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COLL. CAS SCHOOL DOCUMENT NO. 13.

REPORT

OF THE

EXAMINATION OF 27,927 SCHOOL CHILDREN

FOR

COLOR-BLINDNESS,

BY

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IN SCHOOL COMMITTEE, Boston, June 22, 1880.

On motion of Mr. Blake, ordered to be printed as a school document.

Attest: PHINEAS BATES, JR.,  
*Secretary.*

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# REPORT.

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Boston, March 20, 1880.

*His Honor the Mayor, and the School Board of the City of Boston: —*

April 7, 1879, I had the honor to report the results of my testing the public-school children for color-blindness. I have now finished all the schools above the Primary. I employed Prof. Holmgren's method, as described in my recent volume on "Color-blindness, its Dangers, and its Detection." This book and this method have been adopted as the standard in the United States Army, Navy, and Marine Hospital service. My work in our schools has shown its great value in allowing an expert to thereby test large numbers rapidly and with accuracy. I have tested all the male students of the

Normal Art School,	}	14,469 in number ; of these 608 were color blind, or 4.202 %.
Latin School,		
English High School,		
All the High Schools,		
All the Grammar Schools, School for Deaf-Mutes,		

I have also tested all the female students of the

Normal Art School,	}	13,458 in number ; of these 9 were color- blind, or 0.066 %.
Normal School,		
Latin School for Girls,		
Girls High School,		
All the High Schools,		
All the Grammar Schools, School for Deaf-Mutes,		

These results are so near what is found by the best observers in Europe that we may take it as the expression of a general law. Color-blindness is not curable by any known methods, and the color-sense does not alter through life; hence the statistics gathered from the schools apply to the whole community. We may conclude that 1 male in 25 is more or less color-blind, and that the defect very rarely occurs among females. I would here again respectfully call the attention of the Board to the fact that whilst something is done in the Primary Schools in reference to teaching the names of colors, the question of color-blindness on the part of the boys is entirely overlooked. I have found, even in the higher schools, but few teachers who had any knowledge of color-blindness, other than that it was an occasional curiosity. The uselessness of attempting to teach a color-blind boy the names of colors, with the idea that he can afterwards apply them, is self-evident. I have taken great pains to describe this curious defect to all the teachers of the classes I have tested, and explained to them the individual cases of color-blindness as they occurred. This they have generally gratefully appreciated.

The future education of the color-sense and the teaching of color-names will naturally principally devolve on primary instructors, to whom, however, I cannot spare the time to exhibit color-blindness practically, as I have in the schools above this grade. It is, of course, absolutely necessary that these primary teachers should have some knowledge of color-blindness and its peculiar manifestations, such as they can obtain by some practical illustration and teaching and a little study of the book referred to. I must, however, confess that no study will equal the personal observation of an expert engaged in testing. I therefore much regret not being able to carry out my investigations of color-blindness throughout the Primary Schools also, as the teachers would thereby have learned so much by simple observation of my

work. My long-continued labors in the schools, in the cause of science, have been also of practical value. Not only has the hitherto unknown and unbelieved percentage of color-blindness been proved in our community, but the extraordinary exemption from this defect on the part of females has been conclusively established. Moreover, the color-blind boys I found were made aware of their defect in such a way that they will carry home to their parents or guardians some knowledge of their deficiency, which, as this peculiar chromatic defect becomes more generally known and recognized by the community, will serve as a warning, and prevent the turning into businesses and trades those who do not have the necessary color-perception to pursue them successfully. It must be remembered that it is very rarely that a school-boy or his surroundings are aware of his defective color-sense. To warn a painter, a colorer, a weaver, etc., not to attempt to teach their color-blind boys their own trade, or place them, as in dry-goods stores, where their want of color-sense will soon throw them out, is therefore of practical value to the community as well as to the individuals. I shall, moreover, be able hereafter to refer to my records of the color-blind when needed, as I have the names of all found deficient, with their school, class, and age. These, of course, are never to be published, and only shown on proper request of those interested. My work may also be of direct value to our community by the warnings I have sent to railroad employés, engineers, and others, through their color-blind children, that they should not attempt to have these latter follow their own special employment, where the required examinations of the future, through state or national laws, are sure to detect and eliminate them.

In my previous report to your Board, I spoke of the extraordinary lack of knowledge and use of color-names by boys.

My work in testing since then has still further convinced

me that this want does not show itself in school life in examinations or exhibitions. Such want does, however, show itself very quickly when the boy comes out into every-day life and occupations. Thus it is that the necessity of teaching colors and color-names to boys has been overlooked. It is naturally supposed that, in a general way, they must learn them, as girls do from their occupations with colored objects and materials. The fact is, however, as absolute experience has abundantly shown me and the teachers watching my work, that but very few *boys* of the Grammar or higher schools are familiar with the color-names of even the primary colors, and that still less can they correctly apply those names they do remember when shown colored objects.

Although prepared for this ignorance on the part of the boys to a certain extent, I confess I was astonished to find it so frequent and great. It seems almost impossible that a bright boy of fourteen, not color-blind, should not know the word *green*, or be able to apply it. Yet this does not give an extreme idea of the truth in reference to the ignorance of color-names and their application amongst our school-boys.

I found this same ignorance of color-names and their applications among the lads of the City College in Baltimore, four hundred and twenty-five of whom I tested for color-blindness during a recent visit, finding the average the same as in our schools. At the International Medical Congress at Amsterdam, in September of 1879, Prof. R. Virchow, in his address on the Education of Physicians, said: "More time must be given to the study of the higher mathematics, philosophy, and the natural sciences. Especially must the powers of observation be better cultivated, as it is just here that this practical training is of its greatest value. The powers of observation have been so little cultivated that there are many medical students who fail to distinguish the colors. Magnus has shown that the power of distinguishing colors has, by cultivation, gradually increased since Homer's

time. This has been substantiated by other students of Homer. It has been found that the wild races have no names for several colors."

Prof. Virchow tested this with a company of Nubians, and afterwards among the Laplanders. The former did not distinguish the blue, the latter the red shades; yet all these individuals could tell the difference between them perfectly well. They lacked only the power of memory, the necessary observation and mental training. These all have to be learned and cultivated.

Ignorance of color or names, and their application, is not therefore confined to the young, since educated adults are equally at fault from the want of training the color-sense during school life. I have received letters from adults, not color-blind, whose lack of color-names had been a serious drawback to them in their occupations in every-day life; and they have besought me to urge the teaching of color-names, and the education of the color-sense, in our public schools. Although kept after school for it, I passed, as a Latin School boy, many pleasant hours learning to draw, under genial Mr. Segur. Had those hours been spent in the systematic cultivation of the perception of form, and the training the hands to obey the will, I should not, as now, have to envy the boys and girls who show on every school black-board what can be done by thorough and systematic instruction of our sense of form. The cultivation of the other sense our eye possesses, that of color, is at present almost wholly neglected, as was once the sense of hearing and the voice.

What system and instruction have done also for the latter all know, but equally forget the time when the school-room was silent, and the possibility of musical instruction not even believed. The æsthetic taste for color developed in our New England community, as elsewhere, during the last decade, is as extraordinary as gratifying. But it has seemed to come before our color-sense was educated to receive it,

and even before the male portion of our population had learned the color-names and their application.

The teaching color and color-names has been somewhat introduced into our Primary Schools, where, of course, it must be commenced. There is, however, and this perhaps very naturally, no system whatever pursued, as is with the education of the voice, the ear, and the sense of form in drawing.

Color-blindness, of course, has been as unrecognized as unknown. For this no blame can be attached to teachers, or those who direct their efforts. It is only since the color-sense and its defects have been talked about and tested within the last three years, that here, as elsewhere in the world, it has been discovered that men were quite without the knowledge and use of color-names compared with women, very much as it was wholly unknown, but equally true, that the latter were so extraordinarily exempt from color-blindness.

The systematic teaching in the lowest schools of color-names and their application has already commenced in Europe, especially in Germany. This is due, in part at least, to the successful efforts of Dr. Hugo Magnus, of Breslau, in devising simple and effective methods of teaching, adapted to the capacity of teacher and scholar, and of such value as to receive a diploma of honor from the International Medical Congress which met last year at Amsterdam.

The introduction into our Primary Schools of a similar system of instruction in colors and color-names would save time now faithfully but aimlessly spent, and send the children into the upper schools ready to be further instructed, so that our school-boys would graduate ready to turn without chagrin or repulse to the every-day occupations of life which are with us calling more and more for an educated color-sense, or rather a color-sense with common-school education. A

few years of instruction have worked wonders in the ear, the voice, and the hand. Let the same be now done for our sense of color, on which also so much depends. I would here repeat what I said in my report last year.

It has been supposed, and even claimed, that the exemption on the part of females from color-blindness was due to their familiarity with colored objects and materials. This will not of course hold in reference to the individual, as the color-sense cannot be changed by practice with colors. Whether generations of color-education has caused this sexual difference is a point to be remembered, as, if sustained, it proves we may commence to eliminate color-blindness from future generations of boys by teaching and practising their ancestors now under the charge of the School Board.

It must be remembered that our community and our school children are not different from others. Wherever in the civilized world examinations similar to my own have been carried out by competent observers, the same facts as to color-blindness and ignorance of color-names and their use, and an undeveloped color-sense, has been found appertaining to males.

Respectfully yours,

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