A STUDY OF SHORT-SICHT

IN

PUBLIC ELEMENTARY SCHOOLS.

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Since Cohn's investigation of the causes of short- sight and the striking evidence which he brought forward as to the part which Education played in ~~its production~~ connection therewith, we have been accustomed to regard the schools as the "hot bed" of myopia. In view of the apparently conclusive nature of the statistics obtained by Cohn after an examination of over 10,000 scholars in German Schools, supplemented , as these have been, by the work of Snellen, Priestley Smith, Straub (Amsterdam) and many other eminent ophthalmologists, one reads with something of surprise the memoir of Pearson and Barrington " A First Study of the Inheritance of Vision, and of the relative influence of Heredity and Environment on Sight". In this memoir, which was issued in 1909 under the auspices of the Eugenic Laboratory of London University, the authors have carefully analysed, by modern statistical methods, much of the evidence adduced in support of the generally accepted theory that short-sight is largely the result of Educational Environment. The statement is made that "This increase of myopia with age may be due to continued action of some environmental factor." Cohn's statistics, however, do not demonstrate, as has been assumed by many ophthalmological writers, that the school is the hot bed for the production of myopia" It is a

very interesting document throughout, but one in which the technique of statistical methods is somewhat confusing to the uninitiated. It is written by lay authors who have treated the subject from an entirely eugenic standpoint, but the ophthalmologist will find it difficult to accept some of their deductions. From this analysis of the "admittedly slender data" of their first study, and data which , the authors say are, for the purposes of modern statistical methods, not entirely satisfactory, they come to the following conclusions (among others) :-

I THERE IS No evidence whatever that overcrowded or poverty stricken houses are markedly detrimental to the children's eyesight, and that normal vision is, on the whole, slightly associated with overcrowding and bad economic conditions.

II THERE IS No sufficient or definite evidence that School environment has a deleterious effect on the eyesight of children.

Replying to some of his critics Dr Karl Pearson admits that all this has yet to be established and that the final word on these matters has not been heard, but, he adds, " I shall not be surprised to find, when further data are available, that the nation has been putting its money on "Environment" when "Heredity" wins in a canter."

By "Environment" it is assumed that Dr Pearson includes both home and School conditions.

It seems to me that the point is somewhat laboured, for it has never been seriously doubted that heredity is an important factor in the production of myopia. Priestley Smith says "if fresh cases of short-sight are created in one generation we may expect an increased predisposition to short-sight in the next" . A kind of vicious circle is established, so to speak, but it seems impossible to doubt, that even if there was no hereditary tendency, methods of education which postulate the use of the eyes at short distances would produce myopia. One is confirmed in this belief not only by the statistics already obtained by examining pupils in schools of varying grades, but also by the following facts :- I that myopia is exceedingly rare in primitive people; II that the proportion of myopes in civilised populations is in direct ratio to the educational pressure customary among them III and that in trades where the use of the eyes at short distances from the object is necessary (e.g. Lithographers) an exceedingly high proportion of myopes is found.

The causation of myopia is no doubt complex and careful statistics would possibly reveal the relative importance of the various factors. A great mass of material is being accumulated by the Medical Officers of Schools, but as regards eyesight much of it is worthless from the point of view of the ophthalmologist. In his first Annual Report the Chief Medical Officer of the Board of Education estimated that about 10 percent of the children in the elementary schools (who) "need treatment for visual defect",

P.S.

but how much of this is due to Myopia is not shewn.

So many important details call for attention in the routine Medical Inspection of [redacted] School Children that a careful study of any one defect is in many cases out of the question, and, in the matter of eyesight, many medical officers have not had the requisite experience to carry out special investigations into errors of refraction; but, [redacted] if only those more or less expert in ophthalmological methods would make a careful analysis of the cases, and include in their annual reports a detailed account of myopia, in the course of a few years a considerable amount of valuable material would be available.

Myopia, although not exceedingly common, is amongst the most serious of a school child's defects, and is one that has engaged the special attention of ophthalmologists for over half a century. Education Authorities [redacted] have become alert to the danger, and have acted more or less upon the advice which experts have given, with the results [redacted] that whenever that advice has been most closely followed, there has myopia been kept at a low level.

Stimulated by a suggestion of Professor Pearson that "an individual school or two must have all, - not only the defective - children examined and the eye-sight report must be accompanied by a sociological report" it occurred to me that I had at hand some fairly satisfactory means of making such a comparison.

The Borough of Hornsey in North London is one that for a number of years has enjoyed the distinction of having the

lowest annual death-rate of any large town in the Kingdom, viz, about 8 per 1000 (D.R. for all other towns averaged 14 per 1000). It has a population of 100,000 mostly "residential" but it has "good" and "bad" parts, which vary widely in the social status of the inhabitants. I was able to choose two districts with large modern schools in their midst where the home environments were quite dissimilar, but where the School conditions were identical.

In order to bring into relief the difference in these two districts, I give below some figures calculated from the current Health and School Reports.

	District, A. (Better class)	District, B. (Poorer class)
Population (about).....	9,000	13,000
Density of Population. Per Acre..	45	75
Death Rate.....	6.7	9.2
Birth Rate.....	15.0	25.2
Infantile Mortality per 1000 births....	None most years about 30.	79
Number of children found in verminous condition.....	4%	20%

In A, The houses are of the substantial villa class and modern. The occupations of the inhabitants are for the most part those which take them into the City and the skilled trades.

In B. The houses are older and many of them occupied by more than one family. The occupations of the inhabitants are for the most part "Unskilled"(carters, porters, gardeners etc, etc,)

The schools A and B are about 1½ miles apart; A is the more modern, but they are both well-built and well-equipped schools.

A has two departments Infants and Mixed.

B.has three departments Infants, Boys and Girls.

In both schools the Infants Dept is a separate one-storey building, whilst the senior dept is in a two storey building. The class rooms are built round a lofty and well-lighted central hall. The class rooms are all well lighted (left-hand illumination predominating in all cases) the window area is about one fifth of the floor space. The ventilation is by means of open windows, ventilating fire-places and Tobin tubes, Roof ventilators etc, and on the many occasions on which I visited these schools I have never had occasion to complain of the ventilation of any department in either school. (The [redacted] air analyses showed that the C O_2 rarely exceeded 5 parts per 10,000). Dual desks of a modern type are used, and have always been correctly placed with regard to the light.

The artificial light in A is electric: in B. Incandescent Gas Burners.

In fact as regards the school buildings, the conditions are almost identical and in both cases highly satisfactory.

As to the Educational regime. This is identical in each school. It is carried out by exceedingly competent teachers and was for years directed and inspired by a clear sighted Director of Education and a keen Medical Chairman of the Education Committee and School Board.

For the purpose of my paper the essential details of the regime are :-

(a) No slates are used and all writing is by black ink on white paper with faint ruling. The style of writing is almost vertical with slight inclination to the right.

(b) The black-boards are of dull black plain surface. The chalks are multicoloured but mostly white.

(c) Home-work is only given in standard IV and upwards, but only then if the teacher is satisfied that the home conditions are favourable.

(d) "Sewing and knitting" is allowed in the Infants' or Polimet Departments for the older girls only, but is a "discretionary" subject, and permission of the Education Committee has first to be obtained. The present Head Mistresses were appointed some years ago, and I am informed that very little sewing has been done in the Infants Departments for several years, and that whenever it is allowed, only the largest and simplest stitches are made.

(e) No writing or sewing is permitted when the light is bad.

(f.) no child is allowed to attend School until 5 years old.

So far as I have been able to judge during nearly 3 years of constantly visiting these schools, these rules are faithfully carried out and the teachers are fully alive

to the conditions tending to produce myopia and are ever on the alert to obviate them as far as possible.

I may add here , that about five or six years ago Dr Harold Coates, the School Medical Adviser to the Education Committee caused all children in these schools (senior departments) to be tested with Snellen's Types at 20 feet, and warning notices were sent to the parents of all children who could not read $\frac{6}{9}$ full.

On the whole I should think that few schools in England have been more fortunate in supervision than the two schools here mentioned.

It will be seen therefore that [redacted] all the children examined were under practically identical school environment. The home environment and general social conditions were however, quite dissimilar.

The method I persued was as follows :- A specially printed card was used for every child examined .

Copy of card.
Front.

School..... Class.....Age.....Sex.....

Name..... Address.....

Environment.....

.....

.....

General Health and Previous History.....

.....

Parents' History re Vision.....

.....

Remarks.....

Back.

Ex. Eye Conditions.....

.....

.....

R.E.	R.E. L.E.
Vision.....	Refraction.....
L.E.	.....
.....	.....
.....	
R.E.	Vision with Correction...
Fundus.....	.....
L.E.	.....
.....	
.....	

The teachers filled up all the details they could, and gave a general idea as to the home environment under the heading "Good", "bad", or "indifferent". This I amplified after consultation with the head-teacher or the School Attendance Officer and from my own observations. The history as to the parents' sight was obtained as follows - Each child wrote on a slip of paper the enquiry for his or her parents, "Does mother or father wear glasses, and if so, do the lenses magnify or diminish when held a little way from an object?. (The way to test was demonstrated by the teacher to each class.) The information was generally clearly given, but in some of the cases the parents were in doubt and on investigation these proved to be where low cylinders were used.

Where a child was found to be myopic a careful investigation of the question of parental myopia was made in

each case by myself. The greatest pains were taken to ensure accuracy on this point.

The child's vision was then examined (each eye separately) at a distance of 20 feet from Snellen's Types placed in a very good light. If the weather was in any way dull the test was postponed. All children who could not read $\frac{6}{9}$ full (each eye) , and all the children of myopic parents, were roughly refracted in an improvised dark room and the fundus examined by the direct method. A mydriatic was not used, but as all the myopic cases, who had not spectacles, were advised to seek treatment at once I was enabled to confirm my diagnosis in practically all the cases.

I tabulate first of all the results in so far as they concern the incidence of myopia.

TABLE I.

(Both Schools taken together.)

Number of children examined in both Schools....	1458
Number of children examined in both Schools and found myopic.....	29
or Approx.	2%
Number of BOYS examined in both Schools.....	768
Number of BOYS examined in both Schools and found myopic.....	10
or	1.3%
Number of GIRLS examined in both Schools.....	690
Number of GIRLS examined in both Schools and found myopic.....	19
or	2.75%

N.B. Percentage of myopia amongst the girls is more than twice that amongst the boys.

TABLE II

Cases of Myopia analysed according to their position in the School. (Both Schools taken together)

CLASS	NUMBER EXAMINED	NUMBER of CHILDREN WITH MYOPIA	PERCENTAGE OF CHILDREN WITH MYOPIA.
I	303	1	.5
II	314	5	1.6
III	225	4	1.8
IV	234	3	1.3
V	190	6	3.2
VI & VII	282	10	3.6

TABLE III

Cases of Myopia analysed according to age.

AGE	NUMBER EXAMINED	NUMBER OF CHILDREN WITH MYOPIA	PERCENTAGE OF CHILDREN WITH MYOPIA
7	53	0	0
8	231	3	1.3 approx.
9	262	4	1.5 "
10	244	7	3.0 "
11	233	3	1.3 "
12	222	3	1.3 "
13	163	8	5.0 "
14	39	1	2.6 "

The Tables showing the incidence according to position in the Schools exhibit increasing percentages in the higher classes. The curve is certainly more regular than the increase with age. The exceptional rise at the age of 13 years was accidental as there were several girls found at this age who had worn concave spectacles for periods varying from 2 to 4 years.

TABLE IV

Comparison of the TWO Schools.

SCHOOL	TOTAL NUMBER EXAMINED	NUMBER AND PERCENTAGE OF CHILDREN WITH MYOPIA	NUMBER OF BOYS EXAMINED	NUMBER OF BOYS WITH MYOPIA	NUMBER OF GIRLS EXAMINED	NUMBER OF GIRLS WITH MYOPIA.
A. (Better class)	607	16 2.6%	319	6 1.9%	288	10 3.4%
B. (Poorer class)	851	13 1.5%	449	4 0.9%	402	9 2.2%

It will be seen that the incidence of myopia in A is much greater than in B. This is so in the case of the boys and of the girls.

TABLE V

Showing the numbers and percentages of children with defective vision(all kinds)

SCHOOL	TOTAL NUMBER EXAMINED	NUMBER OF CHILDREN $\frac{6}{12}$ OR LESS EXCLUDING MYOPES	PERCENTAGE	NUMBER OF CHILDREN $\frac{6}{9}$
A. (Bedminster)	607	61 or 10%	2%	105 or 17.3%
B. (Poor's Close)	851	93 or 10.9 %	2.5%	141 or 16.5%

This Table shows that the percentage of children with defective vision from all causes (excluding Short-Sight) was approximately the same in both schools.

TABLE VI

EXTERNAL EYE DISEASE.

SCHOOL	NUMBER OF CHILDREN EXAMINED	NUMBER OF CHILDREN		NUMBER OF CHILDREN		NUMBER OF CHILDREN CORNEAL OPACITIES.
		STRABISMUS	PERCENTAGE	~~BLEPHARITIS~~ BLEPHARITIS	PERCENTAGE	
A.	607	9	1.5%	12	2%	0
B.	851	16	1.8%	22	2.5%	2

TABLE VI. Shows the comparison of the two schools as regards external conditions of the eye. B. is somewhat worse than A, but not markedly so; in fact, except for the squints and the two corneal opacities all the ~~diseases~~ defects were trivial.

Among all the 1458 children examined there was no instance where even a suspicion of Congenital Syphilis was present.

? corrected or not.

TABLE VII

THE MYOPIA CASES.

CASE	NAME	AGE	SEX	SCHOOL	CLASS	VISION R	VISION L	GLASSES	APPROX. REFRACTION	FUNDUS	PARENT'S REFRACTION	INTELLIGENCE	HOME ENVIRONMENT	GENERAL HEALTH.	Remarks.
1	M.S.	11	F	A	V	6/18	6/18	Yes	-2 sph -1 cyl 0°	normal	Father myopic	good	excell.	good	Brother myopic.
2	D.B.	14	F	A	VII	6/24	6/18	Yes	-5 sph -1 cyl 0°	slight crescent each eye	-	good	excell.	good	--
3	O.A.	13	F.	A	IV	6/9	6/18	No	-2	normal	Father myopic	good	excell.	good	Divergent Strabismus.
4	H.H.	13	F	A	VII	6/18	6/18	No	-2 sph +1 cyl 90°	normal	Father myopic	good	good	good	
5	M.H.	13	F	A	VII	6/18	6/9	No	-.5 sph -2 cyl 0°	normal	-	good v.clear	poor	good	
6	A.T.	12	F	A	VI	6/60	6/60	yes	-7	crescent each eye	?-	good	v.poor	good	Sister to 7
7	P.T.	10	F	A	V	6/60	6/60	Yes	-5 sph -1 cyl 0°	do	?-	good	excell.		Sister to 6.

Continued:-

CASE	NAME	AGE	SEX	SCHOOL	CLASS	VISION R.	VISION L	GLASSES	APPROX. REFRACTION	FUNDUS	PARENT'S REFRACTION	INTELL-IGENCE	HOME ENVIR-ONMENT	GENERAL HEALTH	Remarks.
8.	D.G.	10	F	A	IV	6/18	6/18	No	- 3	normal	Father myopic	good	excell.	good	
9	M.B.	9	F	A	III	6/60	6/60	Yes	-6	crescent each eye	Aunt has myopia	good	good	good	
10	R.C.	8	F	A	II	6/18	6/18	Yes	-5	normal	--	good	good	good	
11	J.C.	8	M	A	II	6/24	6/24	Yes	-2 / -1	normal	Father myopic	good	good	good	Sister in class IV - R eye M L " H Case 5 Table VIII.
12	L.L.	10	M.	A	V	6/9	6/12	No	-1=-2e0°	normal	?	good	good	good	
13	S.D.	10	M	A	III	6/60	6/60	Yes	- 6	slight crescent	Father myopic.	slow	fair	good	Brother myopic hot in School.
14.	E.L.	10	M	A	III	6/12	6/9	No	-1=-2 / =2 e 0°	normal	do	fair	fair	good	Brother myopic

Continued :-

CASE	NAME	AGE	SEX	SCHOOL	CLASS	VISION R	VISION L	GLASSES	APPROX. REFRACTION	FUNDUS	PARENT'S REFRACTION	INTELLIGENCE	HOME ENVIRONMENT	GENERAL HEALTH	Remarks.
15	A.L.	13	M	A	VI	6/60	6/60	No	-6	slight crescent each eye	Father Myopic	slow	fair	good	Brother Myopic
16	W.J.	11	M	A	V	6/60	6/60	No	-6	do	do	fair	V good	good	
17	S.D.	9	M	B	II	6/60	6/60	No	-6	slight crescent	-	poor	good	good	
18.	J.M.	12	M	B	III	<6/60	<6/60	Yes (6 years)	-11	Myopic ring	Father myopic	poor	bad	fair	3 sisters myopic 2 in school. Cases 25-9-26
19.	J.R.	10	M	B	V	6/60	6/60	Yes	-5	Slight crescent	-	good	good	good	
20.	W.S.	13	M	B	VII	6/36	6/36	Yes	-4	normal	Aunt myopic	good	good	good	
21	S.H.	13	F	B	VII	<6/60	<6/60	Yes 2 years	-14	Myopic ring &c.	Father Myopic	good	bad	Anaemic.	
22	M.D.	13	F	B	VII	6/60	6/60	No	-5	normal	-	good	good	good	

Continued :-

CASE	NAME	AGE	SEX	SCHOOL	CLASS	VISION R	VISION L	GLASSES	APPROX. REFRACTION	FUNDUS	PARENTS REFRACTION	INTELLIGENCE	HOME ENVIRONMENT	GENERAL HEALTH	Remarks
23	H.H.	13	F	B	VII	$<\frac{6}{60}$	$<\frac{6}{60}$	Yes 3 yrs	-8	crescent	-	good	V.good	good	
24	H.G.	12	F	B	VII	$<\frac{6}{60}$	$<\frac{6}{60}$	Yes 1 year	-6	slight crescent	Mother myopic	good	V.good	good	
25	G.M.	10	F	B	V	$<\frac{6}{60}$	$<\frac{6}{60}$	Yes 3 years	-8	crescent	Father myopic	fair	bad	fair	Sisters to Case 18
26	G.M.	8	F	B	I	$\frac{6}{24}$	$\frac{6}{24}$	Yes 1 year	-3	normal	do	fair	bad	fair	
27	E.H.	9	F	B	IV	$<\frac{6}{60}$	$<\frac{6}{60}$	Yes 1 month	-10	crescent	-	V.good	V good	fair	
28	N.J.	9	F	B	II	$\frac{6}{12}$	$\frac{6}{12}$	Yes 1 year	-2	normal	-	fair	good	good	
29	F.F.	11	F.	B	V	$\frac{6}{36}$	$\frac{6}{36}$	No	-5	normal	-	good	V.good	Anaemia & Debility	

All the children were of British Parentage.

The estimate of the refraction must be taken as very roughly approximate as it was arrived at by estimating ~~through~~ the strength of the lenses(where glasses were worn) and in other cases by the direct method and without cycloplegia.

TABLE VIII

Children who were found Myopic in one eye only.

CASE	NAME	AGE	SEX	SCHOOL	CLASS	VISION R	VISION L	GLASSES	APPROX. REFRACTION R	APPROX. REFRACTION L	FUNDUS	PARENT'S REFRACTION	INTELLIGENCE	HOME ENVIRONMENT	GENERAL HEALTH	REMARKS
1	L.D.	14	F	A	VII	6/9	6/60	No	+1.5	-7	R Normal L slight crescent	-	good	good	good	
2	D.D.	13	F	A	V	6/24	6/12	No	-4	+2	Normal both eyes	-	good	good	good	
3	K.B.	11	F	A	IV	<6/60	6/9	~~Yes~~ No	-14	+2	R.Myopic Ring. L.Normal	Father Myopic. Lithographic Artist	V.good	V.good	V.good	
4	V.G.	10	F	A	IV	6/60	6/9	Yes	-9	+1	R.Crescent L.Normal	-	V.good	V.good	good	
X 5	N.C.	10	F	A	IV	<6/60	6/9	Yes	-10	+1.5	R.Marked crescent. L.Normal	Father myopic	good	good	good	
† 6	R.G.	11	M	A	IV	6/6	<6/60	Yes		-11	R.Normal L.Choridal atrophy	do	good	good	good	
7	R.S.	12	M	A	V	6/12	6/9	Yes	-2	-1 +5e90°	Normal	-	good	good	good	

I give the foregoing list (Table VIII) in order to complete the enumeration of the myopic cases. The etiology of such cases seems obscure and difficult to explain but I have indicated the association of two with other cases of myopia. Heredity seems to have been a factor in three of them.

It has been suggested that trauma either with forceps at birth or otherwise, is a likely cause. I did not make any careful enquiries on this point.

It is curious to note that all these "odd" cases occurred in the one school (The better class).

I might add here that the refraction is very roughly estimated, being judged in many cases from the glasses worn (or ordered subsequently) and in the other cases as near as I could get by the direct method without cycloplegia.

Perhaps the first thing that will strike one in examining these tables is the small number of myopic children discovered viz, only 2 per cent. In his examination of 1,100 children in Birmingham Elementary Schools, Priestley Smith found myopia present in 6 per cent.* Cohn in 20 Elementary Schools in Germany found 6.7 per cent.

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* Priestley Smith included in this figure all children who were myopic in one or both eyes. I have kept them separate, as probably being due to a different etiological factor. I found 7 of these cases, so that even had I included them the percentage would still have been under 2.5.

I believe this low figure is due to the fact that the part which the School plays in the production of myopia has been reduced to a minimum in the schools in question by careful attention to detail. It will be seen that the percentage in what I will call, the better class school (A) 2.7 compared with 1.6 in (B). This is in accord with Pearson's contention as to bad home environment being slightly related to better vision. I imagine this is due to ~~the better~~ indirectly prejudicial effect of the good home environment in the production of myopia; for it will be seen on reference to Table (V), that, as regards the totals of defective vision, they are practically identical. As usual, the girls had a much higher percentage of myopia than the boys, - in fact, more than double. This ratio coincides approximately with that which Priestley Smith found.

The larger percentage of myopic cases among the girls I believe is to be attributed in a large measure to the fact that they are more accustomed to use their eyes at near work, e.g., sewing, reading, both in and out of school hours, and that even in the poorer homes they are kept more indoors than the boys.

I think one of the reasons why the incidence of myopia among the girls of the School A, is 3.4 per cent as compared with 2.5 per cent in B is that a larger number of the girls in the former school spend much time at home in the evening in music lessons and practising at the piano, and doing fancy sewing work. Practically all the myopic girls in this school were so occupied.

HEREDITY. One of the chief points I wished to determine by my investigation was the relative importance of this factor, and certainly the result is very striking. I have given a detailed list of all the myopic cases found in the schools, and it will be

seen that a considerable number were children of myopic parents.

Of the 29 cases discovered, 14 (approx. 50%) had this family history and in 5 of the others it was possible. In two of the latter cases the child had a myopic aunt.

It is a remarkable fact that of the 6 cases of myopia amongst the boys in the "better class" school A, no less than 5 had a myopic parent. In only one case was the myopic parent the mother.

In two or three instances there was more than one child in the same family who was myopic, and I discovered one family of 4 (three girls and one boy) all myopic. They were the children of a highly myopic father who was a clinical thermometer graduater and who attributed his short sight to the fine nature of his work.

I give below a table showing the number and percentages (of the whole) of the myopic parents in each school.

TABLE IX

SCHOOL	TOTAL NUMBER OF CHILDREN	NUMBER of PARENTS WITH MYOPIA.	
		NUMBER	PERCENTAGE
A	607	36	5.9
B	851	33	3.87

Of the 36 children in School A, who had a parental history of myopia , 9 (or 25%) were found to be myopic. In School B, out of 33 children the number was 7 or 30%.

Upon what then does the very marked incidence of myopia in SchoolA over School B depend.? Is it in the School environment? I have shown that in both Schools this is identical.

Is it due to hereditary predisposition? This is a more difficult question to answer. Had there been the same percentage of children with myopic parents in B as A there would have been 50 such children instead of 33. If 25% (see foregoing table etc) of them had become myopic, then instead of 7 cases as possibly due to heredity we should have had 13 (assuming this heredity factor to have the same value). Then instead of B having 13 cases of myopia it would have had 19. This figure would give a percentage of 2.3 in School B, thus approximating very ~~clearly~~ closely to the 3.7 of School A.

In School A, ~~M~~there were 16 cases of myopia of which 9 or 56% had a parental history of the defect.

In School B, there were 13 cases of myopia and of these 6 or 46% had such a history.

Analysing the sexes in this way we find that of the 19 myopic girls 9 or 43% had parental history of myopia. Of the 10 myopic boys 6 or 60% had such a history.

It must be here stated that these percentages are calculated on the cases where the parental history was absolutely certain In 4 others there was a history of "shortsight" but owing to the death of the parent in question, or for other reasons, it was impossible to verify the statement. In one of these instances where the child had neither father or mother, the aunt appeared and was wearing concave glasses of about - 6 dioptors. It will thus to seen that I am not overstating the heredity factor.

I am certainly of the opinion therefore that this does in a great measure account for the comparative excess of myopia in

School A. It does not account for the whole of it, however.

It will be observed on reference to the Table VII that practically the whole of the children come from homes where the environment is marked "good" or "very good." Not one of them lived in a home occupied by more than one family and I came across no instance of vice or debauching in any of the parents, and this supports the contention that myopia is more prevalent among the better housed population and has no relation to poverty.

In more than half the cases no history of myopia in parents, grandparents, aunt or uncle could be obtained, and obviously heredity had no influence in these. Heredity can certainly not account for the universally found excess of myopia in girls, and I personally entertain no doubt that the difference in the School Curriculum (sewing etc.) and especially the exercise of these occupations at home, in a great measure tends to bring about the result.

I believe that for some years this heredity factor will be the most important one in the myopes to be found in the well conducted schools, but it should be a gradually diminishing one if we adopt all the preventive measures which experience proves to be so effective. In the meantime the children of myopic parents require the utmost care and supervision.

It is interesting to note that about 25 per cent of the children of myopic parentage became short-sighted - this figure was practically the same in both schools. TABLE IX indicates further that this heredity factor was much more in evidence in the better class school. That the father was so frequently found to be the myopic parent was no doubt accounted for by the fact that a man's need for concave glasses is occasioned more frequently than a

woman's. Of all the parents reported as myopic only a small minority were mothers.

A study of the foregoing facts leads me to the following conclusions :-

1. That there is evidence to shew that there is a greater incidence of myopia among the children of the well-to-do than among those less fortunately circumstanced. That this is in some measure due to the better economic conditions rendering possible the children being occupied (out of school hours) in pursuits which postulate near vision.

2. That heredity is an important factor in the production of the myopia which exists in modern and well-conducted elementary schools, but that there is still a large number of cases in which heredity appears to play no part whatever.

3. That about 25 per cent. of the children of myopic parentage become myopic during school life.

4. That among the well-to-do children there is a higher percentage of parents who are myopic.

5. That in schools constructed according to modern ideas of correct lighting, ventilation, etc., where strict attention is paid to hygienic conditions, and to the preservation of good sight, myopia is not very common, as compared with that which existed in schools examined twenty or thirty years ago.

I do not apprehend that Dr. Pearson's brochure will tend in any way to diminish the efforts of Ophthalmologists to check the danger of myopia which would result from faulty methods of education.

The case against the older schools and older methods is too strong to be easily shaken. On the contrary I think it may be taken as a warning of the greater care that should be taken to control this, important, predisposing cause of myopia. I am

strongly of the opinion that wherever there is a history of myopia in the parent the child should be the object of the most careful supervision by the teacher and the doctor, and a careful examination of his eyes should be made at least once a year, to detect and if possible to remedy any departure from the normal. I would prohibit all sewing in the infants school altogether, and homework (in all departments) where there was any tendency, hereditary or otherwise to shortsight.

Despite of all the care taken for the preservation of good sight whilst the child is at school, these efforts are frequently stultified by the children coming under the worst possible conditions when they reach home. These bad conditions wherever they exist are greatly intensified in the dark winter evenings, and efforts should be made to awaken in the parents a lively sense of the danger their children are running if the methods practised in the school are not carried out when the child studies at home.

I cannot claim great originality for any idea or conclusion at which I have arrived, but the investigation here detailed is a true record of the myopia as it exists in these two schools and I have taken every possible care in order to ensure the accuracy of the figures given.

Owing to the nature of my other work this enquiry was spread over several months and I have to acknowledge with sincere thanks the kindness and forbearance of the teachers with whose work I interfered, their ever ready help, and the interest they took in getting so much information for me.