purchasers therefore, saves one-third of the postage, and gets his paper-envelope and the privacy of his correspondence for nothing. The scheme is worked by a corporation which is practically a government enterprise. While the sale of the postal cards and postage stamps will probably be decreased by this means, the receipts from advertising will enable the government to make a substantial profit out of the project.

THE DEFECTIVE EYESIGHT OF SCHOOL CHILDREN.*

BY ARCHELAUS G. FIELD, M.D.

Defective eyesight among school children has been and still is a subject of much concern.

The abnormal condition largely in excess of all others as shown by statistical reports in general is myopia or short sightedness.

In his report of investigations of the subject more than thirty years ago, Cohn shows after examining the eyes of ten thousand school children that there were in the elementary departments about two per cent with defective vision from this cause; in the intermediate departments about eight per cent; in the high school fifteen per cent; and in the gymnasium twenty-six per cent. It will be noticed that these figures indicate an approximation to a regular ratio of increase from the lower to the higher grades. More recent statistics show an increase since that time of from twenty-five to fifty per cent in the higher German schools. While Germany leads the world in the intensity and persistence of school life, she also leads it in the percentage of myopics. Statistics show that the same conditions prevail in every other educational country in very near proportion to the devotion to school work. The causes assigned are first, "bad" light; second, bad air; third, inheritance; fourth, unnatural position; fifth, using the eyes during partial congestion of the blood vessels of the brain; sixth, general debility; seventh, using the eyes upon fine print or in too near proximity. These causes are all more or less amenable to remedies, and it is fair to assume that the suggestions have been adopted in the sanitary management of schools. If so, we are confronted at this stage of the inquiry by two propositions, first, that the importance of the subject has been fully appreciated, and second, that the prevalence of the defect has not decreased. Cohn placed as first in the list of causes "bad," meaning dim light, and the same prominencehas been given to this cause by most writers and teachers down to the present time. He recommended the construction of school houses with one square foot of glass area to every two feet of floor space, Modern school houses are constructed with a view to flooding them with light. Such provisions should all be utilized on dark days. But the flood of light on bright days is responsible, associated as it is with near vision for the prevalence and increase of myopia. With the better provisions for lighting modern school houses the care and responsibility of properly regulating the light increases.

While collecting material for this paper the writer visited, and from measurements, estimated the proportion of glass area to floor space of more than forty school rooms. The variation in view of the fact that they were all constructed for the same purpose was very striking running all the way from 1 to 4, or 1 to 20. While the light in the latter is none too strong to be used by scholars in their ordinary work on dark days, and can be sufficiently shaded for bright days, the light of the former cannot be made sufficient for any but the brightest days.

It is doubtful if any human eye can be habitually employed in near vision on ordinary print in such strong light as is afforded by 1 to 4 or 1 to 6, without producing permanent and irreparable myopia. All of the rooms visited were provided with some sort of window shades or shutters, and there was some pretence at using them, but in the absence of any guideother than the sensations of the teacher the benefits were spasmodic and insufficient. This brings us to the single object of this paper, viz., the necessity for the most systematic and efficient regulation of light, and constructive provisions for lighting. Most rooms are lighted from windows on one side, or on one side and one end. No such room can be approximated to uniformity in lighting. The seats nearest the windows may have light equal to 1 to 2, while the distant seats may have light equal only to 1 to 15 or 1 to 20, and the respective scholars are placed at corresponding disadvantage. While much has been done to improve the architecture and convenience of modern school houses in some respects it is doubtful if many of them surpass in evenness of light, the old log school house of former times with two or three windows upon each of two opposite sides. The accommodative apparatus of the normal eye adapts its optical parts to a wide range of external conditions, but too long continued or over worked it becomes disabled. This is precisely what happens to produce most visual defects in the school room. Every one knows that when a double convex lens such as is the crystaline lens is focused upon a near object, the back focus recedes. In other words, the change of one of the conjugate foci changes the other. On the same principle in near vision the image falls too far back for the posterior wall of the retina, and to secure sharp vision the distance between the lens and posterior wall of the retina must be increased. This is accomplished by the accommodative apparatus.

The contraction of the celiary muscle increases the convexity of the lens to shorten its focal distance and at the same time moves it slightly forward, while the probability is that the two oblique muscles, grasping the eyeball upon either side and acting against each other, compress the eyeball laterally, thus elongating its anterio-posterior diameter and increasing the distance between the lens and posterior wall of the retina. Whatever may be thought of this explanation, it cannot be denied that elongations of the eyeball is the pathological condition in uncomplicated myopia, and that such elongation must, of necessity, have resulted from the action of the accommodative apparatus.

Again, the stimulus of bright light contracts the iris, reducing the pupil, and shutting off the peripheral rays. The central rays, which are brought to a focus further away, become the visual rays, and again the image is formed too far back for the posterior wall of the retina. The action of the accommodative apparatus in securing sharp vision is precisely what it was in the case of near vision, and again the result is temporary myopia. This may also be demonstrated by the use of a large and then a small stop before the same double convex lens, the image falling further back as the size of the stop is reduced.

In school life we have these two causes acting singly and also conjointly to produce the myopic condition, and being continued too long, overcomes the natural elasticity and recuperative energy of the accommodative apparatus, resulting in chronic, permanent and incurable myopia.

The remedies are obvious:

1. Provision for uniformity of light and impartial seating of pupils, by placing windows on two opposite sides at least of the school room.

2. Every window, more especially those exposed to direct sunlight, should be provided with two shades of different density, both lowering or opening from the top of the window.

3. The maintenance, approximately, of a uniform standard of light, presumably that represented by one square foot of glass to twelve or fifteen of floor space on bright days.

Some attention would be required, but if the great army of myopices constantly emerging from the schools and colleges can be thereby reduced the trouble will be well rewarded.

*Read at the Columbus meeting, 1899, of the American Association for the Advancement of Science.

THE BOERS AND THE GIRAFFE.

The Boers are credited with being great hunters, and chief of them in his younger days was President Kruger, whose daring in attacking a lion single-handed, with a hunting knife, as has many times been told. When the Boers migrated from Cape Colony to the Transvaal they were forced to clear the way by killing 6,000 lions, many of which were killed by Kruger. For years the South African Boers have been hunters, and their skill with the rifle is due to this daily practice in the fields and woods. But with them the killing of game has been either a matter of dollars and cents or self-protection.

Their creditable work of freeing South Africa of the dreaded lions, which roamed in such numbers that life was rendered unsafe anywhere in the country, is offset by their ruthless destruction of the giraffe from Cape Colony to the Botletli River. If they killed 6,000 lions in the Transvaal before existence was made safe, they may have killed 60,000 of the innocent, graceful giraffes. In the early days of South African history the giraffe was the most abundant game in the Transvaal, Matabeland, and Orange Free State, but the creature has been killed off like our American buffalo, and the few remaining representatives of a noble race gradually driven north. For years past the giraffe has been a profitable quarry for the Boer hunters, and the animal was valued by them only because the hides were articles of commercial use. They were pot-hunted, shot down in droves, and destroyed in the greatest number possible in every direction. The extinction of the animal in South Africa is now threatened, and its preservation by legislation comes when it is almost too late. In this respect, too, the brief history of the creature will resemble the story of our buffalo.

A good giraffe skin is worth from $10 to $20 in South Africa to-day, and much more in Europe. On their hunting trips ten and fifteen years ago it was a common matter for one hunter to kill forty and fifty of these graceful animals in one day. The reason for this is that the giraffe is the most innocent of animals, and easily hunted. They are absolutely defenceless, and there is hardly a case on record where a wounded giraffe turned upon the hunter. It is true they have great powers of speed, and they can dodge rapidly from tree to tree in the woods, but they offer such a fair mark that these tactics hardly ever save them. Not until unusually frightened does the giraffe make its best speed, and then it is often too late, for the hunter is upon it. There is really no elemant of danger connected with this sport, and that makes it less exciting and attractive to a true sportsmen. Under certain circumstances it is possible to be injured with the powerful legs of the giraffe, which are capable of kicking a blow that would kill a lion. This latter beast for this reason takes good care to attack the giraffe at unexpected moments.

It takes a good horse to run down a giraffe, and if the least advantage is permitted the wild creature the race is lost. Its peculiar gait is very ungraceful and deceptive, but it covers the ground with remarkable facility. In the open veldt the hunters always have the best of the race, but the giraffe when surprised makes instantly for the forest where tough vines and intermingling branches make travels difficult for the hunter. The bushes and thorns tear and lacerate the skin of the horses, but the tough skin of the giraffe is barely scratched. The creature will tear a path through the toughest and thickest jungle, and never suffer in the least.

This skin or hide of the animal is its chief article of value. No wonder that the bullets often fail to penetrate this skin, for it is from three-quarters to an inch thick, and as tough as it is thick. This skin when cured and tanned makes excellent leather for certain purposes. The Boers make riding whips and sandals out of the skins they do not send to Europe. The bones of the giraffe have also a commercial value. The leg bones are solid instead of hollow, and in Europe they are in great demand for manufacturing buttons and other bone articles. The tendons of the giraffe are so strong that they will sustain an enormous dead weight, which gives to them pecuniary value.

The extinction of the giraffe in South Africa is to be deplored, because the animal is peculiarly adapted to the wilderness of forest and veldt, where it feeds on the giraffe acacia that nature seems to have raised specially for it.

G. E. W.

VITRIFIED CLAYPIPE INSTEAD OF IRON FOR GAS MAINS.

The idea of using vitrified claypipe instead of iron was proposed to Irvin Butterworth by Henry L. Doherty, President of the Madison (Wisconsin) Gas and Electric Company. The former read a paper upon it at the Western Gas Association meeting at Milwaukee. The suitability of vitrified claypipe for gas mains is due to their cheapness, durability, strength, non-susceptibility to electrolytical action, slight susceptibility to changes of temperature, non-porosity, adaptability to the making of service connections by the use of special or small auxiliary distributing pipes of wrought iron. Vitrified claypipe should, of course, be selected and laid with the same care which is given to the laying of cast iron mains. The possibilities for the reduction of the construction accounts of gas companies by the use of vitrified claypipes instead of iron for gas mains seems too great and promising to be despised.

AMERICAN STEEL FOR A PRINCE'S PALACE.

The Imperial architect of the Japanese government has placed orders with the Chicago Steel Company for several thousand tons of structural iron and steel to be used in the construction of a palace for the Crown Prince of Japan at Tokio. The palace is to be 400×300 feet and three stories high, to be constructed specially with a view of withstanding earthquake shocks. The general plans includes, says The Railway Review, a system of bracing connecting all of the columns below the basement floor, the whole system to be imbedded in concrete. Under the roof on the line of the bottom chord there is to be another system of heavy bracing connecting all of the columns. The object of this unique structural design is to get a framework which will move as a whole in case it is disturbed by the force of an upheaval. There will be an open colonnade in front with heavy columns and a broad staircase up to the entrance. The exterior is to be built of Japanese granite.

A LONG PHOTOGRAPHIC TELESCOPE.

Last spring a plan was proposed at the Harvard College Observatory for the construction of a telescope of unusual length for photographing the stars and planets. Anonymous donors have now furnished the means by which this experiment may be tried. The plan will, therefore, take definite shape, and it is expected that a telescope having an aperture of 12 inches and a length of 100 feet or more will be ready for trial at Cambridge in a few weeks.

EDWARD C. PICKERING.

THE method of making sheet lead for tea packing in Formosa is most interesting. The lead is brought from Australia in pigs and after being melted is poured between two large tiles, the required degree of thickness for the sheet being obtained by pressure by the feet. The sheet is afterward trimmed to suitable sizes and shapes for soldering.