

Most cases of color-blindness are found to be congenital, and are incurable. Many have been produced by disease, some by violent concussions in accidents, and some by excessive use of tobacco and alcohol. Temporary blindness to violet may be induced by santonine. From these facts several interesting questions have suggested themselves to us. If color-blindness follows the law of heredity, is it on the increase, or decrease? Further, is it a product of civilization? The first of these queries can be answered only by statistical data extending over long periods of time. The second naturally suggests a comparison, first, of the color-sense of civilized nations among themselves; and, second, of civilized with uncivilized peoples. Of tests in native tribes, we can find but two recorded, — those of Dr. Favre on some tribes in Algiers, and those of a Dr. Fox on 150 American Indians, but where we do not know.

First, for the comparison of civilized tribes among themselves, we have calculated the following percentages from tables reported by Dr. Jeffries:—

	No. Examined.	Per Cent Color-blind.
Austria.....	5250	3.79
Denmark.....	5840	3.74
Belgium.....	8106	4.13
Holland.....	2300	1.43
Finland.....	1200	5.00
Norway.....	205	4.88
Sweden.....	32504	3.73
Switzerland.....	3024	5.36
Germany.....	6344	4.12
Russia.....	12830	3.30
Italy.....	2065	2.32
England.....	16431	3.75
United States.....	44844	3.64
Average per cent.....		3.76

No great reliance can be placed upon these results. The numbers examined are too small, the methods of testing not uniform, not equally reliable. However, the probabilities of error are about equally distributed; so that the conclusion is fairly well established, even without great accuracy of data, that among civilized nations color-blindness is at present 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 tested, and only 1.81 per cent color-blind. These percentages, so low compared with those for civilized people, suggested to us that color-blindness may be a product of civilization, and have led to our tests here reported. At the Haskell Institute at Lawrence, Kan., are several hundred Indians, representing many tribes. These we have recently examined by Holmgren's method with Berlin worsteds. Out of 418 tested, — 285 males and 133 females, — only three cases of color-blindness exist, or only .7 of one per cent. These three are full blooded Indians of the Pottawattamie, Pawnee, and Crow tribes. Of these, two have defective color-sense for red, and one for green.

The Indians of the school are about equally 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 an argument in the theory proposed by us that defective color-vision is in some way the product of civilization.

The use of tobacco suggests itself as a possible cause. This would explain also the low percentage among females. It leads also to the thought of increase of color-blindness in males in future

generations. But the data are at present too meagre to more than suggest this explanation.

It is certainly not accidental that nearly every case of color-blindness is for red, few for green, and seldom one for violet. Why are the defects thus limited, at present at least, to the longer wavelengths of light?

The Young-Helmholtz theory of color-perception will locate the affection in that layer of the retina corresponding to the first of the three primary sensations of color. But why this special layer, with few exceptions, is the only one affected, has at present no explanation.

The law of heredity indicates increasing 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 among males there will probably be an increase, in future generations, of the number of cases of defective color-sense.

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Lawrence, Kan., Feb. 19.

Note on the Wind-Pressure Constant.

THERE is a very old formula in use among English and American engineers and meteorologists for obtaining the force of the wind from its velocity. The product of the square of the wind's velocity in miles per hour into the factor .005 is taken as the pressure in pounds upon each square foot. It is used alike at sea-level and on the tops of high mountains, and in the extreme temperatures of winter and of summer, notwithstanding the pressure must vary as the density of the air. This is the value of the factor determined by Rouse from experiment about one hundred and fifty years ago, and of all the crude experiments which have been made from that time to this, and before. It seems to be an extreme value. Of a number of the older determinations of this factor, it is stated, in Gehlér's "Physicalische Wörterbuch," that this is the worst, while those of Hutton and Woltman are perhaps not much in error. It is astonishing to see, therefore, with what tenacity engineers and meteorologists still hold on to this factor. It has been maintained by the writer for several years that this factor is much too large, — first in *Van Nostrand's Journal*, 1881; then in "Recent Advances in Meteorology;" and in the *American Meteorological Journal*, 1887. It was shown that the theoretical value of the factor, not considering friction, is .0027; and it was thought that this could not possibly be increased to .005 by the friction of the air. And it was shown that this view of the matter is confirmed by Loomis's results obtained from the discussion of experiments made by the request of Newton in St. Paul's Cathedral, London, upon the velocity of the falling of hollow glass globes and of bladders, and of Hutton's experiments with a whirling-machine. From all these researches, and also the somewhat recent experiments of Hazen with a whirling-machine, it was concluded that the theoretical constant above could not be increased by friction more than one-tenth, or, at most, one-eighth part. But the old factor has been in use so long, that conservatives think it must be correct, and so are unwilling to give it up.

A further confirmation of the erroneousness of the factor is now found in the last number of the *Quarterly Journal of the Royal Meteorological Society*, which contains a report from the wind-force committee appointed by that society. The committee, as yet, have made only a few preliminary experiments in this part of their work; but the average value of the factor from these is .003, which is about one-tenth part greater than the theoretical value given above. This will, no doubt, be changed a little in their final report, after more experiments shall have been made; but as it agrees nearly with the factor obtained by Hazen, and with what is to be inferred from other experiments, it is not probable that the final result will vary much from this.

This is a factor in which engineers are especially interested, and its value ought to have been accurately determined by them long ago; but, as the Royal Meteorological Society has now taken it in hand, it is to be hoped that its committee will do the work thoroughly, as they apparently intend to, and determine the value of this factor accurately, not only for plates of different sizes and shapes, but also for different temperatures and barometric pressures.

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