them how to make the tribal marks upon the walls of their huts and caves. There, in brief, is the scheme of the myope class. It is essentially personal, and lacking in that modern substitute for personal teaching, the book. Details of the curriculum will differ in different countries, but the general plan is the same. The work has three sides: (1) oral teaching, (2) written work, (3) handicraft. The classroom has one prime necessity—perfect natural lighting. Artificial lighting for these rooms is a negligible consideration. All work, other than suitable exercises, oral lessons, and games, should be suspended immediately artificial light is needed. The ordinary school desk is unsuitable; special ones have been designed having a full-sized blackboard suitably sloped, which can be converted by a movement into a horizontal table. A band of blackboard is fitted all round the walls of each room, at such a height that both teachers and pupils may use it. There are also continuous black screens fitted to rollers, like jack-towels, for extended vertical work.

It is a great benefit to myopic children if their oral lessons can be taken, at any rate to some extent, with the normal children. Their presence in the normal school has not been found a drawback, and the advantage to the myopes is great. In the myope class oral teaching should

be developed as much as possible. It requires thought and intelligence on the part of the teachers, but they agree that it adds zest and interest to their labours. When an oral lesson is completed, either in a normal school or the myope class, the written work should follow. The lesson is written out from memory on the blackboard, and the children are then questioned on it. Arithmetic is similarly practised on the blackboards, teacher and children working together, each on his own board. Special attention is paid to mental arithmetic, which facilitates the association in the mind of ideas of numbers without the adjuvant written symbols. Further, arithmetic is associated with practical work in handicraft. In the higher standards the need is felt for some permanent record of work. Exercise books consisting of large paper sheets are used; these are clipped to the blackboards and written upon with black crayon, free-arm fashion. The older pupils are encouraged to make permanent records of their work by printing. Rubber-faced types mounted on wooden blocks convenient for handling are provided, and over the paper on which the print is to be made are ladder-like frames, which give the necessary alignment and spacing. The record is permanent, and forms a class library of large paper books which is invaluable for teaching purposes.

Oral teaching is greatly enhanced by the use of models, objects of interest, and pictures. Some teachers felt that the optical lantern and the epidiascope would be of assistance to them, and the idea was put to the test in a series of lessons illustrating world-wide food production. The subject-matter of the lessons and the pictures were excellent, but the lantern show was a failure; the children did not see well enough to appreciate it. That this must be so can be demonstrated by putting spectacles fitted with + 3 D lenses before one's eyes: the sharpest pictures will be so blurred as to present little attraction. Further, there is no doubt that the brilliance of the screen in a darkened room is a source of fatigue to myopes. The use of the typewriter was similarly advocated for these classes. As a means of writing it is definitely less fatiguing than the pen, but, unfortunately, habits of thought amongst elementary school children and their parents are such that the use of the typewriter is linked with a future clerkship, a wholly unsatisfactory employment for a high myope. Typewriters are therefore not used in the myope classes connected with the elementary school.

Periodically there have been attempts to introduce printed books into these classes. Some educationists have urged that the loss of books is a serious handicap to the children; it has been said that the mental age as shown by Binet-Simon and similar tests is indicative of this. It may be admitted that these children average a year or so below age standards. This is due to the presence of children with scarred and defective eyes; the former have been ill and absent from school, while the latter rarely attain normal standards. Most of the myopes are up to the average. The admission of books, even of the best-printed large type, will not raise the general average, and from the medical point of view it is undesirable. The medical aim is to secure a good education for the children with the least risk, and at the same time to cultivate a life habit of *not* reading.

#### HANDICRAFT

Handicraft occupies a different place in these sight-saving classes from that which it holds in the normal or in the blind schools. In the normal school it is a side-show, of great interest to the children, but not counted as part of the serious work of the school. In the blind school its position is the antithesis of this: it is the main feature of the curriculum. The schools for the blind strive, from the outset, to make the child an efficient

worker. Without sight, craftsmanship is doubly difficult to learn and to carry on; hence the attention given to the early and continuous training in what will be the blind child's means of livelihood.

In the sight-saving classes handicraft is not taught as an apprenticeship to a life-long work. It is to the sight-saving class what Latin is to the public school—the one great training in care, precision, and control, and, I venture to think, a better one than Latin can ever be. The provision of a suitable and varied scheme of work is by no means easy. Consideration has to be given not only to the practicability of the work for classroom equipment, but also to its educational value and to its effect on the eyes. By the assiduity of teachers in the London classes a scheme of work has been drawn up which has proved of great value. It is not put forward as canonical; it is the outcome of the needs and experience of both teachers and children. Details vary as local conditions vary, and for this reason I do not propose to set out the scheme in full.<sup>10</sup> But the principles of the scheme may be outlined.

Handicraft has value in two directions—first, in training hand and eye, and secondly, in cultivating "association." Through handicraft the good teacher can impart something of history, of arithmetic, of geography, or of languages. In all our mental work there is some form of association. The written statement or the figured sum presents an association between symbol and idea. Most of us when calling up a memory see the incident, or the page of the book, or the written letter, as with our bodily eyes. In these sight-saving classes another association is taught—one that is certainly better for children whose eyes must be spared the strain of ordinary class-books, and one which is of greater educational value, if not so convenient—an association in materials, the use of material, and the process of making material objects.

Space does not permit description of the cultivation of the artistic and musical powers of the children, or of the organization of drill and games. These are of great value.

#### OCCUPATIONS FOR THE SHORT-SIGHTED

In the sight-saving classes the children are taught to take care in the use of their eyes, and the same care is inculcated in the choice of an occupation when leaving school. Teachers ascertain the types of occupation carried on locally, and talk to the children about them. Outdoor work is most suitable, especially work which involves standing and moving, and a minimum of close eye work. Health improves with the freedom from confinement, and the eyes, as barometers of the body, benefit accordingly.

Attached to each London school there is an after-care committee, the voluntary helpers of which do much to direct the children into suitable work. The medical officer of the school indicates to the committee any particular disability of the child. Children whose sight is especially delicate are notified to the care committees which deal with the blind and partially blind. These committees endeavour to put them in touch with occupations which they can still follow should their sight get worse.

All the children in the classes are regularly examined by the school doctor—as regards both physical condition and the state of their eyes—and detailed records kept.<sup>11</sup> Parents are encouraged to attend medical inspections, and periodically teachers invite parents to a reunion of the school, that they may be interested in the work of the pupils and may understand why such care is being taken of their children's eyes.

#### THE HIGHER EDUCATION OF MYOPES

The success of the sight-saving classes in the elementary schools led to the demand for similar facilities in the secondary and central schools. Some elementary school

children who were myopes were of exceptional ability ; some had gained scholarships, and it seemed both unfair and unwise to deny them the opportunities which were open to normal children. Six years ago myope classes were started in some higher schools of the London County Council ; there are now five classes for 100 children. Parents are warned of the risks of strain, they agree to remove their children if signs of strain be found, and they are warned that these facilities should not be considered as a stepping-stone to clerical employment after school days.

Most children admitted at the age of 11 have myopia of 4 to 7 D in the better eye, a much lower degree than in children in the elementary myope classes. Education is in each case modified according to the eye conditions. Certain children are allowed to read books with clear print for short and stated periods each day ; others with worse defects are allowed to read notes made with "bulletin" typewriters for a quarter of an hour twice a day. Children with high and progressive myopia are kept strictly to myopic regulations ; they do not read, but are read to by others. At three of the classes myopes are taught "touch" typewriting. The ribbon of the machine is removed, and two sheets of paper with an intervening sheet of carbon paper are inserted. The upper sheet shows no printing, the lower sheet, invisible to the child, receives the impress of the type. The results of these classes are, on the whole, good. The myopia often remains practically unchanged over a period of years, and at the age of 16 or 17 selected pupils are allowed, under sight-saving conditions arranged with different examining bodies, to sit for leaving examinations, in which they generally do well. The mean average increase of myopia per annum has been about 0.2 D. Much trouble is taken by the staffs of the different schools to obtain suitable occupation for these myopes. Many take up some branch of salesmanship ; others train in pharmacy, domestic science, farming, nursing, massage, or commercial travelling. Notwithstanding these efforts, nearly one-fourth have taken up unsuitable work, although the number who do so is decreasing. In the myope classes in the higher schools there are no children with scarred eyes or congenital defects—all are high myopes.

#### CONCLUSION

That these sight-saving classes, or myope classes, do meet a real need in the modern school system is certain. Thirty years ago ophthalmic surgeons were wont to forbid school to their highly myopic patients ; now they refer them for admission to a myope class, or, if one of these is not available, the parents are instructed in the simple principles which underlie these sight-saving classes. The work is found to be as practicable for home use, or for exceptional use at an ordinary school, as it is under the organized conditions of the London schools.

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- <sup>9</sup> Harman: *Trans. Ophthalmol. Soc. U.K.*, xlii, 20.
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## PREVENTION OF POLIOMYELITIS\*

BY

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The evidence presented on the mode of infection in poliomyelitis has established two important facts: first, that the disease is a particular form of infection of the upper respiratory tract ; and, secondly, that in harmony with other epidemic diseases of respiratory origin, the cases arising during an epidemic cover a wide latitude in degree of symptoms and pathological effects. There is a consensus of opinion among clinicians that the number of children suffering some degree of infection—the slight cases expressing themselves as minor illnesses only—is very large, being many times as great as the number that are frankly paralysed. The wide occurrence of the slighter forms of infection can be taken as a means, favourable in character, of delimiting the prevalence of the severer affection, since early experimental observations showed (Lewis and myself<sup>1</sup>) that any degree of actual infection, irrespective of whether muscular paralysis arose or not, protected the inoculated monkeys from the effects of a second administration of the virus.

Hence the investigation of the immunological phenomena in poliomyelitis became at once a rewarding field of experiment. The knowledge of the phenomena has become considerable during the twenty-year period of the experimental study of the disease, and the application of this knowledge to the prevention of epidemic poliomyelitis has met with encouraging results in the severe outbreaks occurring in New York State in 1931 and in Pennsylvania in 1932. I shall endeavour to give a short review of the main discoveries which have led to the practical achievements to be described. It must be explained, however, that I include in this statement certain later results bearing out the earlier ones presented, which were not available at the time when this lecture was originally delivered. It is sometimes advantageous to defer writing a lecture until the time of publication arrives, especially when, as in this instance, a new method has been under trial. During the intervening period the method may have been given a wider test, with results sometimes favourable, and, of course, sometimes unfavourable, to its employment. We appear in this instance to be in the happier situation, and while it is still too early to pass final judgement on available means of preventing poliomyelitis in the young during the prevalence of an epidemic, it is desirable that the nature of such means shall become widely known, since epidemic poliomyelitis continues to appear annually in some parts of America and Europe during the summer and autumn seasons.

#### EARLIER EXPERIMENTAL WORK

The observation of Lewis and myself, already referred to, that monkeys which had recovered from an attack of experimentally induced poliomyelitis—irrespective of its severity—were not subject to reinfection, led quickly to the testing of the blood of recovered monkeys and human beings for immune substances to which the protection might be attributable.<sup>2</sup> Tests made almost simultaneously in France, Germany, and the United States disclosed the existence in the blood, after recovery from the disease, of neutralizing, antiviral bodies. A mixture consisting of the virus of poliomyelitis and the serum of the blood was injected into monkeys. No symptoms of disease tended to arise from this injection, while mixtures of virus and normal monkey serum, or the serum of many

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