

**Influences of school life on eyesight : being the substance of a lecture delivered before the Sheffield and District Certificated Teachers' Association, on January 12th, 1884, and published at the request of the Committee / by Simeon Snell.**

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INFLUENCES OF SCHOOL LIFE  
ON  
EYESIGHT.

BEING THE SUBSTANCE OF  
A LECTURE  
DELIVERED BEFORE THE  
SHEFFIELD AND DISTRICT CERTIFICATED TEACHERS'  
ASSOCIATION,  
ON JANUARY 12th, 1884,  
AND PUBLISHED AT THE REQUEST OF THE COMMITTEE.

BY  
SIMEON SNELL,  
*Ophthalmic Surgeon to the Sheffield General Infirmary.*

Reprinted from "Health" by  
WYMAN & SONS, 74-76, GREAT QUEEN STREET,  
LINCOLN'S-INN FIELDS, W.C.

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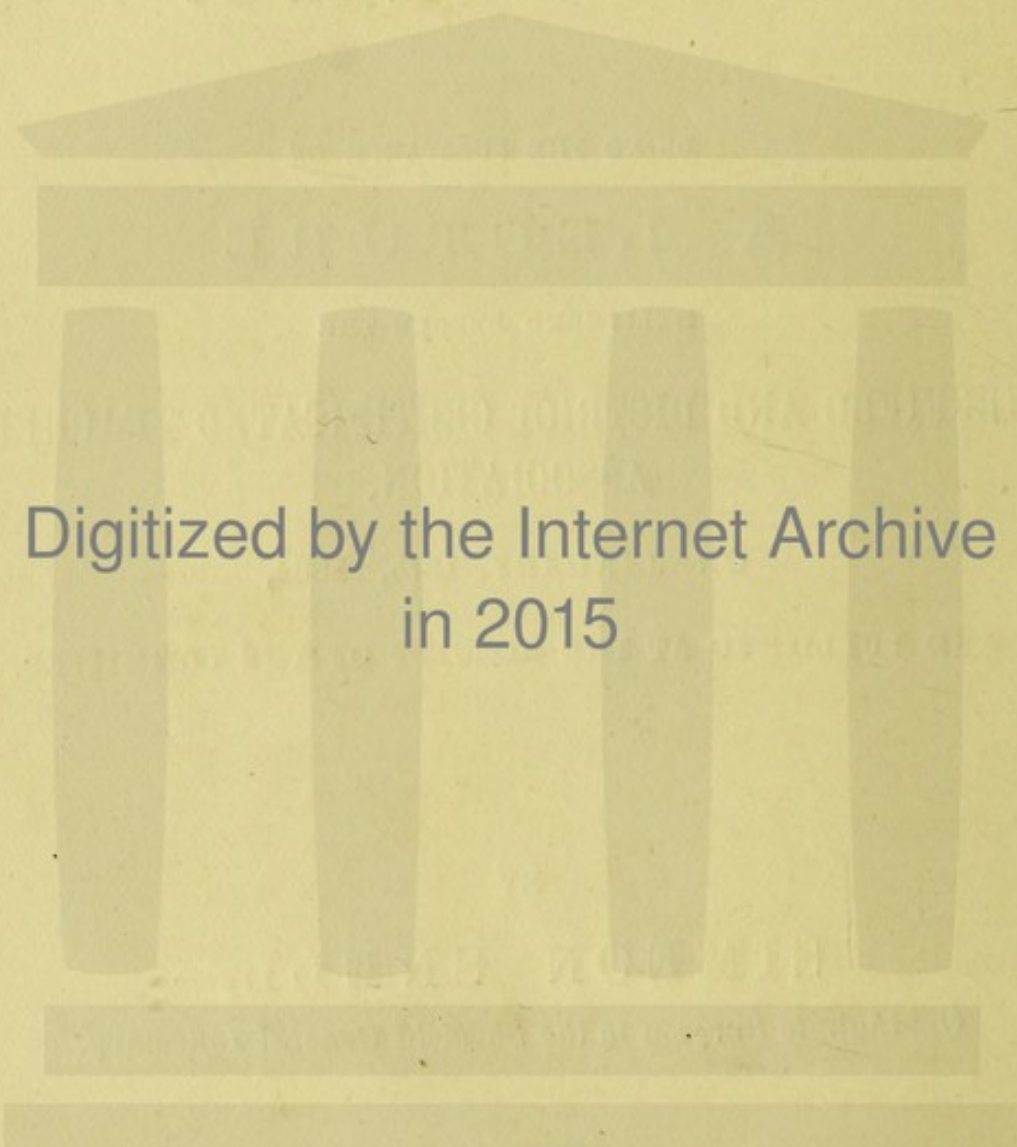
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## INFLUENCES OF SCHOOL LIFE ON EYESIGHT.

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MUCH is said nowadays as to the effects of over-pressure in our educational systems. Many of our readers will, however, recollect that, important as this subject undoubtedly is, it is by no means new. For Charles Dickens, as he recognised and so vividly portrayed the bad housing and overcrowding of the poor, with the attendant evils, just now deservedly commanding attention from the legislature, no less forcibly delineated the effects of "hot-house" and the "forcing system" of education on the youth of his time. Many will thus recall the circumstances attending the selection of a school for little Paul, in "Dombey and Son," and how one was chosen, where, as Mrs. Pipchin expressed it, "there is nothing but learning going on day and night," and the description of this Dr. Blimber's establishment, its inmates, and the modes of teaching pursued. "Nature was of no consequence at all," and it is asserted of young Toots, that "when he began to have whiskers he ceased to have brains." Here is to be found, expressed in the great novelist's own unequalled style, much of what the to-day school reformers would themselves assert.

In these pages, however, it is only intended to draw attention to the influences exerted by school life on eyesight. Over-pressure, it may at once be mentioned, like other causes acting prejudicially on the health of the scholars, will aggravate the evil tendencies to be alluded to.



In the normal eye, distant rays of light are brought to a focus on the retina, and for near objects, with the aid of what is called accommodation, by increasing the convexity of the lens, this is still the case. In the myopic or short-sighted eye, the pencil of light meets, however, in front of the retina, whilst in the hypermetropic, or long-sighted, the point of union is behind the retina. Besides these, there is a third deviation, called astigmatism, in which the curvature of one meridian is different from that in the other. The effects resulting from this last-named condition are relieved by the employment of the appropriate spectacles (cylindrical), and we shall not have occasion to particularly refer to it, separately from the other "errors of refraction" I have mentioned.

The eye naturally seeks after a clear image, and it will be at once evident, that with the long-sighted—if we consider this condition first—under ordinary circumstances this cannot be obtained. For the hypermetropic child is only able to bring the rays of light to a focus on the retina by an extra use (strain) of the focussing muscle; this it is enabled to accomplish for a time, but after a longer or shorter period, according to the degree of the defect, with comfort it is no longer possible. Then, after reading, the print in the book or, in working, the stitches in the garment run all together, become indistinct, the eyes tire, and the child seeks relief by closing the eyes; again, however, on resuming its task the symptoms recur. This constant strain is without doubt, causing as it does congestion of the globe, of detriment to the eyeball, and the nervous irritation becoming reflected is a frequent source of the headache so common among school-children. The symptoms mentioned are relieved by properly-correcting convex spectacles. And then there is no reason why the long-sighted child should not become a good scholar. In such a case as has been portrayed, sometimes, instead of the little muscle performing the focussing of the eye becoming relaxed, when the eye is no longer intent on near work, it remains constantly on the strain, a condition of "spasm" being produced, and causing a fictitious short-sightedness. If a qualified surgeon has not seen



such a case, but has been supplied by an optician with concave glasses, the state is, of course, rendered worse. It is thought that this condition is more common of late, owing to the constant pouring over fine, near work required under our educational system. It may be mentioned also that perhaps 90 per cent. of the cases of ordinary squint observed in children is dependent on the flat condition of the eye. Avoiding the straining spoken of, and causing them to be occupied with large objects, and, when convenient, the adaptation of the suitable spectacles, would lessen the number of squinting children which our elementary schools do so much to cause.

Longsightedness is always congenital, but its converse, shortsightedness, is either so or acquired. Be it, however, one or the other, once present, it is prone, especially in early life, to become increased in degree. It may be looked upon, also, as a direct result of our civilisation; and it is in the production and aggravation of this condition that the influences of school life exert their most baneful effects, and with which our remarks have more particular reference. The prevalence of short sight among the Germans is well known, and it may earnestly be hoped it may be long before a similar frequency exists in our own country. Still, it is generally held that shortsightedness is on the increase among us, and that school life is an important factor in its causation; and, once occasioned, this affection is liable to become aggravated as long as the prejudicial conditions surrounding the scholar remain. The long continuance of vision for near objects, in, it may be and indeed often is, children with brain and body fatigued, occasions and increases it. The muscles producing the convergence necessary for this near work are kept tense, and exert a degree of pressure on the eyeball, and, as a result, the globe yields and becomes lengthened, the congestion which this convergence also causes facilitating the process. The effects of studious habits on this complaint were recognised as long ago as 1812, by Ware, and, whilst he examined 1,300 children at the Chelsea Military School, and discovered only three inconvenienced from shortsightedness; at the



colleges at Oxford and Cambridge he found it very prevalent. In one college at Oxford, 32 out of 127 members wore spectacles or hand-glasses. Within recent years, more exact statistics have been furnished by observers in different countries than it was possible for the distinguished oculist of that day to contribute. Dr. Cohn, of Breslau, in this way examined 10,060 pupils, of which number 1,486 were in village schools and 8,574 in town schools. Ten per cent. of this whole number were shortsighted. Divided into classes, the proportion is of peculiar interest. Thus:—

|   |      |
|---|------|
| In 5 village schools the percentage was ..... | 1·4  |
| „ 20 elementary schools.....                  | 6·7  |
| „ 2 higher girls' schools .....               | 7·7  |
| „ 2 middle schools .....                      | 10·3 |
| „ 2 royal schools .....                       | 19·7 |
| „ 2 gymnasia .....                            | 26·2 |

The rise in percentage in the higher schools will have been noticed. At St. Petersburg, also, Erisman examined 4,358 pupils. Among those employed two hours daily he found a percentage of 17·7, those working four hours 29 per cent., those working six hours 40 per cent.

Statistics such as these by competent observers in all parts could readily be added to were it necessary, or did the limits of these pages permit it. It may be well, however, to recall the fact that among races with very elementary or no education the percentage of short sight is very small. Savages are, of course, noted for their wonderful range of vision, and Mr. Macnamara has stated that he examined a large number of Hindoos and found myopia practically absent. Among negros, again, the percentage is stated to be very small, and, moreover, those who, for statistical purposes, have examined the eyes of the newborn, assert the infrequency of short sight at that early period.

Let us now pass to the consideration of circumstances incident to school life which act prejudicially on vision, and of the means which may mitigate or overcome them. Light and ventilation are of prime importance. Impure air, in crowded rooms, by its injurious influence on the pupils'



general condition, acts, also, on their eyesight. Light is a subject which it is necessary to refer to at greater length. It is not only of importance to have good *light*, and plenty of *light*, but light properly applied. Many of the modern elementary schools are substantially and handsomely built on the exterior, and, on the whole, perhaps conveniently so inside. In some instances, however, it would seem as if appearance and the architect's reputation had received more consideration than the purposes for which the building would be used. Certainly the question of lighting has not always been settled in a manner to be desired.

Light, then, in a school-room, it may be said, should be ample ; not, however, beaming full in the scholars' faces. The windows should be fairly high up, not lower than the height of the children, or the room may be lighted from above. If the windows be situated low, or reach to the floor, it will be advisable for the lower panes to be of ground-glass. The most suitable direction for the light to come from is the left and above ; for the reason that on the right side the hand being employed, the task or book before the scholar must otherwise frequently be in the shade. To employ the eye in a dim light, is in the highest degree injurious. All are aware of the discomfort occasioned by reading or working at dusk when the light is failing, and, moreover, the book has to be brought nearer to the eye, another disadvantage. If it is necessary to employ artificial illumination, the light should be ample and steady, and come from a proper direction. Something may be said as to the kind of light to be used, but it cannot be entered into now.

It seems hardly necessary to allude to what should be obvious, that the school-furniture should be adapted to the size and requirements of the pupils ; yet in some schools one regulation size seat and desk is employed for all scholars. Tall and short children are now indiscriminately mixed. The seats should be arranged according to stature, and not age. A teacher recently informed the writer that in his school one regulation-sized desk was employed for 800 of his scholars. Professor Snellen observes :—"It is



absolutely impossible that a tall and short boy will both sit equally well on the same seat and the same desk. It is just as unlikely as that the same clothes would fit the same pupils. Yet in many schools we find desks and seats of the same size for all."

The desks should have seats with backs to them, and the slope of the desks has been suggested as 40 deg. for reading and 20 deg. for writing. There are schools still in which seats are used unprovided with backs. This is not merely prejudicial to eyesight, but, as Mr. Liebreich and others have pointed out, an important means of causing spinal curvature, a condition not uncommonly arising during the period of school life. The extreme importance of the proper seating of the scholar can hardly be over-estimated, and has received much attention at the hands of such excellent authorities as Snellen, Liebreich, Cohn, Joy Jeffries, and many others. The reason is obvious when it is understood that work should be accomplished at a distance of ten to twelve inches from the eyes, and anything that pushes the pupil nearer his task is attended with risk of injurious consequences. The faulty construction of school-seats is responsible for the crooked and stooping posture assumed by many school-children, and in this manner encouraging the production of short sight.

From what has just been said, it will be evident that the methods employed in writing require careful consideration. The common slate so generally in use, has for long been recognised as unsatisfactory, owing to the little contrast between its surface and the pencil-markings. Moreover, the shiny surface encourages a bad position in writing, and when the slate has become greasy, the contrast between it and the pencil is considerably diminished. At any time, the contrast is much less than with black letters on a white surface, and it has been proved by experiments that letters written on a slate, to be equally legible, must be placed nearer to the eye than characters of the same size with pen and ink, on ordinary white paper, the difference being as much as three to four. Mention may be made of the minor evils of the noise of writing, and the sharpening of



pencils. At Zurich, Professor Horner suggested the abolition of slates in schools. In their place, he advised the employment of ink and paper. This was practically tested. Noise in the school was lessened; care in writing increased, on account of the difficulty of correcting faults, and it was found that the teacher could better guide the improvement of the scholar in the copybook. Pen and ink was exclusively used for nearly two years; but it was found that there were difficulties in commencing the teaching of writing in this manner; and for the younger children there were advantages in the use of slate and pencil.

The School Board adopted the resolution that pen and ink should be used as writing material, but that the teacher should be permitted to make use of slates for beginners in the first winter term. Professor Cohn adopted these conclusions, and, to obviate the evils complained of in the ordinary slates, has had manufactured white composition stone slates. These have a non-shiny surface, and a specially-prepared black pencil is used, the markings of which are easily erased with a wet sponge; or a soft lead-pencil may be employed. The slates are manufactured, also, with or without the surfaces ruled. The writer is practically acquainted with these slates,\* and has recommended to others their use.

The position assumed by scholars in writing has received a good deal of attention. Last year, Drs. Berlin and Rembold published, at Stuttgart, their "Investigations on the influence of writing on the eyes and attitude of school children."† Their observations are most valuable, and it will not be without interest to refer briefly to them. They recommend the retention of the slanting position of penmanship, and suggest the following rules for schools:—The inclination of the letters, *i.e.*, the angle which the downward stroke makes with a line perpendicular to the ruling

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\* To be obtained now of O. Newmann & Co., 40, Cheapside, London, E.C.

† The difference between the German and English letters must be borne in mind. The principle may be accepted.



of the paper, should be 35 deg. to 40 deg. The book should not be placed to the right, but as nearly as possible before the middle line of the body, and so inclined that the direction of the writing rises from the left and below to the right and upward at an angle of 30 deg. to 40 deg.; when in the proper position the downward stroke is perpendicular to the table's edge, and the centre of the line just being written opposite the median line of the body. The upper part of the body remains upright, supported by the spinal column, which is prevented from becoming tired by resting its lower part against a support. The transverse axis of the body—the line between the shoulders—is parallel to the lower edge of the table. An oblique position of the body is deemed unjustifiable; the head is lowered only sufficiently to obtain a suitable angle between the visual plane and the surface of the table. The body should not be pressed against the edge of the table, but kept at a distance of three centimètres from it. The elbows are kept a little lower than the edge of the table, and the fore-arms, and not the elbows, are laid on the table.

The necessary movements for the formation of letters and words must be performed by the fingers and wrist; the right fore-arm must not move its point of support as the writing moves outwards, but must revolve about it as a centre thus describing an arc upon the table. It is suggested that children should use short lines.

In consequence of the injurious results to the eyes of too close an approach in writing, these observers insist on the importance of young children being taught as much as possible from objects not requiring close vision. Instruction in writing should, at first, be as limited as possible; reading of distant objects (black board) should be first taught, then of books, and finally of writing, the time being very limited, and being followed by a pause; letters should be large, symmetry and beauty being of less importance; slanting lines of black boards and books should be omitted; writing at home curtailed as much as possible.

Too much writing for children is to be deprecated, and



impositions—a not uncommon mode of punishment—should be dispensed with. Dictation also serves but little good purpose, and would be better avoided.

The manner in which school-books are printed is a no less important matter than the position assumed in writing, the straining over small and bad type being in the highest degree injurious. Many of the school-books in use at present are well printed. Arithmetic books, however, with the pages crowded with figures, are, it is understood, among the worst, when they should be among the best. It is, moreover, evident that many of the books issued from the press are not what, hygienically considered, they should be. Much, too, of the cheap literature devoured by the young is only indifferently printed, nor, indeed, do the daily papers exhibit that care for clearness which, considering the number of eyes which pour over their columns, should be the case. Our endeavour for all school-books should be to provide fairly large type, clear and distinct, on good paper, and legible without difficulty, neither should the books be too heavy. The paper should be toned, as more comfortable to the eye than the greater contrast of purely white paper and black letters.

Javal published some short time since his very valuable observations on "The Physiology of Reading." He discovered the interesting fact that in reading, the point of fixation runs horizontally along the upper part of a line, cutting the letters just below their tops. The other parts are seen indirectly by those parts of the retina at a greater or less distance from the centre. The accuracy of this fact is readily demonstrated. It is far easier to read the upper half of a line, the lower part being wanting, than when the upper half is absent and the lower present, as the following sentence will show:—

To test this the reader will see that  
this sentence will be much more easily  
read, the lower half being wanting than  
this where the upper half has been removed.  
And special words are not chosen, nor is  
special type selected.



Taking into account the frequency of capitals, the dots, and long letters, it is found that out of 100 exceeding the line, 85 project above and 15 below it. Above the line are all capitals, the dots of i and j, and the letters b, d, f, h, k, l, t, whilst below are g, j, p, q, y. From this fact Javal suggests such alterations in the letters that the upper parts would be clearly distinguished, as the eye runs horizontally along; the tails of the letters below the line he would alter slightly as well. Extended lines are distinctly hurtful, and therefore short lines should be preferred. The change of focus in following long lines is annoying, as well as injurious, as the readers of old quartos well know. It has been suggested, as a further improvement, that some day we may read from right to left and follow the succeeding line from left to right. The next sentence is printed in this manner :—

“ There is not a proclamation of  
 Napoleon to his soldiers in which  
 glory is not mentioned, nor one in  
 which duty is alluded to ; or an order of Wellington to the  
 troops in which duty is not incul-  
 cated, nor one in which glory is  
 mentioned.”

But whatever advantages may be supposed to attend such a method of printing, it is evident that at first the reading of it would be by no means easy.

The same sentence is now printed in columns in the manner adopted by Eastern peoples (Chinese, Japanese), but with them a single symbol represents a distinct idea. In reading, commence at the right at the top, and continue downwards :—



|             |            |              |
|-------------|------------|--------------|
| to          | mentioned, | There        |
| his         | nor        | is           |
| troops      | one        | not          |
| in          | in         | a            |
| which       | which      | proclamation |
| duty        | duty       | of           |
| is          | is         | Napoleon     |
| not         | alluded    | to           |
| inculcated, | to ;       | his          |
| nor         | there      | soldiers     |
| one         | is         | in           |
| in          | not        | which        |
| which       | an         | glory        |
| glory       | order      | is           |
| is          | of         | not          |
| mentioned.  | Wellington |              |

A few words as to needlework may appropriately come here. It is impossible to regard this portion of a school-girl's work as otherwise than a very fruitful source of danger to eyesight, and this is especially so to the very young. Certainly there is finer work required than is really necessary, and what proportion of children, in this day of sewing-machines and ready-made garments, will find hereafter a good return for time expended at the risk of injury to vision? This is particularly a subject for lady members of School Boards to bestir themselves upon, and prove to sceptics the *raison d'être* of their existence.

The number of hours employed in school is closely associated with the question of "Over-pressure in Education." The subject, however, claims from us a few words. Frequent breaks in the hours of study are desirable, and application for too long a time is to be deprecated. It is, moreover, an opinion held by several that children learn as much or more by a short period of daily study as they do by a much longer one. With a tendency to short sight, the time for study will often have to be lessened, and if the affection is increasing perhaps absolute rest advised.

The following instance is one among many, frequently



coming under the notice of the writer, exemplifying the deleterious influences already referred to. A bright, intelligent boy of ten was brought by an interested friend, in consequence of failure of his sight. He was and had been for eighteen months an inmate of one of the largest and most popular of our orphanages. When he entered he could read the names of the streets, now he could not.

He had a moderately high degree of short sight. Inquiry elicited the following facts: he rose at 6.30, school from 7 to quarter to 8, breakfast at 8, school 9 to 12, dinner and play 12 to 2.30, school 2.30 to 5, tea and play 5 to 7, school 7 to 8. The feeding was apparently excellent. The books were some of them of good-sized type, some were very small and poor. The seats had no backs to them. The light from the windows shone full in his face. Circumstances here were favourable to the production and increase of short sight, particularly in one who inherited the tendency from his mother. Work before breakfast, fasting, must be condemned. If this poor lad stays his five years more at the Orphanage, he will be well cared for and *educated*, but at what a cost, if vision is permanently injured, which must be the case if the injurious surroundings are unaltered.

The deleterious influence of "home-lessons" on the visual organs can hardly be questioned. Perhaps with every one the mental faculties are clearer and brighter in the earlier part of the day than later on, and with children especially tired and fagged with the day's schooling, burdensome enough of itself, the hours of ease, play, and repose are diminished by this practice of preparation. Nor, if this preparation be faithfully performed, with the brain already fatigued, is it, as Dr. Crichton Browne has pointed out, rendered innocuous by a long interval of recreation. It can be shown also that any lowering of the nervous system enables any baneful influence to act with increased force on the visual organs. This "home-work" is bad enough in the homes of the well-to-do, but it is doubly injurious among the class that make up the numbers attending our elementary schools.



We have only to consider their homes—the cramped rooms, often unhealthy surroundings, and the many disturbing elements; and as to light, the farthing rushlight was preferable, in many particulars, to the present-day gas-bracket, as seen in the houses of the poor, often in an inconvenient position, and perhaps at a distance, for it possessed this important advantage—poor illumination as it gave—that its light could be brought near the desired place. The “home life” of the scholars plays a more important part in causing the ills of “school life” than is always allowed.

In support of this contention as to “home-work,” it may be mentioned that Dr. O. Just, of Zittau, in Saxony, has furnished interesting statistics on this point. After comparing the prevalence of short sight in given schools in which hygienic arrangements as to light and space left nothing to be desired, with those previously to the adoption of preventive sanitary measures, he came to the conclusion that short sight “does not chiefly result from insufficient illumination of the school-rooms, but rather from the great and ever-increasing demands on the industry of the pupils at home, forcing prolonged labour on their eyes during the evening hours, frequently by insufficient artificial light.” To this he adds:—“I am far from underrating the dangers of bad sanitary conditions in the school-rooms, but would urge the necessity to disencumber our children’s eyes of as much evening work as is possible.” In many cases it should be dispensed with altogether, and it is gratifying to notice that in some elementary schools, at all events, the practice is discouraged. Encouragement should be given to healthful recreation and physical exercise. In the hurry-scurry of forcing as much learning as possible into the heads of the rising generation, it is apt to be overlooked that a physical education is as requisite in the battle of life as a mental one; in fact, it may be averred that in the struggles for existence, among the survivals of the fittest will be found more with a good physique and less learning than those more highly cultured but with a neglected physical frame. “Mens sana in



corpore sano " is an aphorism the importance and truth of which must remain.

In conclusion, it may be mentioned that reference was made at an earlier part, under Dr. Cohn's statistics, to the less frequency of short sight in country children, and this fact could be supported by other evidence. It may, of course, be urged this difference depends on the less complete system of education prevailing in rural districts—a statement not so true now as formerly—but the main reason is to be found in the diverse daily life of the country lad and his city cousin.

