established, even without great accuracy of data, that among civilized nations color-blindness is almost equally common.

Second. Among uncivilized people Dr. Favre's results from Algiers, already alluded to, show 414 examined, and only 2.6 per cent color-blind.

Dr. Fox reports 161 young Indians in the United States tested, and only 1.81 per cent are color-blind.

These percentages. so low compared with those for civilized people, suggested to us the thought that color-bindness may be a product of civilization, and these have led to our own tests, here reported.

At the Haskel Institute, at Lawrence, Kansas, are several hundred Indians, representing many tribes. These we have recently tested by Holmgren's method, with Berlin worsteds. 418 have been examined — 285 males and 133 females — only three cases of color-blindness exist, or only $\frac{7}{10}$ of 1 per cent. These were males, and all full-blooded Indians. The tribes were Pottawatomie, Pawnee, and Cheyenne. Of these two had defective color sense for red and one for green.

The Indians were almost evenly divided as full-bloods and half-breeds. It seemed to us that the half-breeds showed more instances of blunted color-sense than the full-bloods. This was evidenced in more frequent and prolonged hesitation among them in comparing the colors, than among the full-bloods. If this be confirmed by more extended examinations, it would, in conjunction with the low percentages obtained as above, be a strong argument for the theory proposed by us, that defective color vision is in some way the product of civilization. To this conclusion, our tests, at least, seem to point. The data are too meagre at present to propose any explanation why defective color-vision comes with civilization. It is not accidental that nearly every case of color-blindness is for red, fewer for green, and seldom one for violet.

What is the meaning, that the defects are thus limited at present, at least, to the lower end of the spectrum? The Helmholtz-Young theory of color perception will locate the affection in the layer of rods and cones responding to the first of the three primary sensations of color. But why this special layer is, with few exceptions, the only one affected, has at present no explanation. Also why the percentage among females is so small, has no explanation.

The law of heredity indicates increased sensitiveness in those nerves which are subjected to special use through many generations. It seems reasonable to look for an explanation of the more perfect color-sense in females, to this fact,— but whether this law of heredity will increase the percentage among males cannot be foretold without an enormous increase of data.

The theory here proposed is that defective color-sense is a product of civilization with the use of tobacco as a possible factor. The non-use of tobacco would explain also the low percentage of color-blindness among females. This theory leads to the thought of increase of color-blindness in males in the future generations.

THE VERTICAL SCRIPT.

BY W. H. METZLER, BOSTON, MASS.

I PRESUME that most of the people of this country were taught to write the slanting script, according to a code of rules such as that given by Spencer, DeGraff, and others. It would be interesting to know what proportion have continued consciously or unconsciously to observe those rules, and what proportion have forsaken them for a position of body, pen, and book more suited for rapidity and ease, and no doubt in many cases better from an hygienic standpoint.

Little observation will be required to convince us that there are but few who observe the rules they were taught.

Some years ago I had charge of about one hundred and twenty-five pupils in writing, who had been taught the slanting script according to Spencer's rules. After using that method a short time, I became convinced that the collapsed position which very many assumed was due to the methods. When allowed to write as they pleased, about 5 per cent of them observed all the rules, about 70 per cent observed part of them, but not all, and the remainder apparently observed none of them. Those pupils placing the book directly in front, with about an equal amount of both forearms on the desk, sat most erect and wrote a script varying but little from the vertical, and those turning the right side, placing the right forearm on the desk parallel to its edge, sat least erect. Observing this, and my own experience having taught me that with paper directly in front I must sit more erect, could write faster, and with a good deal more ease than with it at the right, I directed the pupils to place their writing-books in front of them, and found beneficial results follow in that the body was kept more erect and the writing on the whole much improved. At that time I had not heard of what is now known as the *vertical script*.

It, together with the many evils resulting from the methods so commonly used in this country, was first prominently brought to my mind while attending a course of lectures given by Dr. W. H. Burnham at Clark University in 1891–92. The substance of which is contained in an invaluable paper published in the *Pedagogical Seminary*, Vol. II., No. 1. Dr. Burnham has made a thorough study of the subject of school hygiene, and his paper gives, besides a comprehensive bibliography, the opinions and conclusions of the best writers and investigators of different countries, and should be in the hands of all teachers and school boards.

The following are some of the rules given by Schubert for writing the vertical script: —

1. Straight-central position of the tablet or copy-book. 2. Two-thirds of both forearms should rest on the desk in symmetrical positions, meeting at right-angles and forming an angle of 45° with the edge of the desk. The elbows should be about a hand's-breadth from the body. 3. The hand should rest on the outer edge of the nail of the little finger. The index finger should form a slightly convex bow. 4. The pen-holder should be long and grasped not too near the pen. Its upper part should not rest against the index finger, but on the middle of the hand between the thumb and index finger, and should point towards the elbow rather than towards the shoulder or breast. 5. The arm as it moves toward the right in writing should be moved as a whole, so that all positions that it occupies will be parallel. 6. After each line the paper should be correspondingly raised, so that a proper distance between the point of the pen and the edge of the desk be preserved. 7. The lines should be short. 8. The lines joining the eyes and the shoulders should be horizontal, and the eyes from 30 to 35 centimetres from the paper.

Since hearing the lectures and reading the paper, I have made some observations to ascertain whether those placing the book directly in front of them sit more erect than those who place it at the right, and though I did not find many who used the straight-central position, yet I found that a larger per cent of those placing the book in front sit erect than of those placing it at the right.

Since so many evils are due to poor methods in writing, it would seem that the subject should receive far more attention than has heretofore been given to it, and the vertical script be given a thorough test at least. The fact that no two hand-writings, like no two faces, are exactly alike would indicate that, after a few general instructions to secure a healthful position of the body, no complex set of rules should be given. Each person will then develop that particular hand-writing most suited to him.

DISINFECTANTS AND DISINFECTION.

BY DAVID BEVAN, M.D., PHILADELPHIA, PA.

THE question of disinfectants and disinfection has come to be of as great practical importance as it is of scientific interest. The term disinfectant is by the laity, and to some extent by the medical profession, grossly misused in being considered as synonymous with antiseptic and deodorant, since science has so ably demonstrated the nature of the contagium in infectious and contagious diseases, only such agents as are capable of destroying

the contagium are to be designated as disinfectants. An antiseptic retards or prevents the development and pullulation of the organism; but the organism is not destroyed. A deodorant merely destroys odors, but does not necessarily have any effect whatever upon the organism.

The cholera scare of last summer inaugurated a season of apprehension and an unprecedented demand for disinfectants.

The universal cry for a disinfectant has given birth to a number of compounds, the virtues (?) of which are only equalled by the number and chemical incompatibilities of their ingredients. These compounds are often efficient deodorants; sometimes they are antiseptics, but never are they disinfectants.

To consummate the process of disinfection, there are two essential requirements, 1st, that the substance to be acted upon is infected; 2d, that the agent employed is a disinfectant. During an epidemic or in sporadic cases of infectious diseases, the efficiency and adaptability of a given disinfectant will depend greatly upon the nature of the substance to be disinfected and also as to the presence or absence of spores.

The various subjects for disinfection will now be considered and under each the most available and efficient disinfectant.

Excreta, Sputum, or other Discharges. By far the best disinfectant that we possess is the bichloride of mercury; as in solution of 1:1000 it destroys anthrax spores after a few minutes' exposure. In using this salt three precautions are to be observed: 1st, its extremely poisonous character; 2d, its corrosive action on all of the common metals, and 3d, the facility with which it combines with albumen to form an insoluble, inactive compound.

That the dangers arising from poisoning may be reduced to a minimum, it will be found expedient, 1st, to color the tablets or solution, whichever it may be, with one of the aniline dyes, and further to keep the salt in a peculiarly-shaped bottle, conspicuously labelled. In reference to the second precautionary measure, it should never be used except in metallic vessels. To prevent the salt combining with albumen acidulate the solution. In Wilson's "Hygiene" we find the following formulæ recommended by the Local Government Board of Great Britain. Dissolve half an ounce of corrosive sublimate, one fluid ounce of hydrochloric acid, and five grains of commercial aniline blue in three gallons of water.

Carbolic acid, in a five per cent solution, as a disinfectant for excreta, though very popular, is, taken all in all, extremely unsatisfactory. Upon adding such solution to a quantity of excreta, the additional dilution and the presence of large quantities of organic material decidedly interfere with its action and render it unreliable. If carbolic acid be used, it should be according to the following formula:—

Carbolic acid	10 parts.
Glycerine	10 "
Water qs.	100 "
Mix.	

Expose the excreta to an equal quantity of this solution for at least six hours.

Chloride of lime has been highly recommended in a solution containing four per cent of available chlorine. Although the chloride of lime will not destroy the more highly resisting forms of contagium, e. g., anthrax spores, it is a most excellent agent for disinfecting the stools of cholera Asiatica and typhoid fever. To make the above strength solution, dissolve six ounces of the best chloride of lime, containing twenty-five per cent of available chlorine, in one gallon of water.

Underclothing, bed linen, towels, napkins, etc., if of little value should be destroyed by fire, otherwise, we may expose them, in a suitable apparatus, to flowing steam for fifteen minutes or resort to boiling for twenty minutes or immersing in a 1:1000 solution of the bichloride of mercury.

For disinfecting the hands, we recommend one of the following methods:

The nails should be short and clean.

The hands are thoroughly washed for several minutes with soap and water, the water being as warm as can be comfortably borne, and being changed frequently. Use a brush which has been sterilized by steam. The excess of soap is washed off with clean warm water. The hands are immersed for one or two minutes in a warm saturated solution of permanganate of potash, and are rubbed over thoroughly with sterilized swab. Then place the hands in a warm saturated solution of oxalic acid until they are completely decolorized. Wash the hands with a sterilized salt solution of water. Immerse the hands for two minutes in a 1:500 solution of the bichloride of mercury.

The above method is used by Welch of the Johns Hopkins Hospital.

Professor Keen, of the Jefferson Medical College Hospital, uses the following method:—

The hands are washed with soap and warm water; the nails, being cleaned and trimmed with a knife, are then scoured with a sterilized brush. All loose skin about the nails is removed. The hands are again washed in warm water but without soap. Immerse the hands in alcohol for two minutes and briskly rub one over the other. They are then immersed in a 1:1000 solution of the bichloride of mercury. This latter method is a most excellent one. The writer has tested the skin and nails of the hands, after being sterilized as above directed, and also the cat-gut and silk, which were handled by the professor or his assistants, with almost invariably negative results.

To disinfect the general surface of the body, wash with a 1:2000 solution of the bichloride of mercury and then bathe in warm water.

Should a person die of an infectious or contagious disease, the body must be cleaned and disinfected before removing from the isolation quarters. To disinfect the body, first wash it in clean water and then wrap in a sheet thoroughly saturated with a 1:500 solution of the bichloride of mercury.

So long as the source of infection remains, there is a continuous reproduction of the poison. It is impossible to disinfect a room during its occupancy by a person suffering with an infectious or contagious disease, by liberating gaseous disinfectants, as any such agents of sufficient potency will kill the patient. However, the wall, furniture, etc., may be washed with a 1:2000 solution of the bichloride of mercury and then with warm water. In such instances, the greatest reliance is to be placed upon cleanliness and ventilation. If these two provisions be thoroughly carried out, offensive odors will be abolished, or prevented from accumulating in such force as to be disagreeably perceptible. Ventilation should never be effected through another room or hallway, but communication established and maintained with the outside air and in such a manner as not to create draughts. As soon as the infectious nature of the disease is determined, the patient should be isolated. The room should contain as few articles as possible. All upholstered furniture and drapery should be removed and their places supplied by wooden articles and simple muslin or linen curtains. The attendant or attendants upon the sick should not be permitted to associate with other persons or to leave the isolated portion of the dwelling without first disinfecting their person and putting on clean clothes from the skin out. The sending of unnecessary articles into the room, such as extra napkins, towels, etc., should be strictly interdicted. Everything coming from the sick quarters should be disinfected by one of the methods already indicated.

To disinfect the vacated room or rooms, first disinfect and remove all the furniture, etc., then close all cracks and crevices about the windows and doors, leaving one door open; place in the room a tub in which there are about three inches of water. In the centre of the tub place a large shallow pan, preferably of iron, containing two pounds of sulphur for every one thousand cubic feet of air space in the room. Set fire to the sulphur and drop into the tub, about the sulphur pan, several very hot bricks. Quickly leave the room, close the door and all crevices about it. The infected quarters are now air-tight, sulphurous acid gas is being generated, so also is steam, which will facilitate the action of the gas and secure better penetration. The room is to remain thus for twenty-four hours, then to be ventilated freely; the surfaces washed with a 1:1000 solution of the bichloride of mercury and lastly with warm water.