

**Speech of Hon. Benjamin W. Harris of Massachusetts in the House of Representatives, February 18, 1881.**

**Contributors**

Harris, B. W. 1823-1907.  
Tweedy, John, 1849-1924  
Royal College of Surgeons of England

**Publication/Creation**

Washington : [publisher not identified], 1881.

**Persistent URL**

<https://wellcomecollection.org/works/m7ymgdfm>

**Provider**

Royal College of Surgeons

**License and attribution**

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection  
183 Euston Road  
London NW1 2BE UK  
T +44 (0)20 7611 8722  
E [library@wellcomecollection.org](mailto:library@wellcomecollection.org)  
<https://wellcomecollection.org>

*W. Tweedy*  
6  
SPEECH

OF

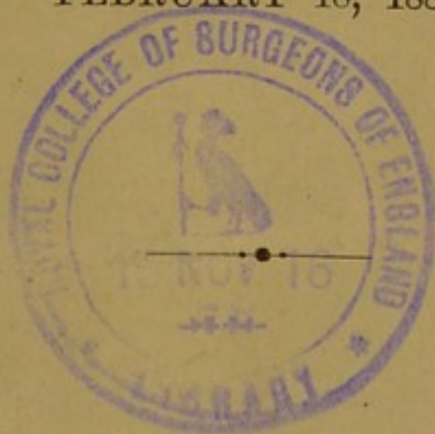
HON. BENJAMIN W. HARRIS

OF MASSACHUSETTS

IN THE

HOUSE OF REPRESENTATIVES,

FEBRUARY 18, 1881.



WASHINGTON.  
1881.

T

THE

# THE HISTORY OF THE

AMERICAN

REPUBLIC

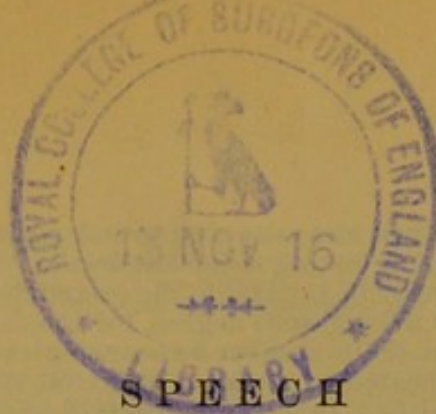
FROM 1776 TO 1876

BY

JOHN

W. FULTON





OF

## HON. BENJAMIN W. HARRIS.

On the joint resolution (H. R. No. 308) relating to color-blindness and visual acuteness in persons employed in the Navy and merchant marine.

Mr. HARRIS, of Massachusetts, said :

Mr. SPEAKER: On the 31st of January last I had the honor to introduce several petitions upon the subject of color-blindness and visual acuteness, which were referred to the Committee on Naval Affairs. They were all in the following language, omitting the address or heading, to wit :

Whereas a normal acuteness of vision and good color perception are needed in officers and seamen, for the safe navigation of vessels; and whereas most of maritime nations now require a certain standard of these qualifications by absolute test, the undersigned would most respectfully petition your honorable body to take into consideration a general law of control in the Navy and merchant marine of color-blindness and visual acuteness, and the agreement by an international commission upon definite and uniform standards of testing these necessary qualifications.

These petitions were not numerously signed, but the names appended to them were of gentlemen who will be at once recognized as of great scientific and literary attainment and of high standing and reputation in the country.

They are as follows :

B. Joy Jeffries, Henry I. Bowditch, O. F. Wadsworth, Thomas T. Bouvé, Charles T. Folson, Charles W. Elliot, Joseph Lovering, E. G. Robinson, Eli W. Blake, jr., Elias Loomis, Theodore S. Woolsey, C. R. Agnew, Edward Loring, Peter A. Callan, Arthur Matthewson, William Thomson, George C. Harlan, George Strawbridge, F. B. Loring, O. W. Holmes, Calvin Ellis, H. P. Bowditch, William B. Rogers, Charles R. Cross, Samuel H. Scudder, Noah Porter, A. W. Wright, W. H. Carmalt, C. S. Lyman, Henry D. Noyes, D. St. John Roosa, H. Knapp, E. Gruening, J. S. Prout, W. F. Norris, H. S. Schell, A. D. Hall, Swan M. Burnett.

These gentlemen have lent themselves to this movement because their knowledge of the subject has enabled them to appreciate its importance and the dangers to life and property which may be averted by a proper control over it on the part of those having authority over the navies and the mercantile marine of the world. No other motive can have actuated these learned and honorable petitioners.

The Committee on Naval Affairs gave the petitions prompt and careful attention. Dr. B. Joy Jeffries, of Boston, the head petitioner, was heard with much satisfaction by the committee. He has given the subject greater personal attention and study than any other person in this country, and has for a long time been in frequent correspondence with scientific societies and ophthalmologists in Europe. He



exhibited and explained the very simple and perfect apparatus now in use for detecting and testing color-blindness.

He found no difficulty in satisfying the committee of the existence of color-blindness to a dangerous degree, for the committee were able to furnish him from their number two examples of decided color-blindness. After repeated experiment and trial these gentlemen became themselves satisfied that they possessed an infirmity of vision which would render them very unsafe persons to be entrusted on watch at sea or where safety required that they should be able to read correctly colored signals. The committee unanimously and promptly agreed that the subject deserved immediate and effective action on the part of Congress. It cannot be reasonably doubted that great loss of life and the destruction of vast amounts of property have occurred at sea from the unconscious defect of vision and inability to distinguish correctly the colors of signals on the part of men placed on watch and in pilots and officers of vessels.

Modern discovery and science furnish us the means of averting these perils in the future, and we shall be remiss in our duty if we fail to adopt and use them. The dangers of the sea are great at best, and we should not fail by legislation and education to avoid and remove such as can be overcome.

The committee in their report say :

The petitioners are among the best and most scientific men in the country. They take a very deep interest in the subject, and we think they are fully justified in presenting it to Congress and urging action upon it. Its importance cannot, in the opinion of the committee, be overestimated. Vast numbers of human lives and a commerce of immense value depend for their safety upon the perfect eyesight of the men in charge of vessels and railroad trains. Persons who cannot distinguish perfectly the colors of lights, flags, signals, and buoys, or are liable to mistake them, or who from want of acuteness of vision cannot perfectly observe the forms of objects at ordinary distances, ought not to be placed in positions of responsibility on ships at sea. A perfect watch at sea requires perfect eyesight. The subject is comparatively new, but not the less important; and perhaps for the reason that it is new and important it should have the more careful attention.

Throughout the civilized world there has been for the last few years great attention drawn to defective vision and color-blindness among sea-going men, as well as railroad employes.

Reliable statistics from the best medical experts in Europe and America have proved the existence of color-blindness in about 4 per cent. of men, while in women this peculiar defect is very rare. Color-blindness exists as *red* or *green* blindness, one involving the other. Violet or blue-yellow blindness also exists, though more rarely.

Red and green being the colors which all maritime nations have agreed to show on the port and starboard sides of vessels at night, and red buoys, red storm-signals, and red light-house lights being used, of necessity require on the part of those navigating vessels a normal or perfect perception of colors, and this of course in addition to good eyesight for form, or normal *visual power*.

In proportion as the person is color-blind, in that proportion will the red and green lights or signals be undistinguishable from each other, and the person be uncertain which he sees. This defect exists in all degrees of severity, the lightest forms of it often being the most dangerous, since, if the person who can see a strong red light at a certain distance, while the paler green light cannot be distinguished from the mast-head light, he may be deceived as to his surroundings and fall into fatal errors which he cannot account for or excuse himself for, but which may be wholly attributable to color-blindness, of the existence of which he is himself wholly unconscious. Just such a case has been reported.

Color-blindness is very hereditary. When congenital it is incurable and cannot be palliated by any practical methods. It is also said to be produced by injury, disease, and poisoning by alcohol and tobacco. All these conditions are now recognized in regulations for its control on land and sea.

Till Professor Holmgren, of Sweden, introduced his method of examination, medical experts had no accurate and quickly applied means of testing for color-blindness. This is largely the reason why it and also defective visual power have been overlooked in the past.

Now that attention has been so generally called to these sources of danger on land and sea, European governments and railroad corporations have enacted laws



and adopted rules of control. In this country only one State (Connecticut) has passed the requisite laws. Some railroad corporations have acted, but, as was also first done in Europe, in an uncertain manner, from lack of recognizing the necessity of medical experts to carry out the examination in a thorough and systematic manner.

The maritime nations of Europe have introduced these tests into their navies, and some of them into the merchant marine. Our Government has recognized the importance of the subject, as shown by the action of the three Departments, Army, Navy, and Marine-Hospital Service. In the last it is made compulsory with pilots but not with seamen.

The Supervising Surgeon General of this Department has well shown in his annual report for 1879 the great value of enforced physical examination of seamen, a part of which is testing the color sense and visual power.

To the medical officers alone of these several departments is intrusted this important duty. They are provided with the "Manual" lately published by B. Joy Jeffries, M. D., the head petitioner, who has given the subject great attention and careful study, and the material necessary to carry out the test of Professor Holmgren therein recommended. There are of course no returns from these departments on these points, regulations having been so recently made. When, as in European navies, the tests have been carried out, about the same proportion of seamen are found color-blind as among railroad employes, namely, from 2 to 5 per cent.

This dangerous defect in so large a number of persons cannot but explain the cause of many marine disasters otherwise unexplainable.

A classification in Europe of the reports of 2,408 accidents, between 1859 and 1866, showed—

Want of skill, carelessness of the ship <i>personnel</i> , or accidents which it was impossible to prevent or avoid .....	1,562.
Error of pilot or captain .....	215
Want of observation or proper interpretation of the rules of the road .....	537
Undetermined causes .....	94
	<hr/> 2,408

Under the last three heads are eight hundred and forty-six accidents which might have been due to color-blindness or defective vision.

While maritime powers have sought to eliminate the danger from color-blindness by requiring examinations, all have not directed such methods to be used as would render the elimination certain. Moreover, all are not agreed as to the requisite amount of color perception necessary to render a lookout perfectly safe for the vessel the lookout is on, as well as for the one approaching. There is also no definite standard of visual power acknowledged as necessary in the navigation of vessels. Mutual intercourse and the comparison of the results of different tests would enable the maritime nations taking part in it to avail themselves of each other's experience, and readily lead to the adoption of the best methods of examinations and the requisite standard of requirements.

Dr. Jeffries, in his "Manual" above mentioned, says: "The test for color-blindness now being so simple as to be readily carried out by the surgeons attached to vessels, especially naval medical officers, there can be no great difficulty in having an international commission meet and frame the laws or regulations which shall govern all the navies and merchant marines of the great maritime nations at least. It would then be as readily recognized that every officer and man must be able perfectly to distinguish the red and green lights as to know where they belong and what they mean." This author's experience is based on the examination of over 30,000 individuals, and corresponds with that of all the scientific European observers. The final conclusion in his Manual is: "An international commission should be called to establish rules for the control of color-blindness on the sea, and the carrying out the same examinations among pilots, masters, and crews of steamers and sailing-vessels in the navies and the merchant marine."

It will avail but little if, of two vessels of different nations meeting, but one of them has no color-blindness on the lookout. An international commission would, from the weight of its authority, force examinations even among those nations not participating in it, as well as settle standards, methods, and requirements.

Since the resolution was introduced even greater attention than before has been given to the question of the necessity of freedom from color-blindness and good eyesight among seafaring men. Constant notices of the examinations of pilots, for instance, have been in the daily press, showing the interest of the community in the matter. This interest has been naturally stimulated by the attempts to enlist the press in behalf of defective pilots and defective railroad



employés, it having been made in Connecticut in reference to the latter even a *political* question.

The published reports of examinations in Europe carry up the number to many thousands, and with the same general result of about 4 per cent. of males, or one in twenty-five as color-blind. In our own country, Dr. B. Joy Jeffries reports among 18,556 examinations of males 764 color-blind, *the same per cent.* These individuals were of all classes and occupations.

The medical expert in charge of the tests of the thousands of employés of the Pennsylvania Railroad Company reports over 4 per cent. as color-blind. (In *Medical News and Abstract*, December, 1880, page 711.)

A similar report comes from the medical expert in charge of the Illinois Central Railroad. (*Chicago Railroad Review*, August 28, 1880.)

Of examinations carried out by the different departments of our Government, we have already reports from the Marine Hospital Service of the Treasury in reference to the tests of pilots. Among 2,870 examined up to June 30, 1880, *sixty-four* were found color-blind, and unfit for their positions. (*Annual Report Supervising Surgeon-General Marine Hospital Service*, 1880, page 18.) It is to be remembered that the whole subject of color-blindness and its detection is new to the medical officers, in whose hands it alone can be placed. Familiarity gained by experience will give greater certainty.

There is no compulsory examination of the vision of masters, mates, and seamen in the merchant marine. This is of course as necessary as for pilots, but requires the sanction of Congress to be carried out. It has been repeatedly and most strenuously urged. The whole question is most thoroughly put in the report of the Supervising Surgeon General Marine Hospital Service, 1879 and 1880.

Lieutenant Shroeder, United States Navy, in an article on collisions at sea in "*United Service*," August, 1880, says:

The number of collisions, however, far from decreasing in proportion to the means taken to prevent them, keeps on increasing. This is mainly owing, of course, to the continued increase in ocean traffic and in the speed of modern steamers, but it also shows that we are not keeping up with the increased demands on professional care and forethought."

The English Lloyd's report the average *annual* number of collisions throughout the world during the years 1866 to 1871 was 2,163, resulting in the sinking of one hundred and seventy-five vessels. This number only includes those that were insured, and also necessarily excludes a great many whose cases were settled without litigation. This may readily be believed when a society of ship-masters in Marseilles report that in the Mediterranean only about twenty vessels in a hundred carry *red* and *green* side-lights. When they see a steamer coming they show a red, green, or white light until she has passed. The French carry but few; the English, American, and other northern nations carry still less, and the Italian, Greek, and Levantines none at all. Lieutenant Schroeder says:

Color-blindness being a not infrequent physical defect, is cited as an argument against the use of colored position lights, as any man of the crew is liable to lookout duty at night. Persons troubled in this way, however, are not fitted for active sea duties, and have no business on board ship. Here again, though, we see the disadvantage under which merchant captains labor. Their crews are not subjected to such physical examinations as are the recruits for the naval service, and it may well happen that one of their lookouts cannot distinguish between red and green. It must be remembered that very much the greater number of vessels met with at sea belong to and are equipped by private parties, and rules and regulations should be framed with due regard to their frequent inferiority in *material* and *personnel*.



Unfortunately, too, this peculiar defect, although most often originating in birth, may be brought about by various causes, such as bruises on the head, typhoid fever, or similar diseases, excessive use of tobacco and alcohol, to all of which seamen are particularly liable, especially the first and last.

To the assertion of danger from color-blindness on the railroads it has been replied that accidents have rarely if ever been traced to this cause. The fact is that they have not been investigated in this light. Certainly color-blindness will explain many maritime accidents; and these are now more likely to be investigated. The inspector-general of steam-vessels says, annual report, 1880, page 6:

Another case to which my attention has been called, and which is of a serious character, more strongly shows the wisdom of requiring an examination for color-blindness. On the night of July 5, 1875, there was a collision near Norfolk, Virginia, between the steam-tug *Lumberman* and the steamship *Isaac Bell*, the former vessel bound to and the latter from Norfolk. The accident occurred at about nine o'clock p. m., on an ordinarily clear night, under circumstances which until recently seemed more or less mysterious. The master of the steamer and all his officers made oath that at the time signals were made to the tug the latter was from one to two points on the steamer's starboard bow, and consequently the steamer's green light only was visible to the approaching vessel. Yet the master of the tug, whose statement was unsupported by any other testimony, asserted that the steamer's red light was exhibited, and he signaled accordingly. The discrepancy in the statements was so great that many persons uncharitably charged the master of the tug with being intoxicated, although no evidence was ever offered in support of the charge. By this accident ten persons lost their lives. Upon a visual examination of this officer under the rules during the past summer by the surgeon of the marine hospital at Norfolk, he was found to be color-blind, two examinations having been accorded him with an interval of ten days between them. The Supervising Surgeon-General reports that up to June 30, 1880, 2,870 pilots were examined, and sixty-four of this number were found to be color-blind.

Professor W. Thomson, of the Jefferson Medical College, in Philadelphia, says, in a recent clinical lecture on color-blindness:

I have been informed by a prominent lawyer in Baltimore, who is counsel for several steamship companies, that he is satisfied that many cases in which he has defended his companies for injuries done to sailing-vessels in Chesapeake Bay could be accounted for in no other way than by supposing that the lookout on one or other boat was color-blind.—*Medical News and Abstract*, December, 1870, page 705.

Our Government, like several other maritime powers, has adopted tests of visual power and color perception for naval recruits and pilots. The amount of visual power required of *sailors* is defined, but not the amount of this for *pilots*, or any definite amount of color perception for officers or men of the Navy or for pilots. This is very natural, as there are no standards recognized universally or standard tests. Among some of the European states there are requirements of visual power and color perception explicitly set down, and based on the reports of the medical experts of highest authority whom the governments have called upon for advice. (Jeffries's Manual, pages 255 and 262.)

The newness of the whole subject, a desire to not exceed what is both safe and practical in requirement, and a knowledge that an international commission must sooner or later settle these points for the guidance of all, contribute largely to this condition.

While our Government Departments have adopted the most simple, sure, and practical test for color-blindness as a standard, and one the medical officers who employ it can readily learn, the lack of definite rules as to the amount of defect in the color-sense which may be safely permitted has been seriously felt. It has also served to hinder the proper carrying out of this reform.

From the report of the Surgeon-General Marine Hospital Service it will be seen that the Treasury Department yielded to the pressure



brought to bear to retain defective pilots in their places, and allowed them to be re-examined by inspectors of steamboats with signal lights and flags, even after being reported by the medical officer as partially color-blind. It is most difficult for the laity to understand the *hidden danger*. The Treasury Department, when fortified by the results of a conference of naval officers and experts from all the great maritime nations, would never place the decision in the hands of steamboat inspectors. Surgeon-General Hamilton well says, pages 20 and 21 :

No test will be satisfactory to those persons who fail to pass.

When signal-lights are proposed as tests for color-blindness, in opposition to the united opinions of the best-informed ophthalmologists in Europe and America, it seems to be assumed that the medical examiner has a peculiar and special interest in the rejection of the candidate. This assumption needs no refutation.

The superintending surgeon of the Illinois Central Railroad showed by absolute testing of the color-blind employes of that road "the danger and uncertainty of the flag test." (Hamilton's report, page 21.)

A most instructive case, entirely in confirmation of this, is given in a "report of a case of color-blindness" by Surgeon W. H. Hutton, which has been quoted and commented on with great interest by the daily press. (Hamilton's report, page 155.) Every sort of pressure was brought to bear on the examining surgeon to induce him to pass a color-blind pilot, or to call him only partially so, in order that he could then be tested by the inspectors of steamboats, who would quickly decide he was all right and relicense him. It is to be remembered, as the Treasury rules now stand, that they could give him at once a license as master of a vessel, since *masters or sailors do* not have to be tested.

Here, again, had the Treasury Department been fortified with the results of an international commission, Surgeon Hutton would have had such definite instructions as to have rendered attempts at pressure useless. Surgeon-General Hamilton would have been sustained in his opposition to tests being taken out of medical officers' hands by steamboat inspectors.

Yielding to the same sort of pressure in a still more exaggerated extent the board of health of Connecticut recently agreed to test defective railroad employes with flags and lanterns. It is true their existence as a board was threatened by both political parties previous to the recent State elections. The introduction of color-blindness into politics afforded food for merriment, at the expense of the State, in many of the journals. A thorough *personal* investigation of the subject by the members of the board would have, of course, obviated their uncomfortable position. They would have had thorough support from the resulting experience of an international commission.

The cry of persecution in every form and on all sides was raised in Connecticut because the board of health, under law, required of engineers and firemen simply the *average* normal visual power or eyesight. In vain did the medical experts show that this was a *low* standard, and that when it was understood the community would demand a higher one of *all* employes. Of other employes engaged in moving trains no more sight was required than of a sailor entering the United States Navy. Now, how uselessly would the counsel of the defective employes have argued with the board of health had they had behind them the authority of an international commission!

The same sort of international commission for *railroads* has been proposed since this bill was entered. The minister of public works in Belgium appointed a commission to investigate and report on all



the relations of color-blindness and visual defects to the working of railroads. This commission made their report June 10, 1880. (*Annales d'Oculistique*, September-October number, 1880.) The report of this commission entirely substantiates the recommendations of the international medical society of September, 1879, at Amsterdam. They prove the necessity of the examinations being carried out by medical experts only, and give the details of the methods recommended for testing, the standard of requirements, rules and regulations to govern the examiners, &c. They close their very practical report by urging the necessity of all railroad corporations entering into a general reform of this kind, and strongly advise an international commission to agree upon standards of requirement and tests, in which Belgium shall take the initiative step, just as our Government is authorized by this bill to do in reference to the sea.

The Chicago Railway Review, November 20, 1880, says:

We would recommend this international railroad commission proposed by the Belgian committee to the serious consideration of our great corporations. If Congress will authorize the Government's taking the initiative in relation to the sea our country will have the honor of commencing so important and valuable a step in civilization. If the State governments would at once organize an interstate commission for the railroads we might even now get the start of Belgium. Connecticut has been the first to pass laws and enforce them. Perhaps to her belongs the right to inaugurate such an interstate commission to discuss and agree upon standard methods of testing visual power and color perception, and the necessary standard of requirements.

The minister of public works of France, December 27, 1879, notified the railroads of the danger of defective vision and color-blindness, and asked them to suggest such measures as the administration should take. This circular of the minister was replied to by a report from the administration of railroads, substantially the same as the Belgian commissioners' report. It received the sanction of the superior railroad commission, and the minister of public works communicated it to the chief surgeons of the companies, asking for their opinion of the value of the different methods of testing therein proposed. (*Examen de la Vision chez les employés de chemins des fer*. Preface, 1880.)

The Boston and Hingham Steamboat Company, who carry thousands of pleasure seekers to and from Nantasket Beach at night, through a tortuous channel and among the shipping in the harbor, have the past two seasons had all their officers and employés tested by a medical expert, although not called upon by law so to do. Now, this expert had no standard, universally recognized, to guide him. He says in his report of June 28, 1879, that his decision as to fitness was guided "by the usual standard, and the color test being adopted in the navies, pilot service, and merchant marine of Europe, and enforced on the railroads there." Had he had a standard agreed upon as safe and fair by an international commission it would have been of great service. Refusal to give a certificate naturally excites in the mind of the *examined* an idea of something personal, which the medical expert has to bear the brunt of. A recognized standard having the authority of such a commission would carry great weight, and no doubt cause owners of vessels and steamboats to have all their employés tested long before Congress makes such physical examinations compulsory, by yielding to the repeated calls to do so from the Treasury Department. (*Vide* annual reports of Surgeon-General Marine Hospital Service, 1879, 1880.)

Imperfect as are the regulations of the Treasury Department in relation to tests and requirements of pilots, they are much in advance of those of England at the present time. There the board of trade required



tests of the color perception of masters and mates as long ago as January, 1877. The method of carrying out examinations has, however, rendered the whole quite useless, as is well shown by the reports to Parliament. The matter was left to the "examiners of navigation and seamanship;" *no medical men were employed*. These examiners were provided with *cards* and pieces of *glass*, white, black, red, green, yellow, and blue. Further examination was refused to any candidate failing in even one of these colors, and a special report was to be made to the board of trade.

No instructions have been issued to the examiners as to the amount of visual power and color perception required, each case being decided on its own merits, and the examiners being directed to apply to the board of trade in all cases of doubt and difficulty.

In the return to an order of the honorable the House of Commons, August 5, 1879, it will be seen that these non-medical examiners tested masters and mates with these pieces of colored glass and cards by asking them the *name* of the color. Now it is admitted and well understood that asking the *names* of color is no test whatever of a person's color-sense, and any method dependent on this is wholly unreliable. No better proof of this exists than the report of these examiners in relation to thirty-nine cases of doubtful color perception.

A person born color-blind remains so, and there is no present cure for it. Yet among these reports we find several cases of masters and mates declared color-blind by the examiners' tests and subsequently allowed to pass. That naming colors will amount to mere guessing is perfectly shown by the report of the "nature of errors as to color." This same sort of testing of railroad employes in England has been very thoroughly shown up by medical experts, and the uselessness of it proved. A man ignorant of color-names, and most males are, or frightened or confused, is just as likely to *prove* himself thereby color-blind, when he is *not*, as a color blind person is quite sure of passing as perfect.

No better proof also is needed of the necessity of examinations being made by medical experts and proper tests being used, than the fact that those *not* medical examiners of navigation and seamanship found only twenty-six color-blind among 5,976 males tested, or less than  $\frac{1}{2}$  per cent., while everywhere in the world where males have been tested by competent experts about 4 per cent. have been found thus defective.

No report of visual power or good eyesight is made, and, as stated, no instructions are issued to these examiners as to the *amount of visual power or color perception*.

Equally faulty with lack of proper examination is the rule of the board of trade that color-blindness is not to prevent a man receiving a certificate of a higher grade, only on this certificate is stated "failed to pass the examination in colors." This will hardly prevent collision from defective vision, and sounds strange from the land of *Dalton*. No wonder the international commission is earnestly advocated in Great Britain.

The great value and necessity of an international commission has been shown, not only by the character and standing of the petitions to Congress, but by the direct evidence of all the medical experts who have been *practically* engaged in the work of examination; especially by the urgent support of those gentlemen in Europe whom the several governments here called upon for advice in the framing of regulations for the navy and merchant marine, as Professor Holmgren, of Sweden, the originator of the movement of control, and Professor Donders, of Holland, than whom we have no higher authority, and



who went to England this last summer to lecture before the British Medical Association on this topic.

The dismissal from service, or the refusal to admit to the navy or mercantile marine for defective eyesight or color-blindness, is of course a serious matter for those interested. Every government will be desirous of being on the safe side, and they must naturally refer the question of the amount of defect permissible to those who are familiar with the question practically, namely, the ophthalmic surgeons whose everyday's work includes these decisions.

Hence the interest the several societies of oculists have expressed in this whole question of defective vision, and especially in this proposed international commission to determine *standard* methods of testing and standard requirements. Several of the original petitioners were professors of ophthalmology in our universities, &c.

The American Ophthalmological Society at their sixteenth annual meeting in July last at Newport passed the following vote:

The society would hereby heartily approve of the proposed international commission in reference to visual acuteness and color-blindness, and the secretary of the society is hereby directed to transmit this vote to the Naval Committee of Congress.

At the forty-eighth annual meeting of the British Medical Association at Cambridge, last August, a very interesting discussion followed Professor Donders's lecture on color-blindness, at the conclusion of which the following resolutions were unanimously passed, the report of the Naval Committee of Congress and the bill being before the members:

*Resolved*, That it is most desirable to establish *international standard tests of visual acuteness and of color perception*, by means of an international commission, to which the several governments should be invited to send delegates.

*Resolved*, That, in all countries, persons upon whom may devolve the charge of life, by sea or land, where signaling is employed, with or without the use of color, should be required to submit themselves to such standard tests of their sight, both before being admitted to their several services and also at stated subsequent intervals.

*Resolved*, That an important part of the duty of such an international commission should be to devise some *common system of signaling*, especially on sea-going ships and for all coast service; and that the standard tests should be decided on with special reference to such common system of signaling.

The sixth international congress of ophthalmology, which met at Milan in September last, voted "to indorse the resolutions and opinions of the ophthalmological section of the British Medical Association," and—

1. That an international commission should be appointed by the several governments to determine standards of tests and of requirements of visional power and color perception for railroad employes and the navy and merchant marine.

2. That in all countries persons called upon to distinguish the signals, on land or sea, should be obliged to submit to an examination not only before entering service, but also afterward at stated intervals.

3. That this international commission should be charged with the determination of an uniform system of maritime signals.

Since then the "Ophthalmological Society of Great Britain and Ireland" has appointed a committee for the purpose of considering "the defects of sight in relation to the public safety and communicate with the government on the subject." This committee has commenced its labors and are now putting themselves *en rapport* with what has been done in relation to control of color-blindness and defective vision on land and sea in all the different countries. The



passage of this bill causes the United States Government to initiate a commission which they will prove the value of to the British Government.

The gentlemen in Europe to whom the various governments will refer this question for decision are awaiting the action of Congress. One of them in Norway writes to one of your petitioners:

I congratulate you with what you have already carried through, and hope that Congress will pass the proposed bill. No doubt other countries will then resolve to be represented at an international commission.

Another, Professor Donders, of Holland, writes:

When will the commissioners meet? And will the American Government take the initiative?

Constant European correspondence with your head petitioner shows that men of science are looking to America to commence this movement.

Captain Robert B. Forbes writes:

The subject is of great importance, and if you can show me where I can be of use, I shall certainly try to help you. When I went to sea I took it for granted that all men had eyes like mine, and I frequently blew up men for neglect and stupidity who were probably more or less blind.

The Secretary of the Navy, in his annual report, (page 116,) says:

The safety of a vessel and crew may turn upon the accuracy of the powers of vision, and hence the importance of ascertaining the soundness of the eye, both as regards color perception and refraction. It is to be regretted that no uniform standards for such examinations exist among the various maritime nations as seem to be demanded in the interest of the safe navigation of the seas. Some movement on this important subject is desirable, and I recommend that Congress authorize the creation of a commission, under the national sanction, to determine these matters by scientific and uniform methods.

General Order No. 253 of the United States Navy, July 16, 1880, a revised code of "regulations for preventing collisions at sea," has been approved by nearly all the maritime nations of the world, and adopted by them to go into effect September 1, 1880, thus becoming an integral part of the law of the sea. It is hereby adopted for the naval service of the United States, to go into effect on the above-mentioned date.

This code requires colored signal-lights and calls for normal visual power on the part of those who are to read them. To be assured of this by international agreement is the object of this commission.

The lamentable lack of obedience to the international code, which requires red and green side-lights to be carried by all vessels, has been commented on. An international commission would by the diffusion of knowledge on this very point, and from the weight of its authority, force the various maritime powers, even those not participating, into requiring their merchant marine to comply with what is not only a custom but a law.

Attention would thus also be drawn to the very great necessity of the physical examination of officers and men in relation to their visual power and color-perception; and *standard requirements* of these qualities being determined on, no excuse could be given for not complying with them. Every officer and sailor in the Navy and merchant marine would know just what must be his physical condition in this respect to be fit for duty. The employment by ship-owners of those not up to the international standard would be at their own risk, a most sure means of preventing collisions at sea.

A few years ago in England a royal commission was appointed on lights, buoys, and beacons, consisting of five members. There is the best authority for stating that "one of these was so color-blind that he could not distinguish a red light from a dull white one, and another, though not color-blind in the ordinary sense, was somewhat abnormal in his perception of them." "An occasional clerk of the



commission was once found writing with *red* ink believing it to be black." There is equally good authority for asserting that *two* members at least of the naval committee could not pass the color test and would be very dangerous pilots.

While the color-blind have even been successful as portrait painters (provided their *red* and *green* paints were carefully marked) it would be well that the several governments taking part in this international commission should not send color-blind delegates. The instances just mentioned show the natural possibility of it.

#### APPENDIX.

[Boston Sunday Herald, Sunday, July 25, 1880.]

COLOR-BLINDNESS AND DEFECTIVE VISION—THEIR CONTROL ON LAND AND SEA—WHAT THE NATIONAL AND STATE GOVERNMENTS ARE DOING IN REGARD TO THESE MATTERS.

A year ago the Herald called the attention of the public to the regulations then in force in this country protective against defective vision and color-blindness on our railroads and at sea. The purpose now is to present the public what the past twelve months have been productive of in the same direction. The following order explains what has been done in the Army. It should be added that the cadets entering and leaving West Point this year were carefully tested by the medical board convened for their physical examination:

"[General Orders No. 82.]

"HEADQUARTERS OF THE ARMY,

"ADJUTANT-GENERAL'S OFFICE,

"Washington, August 13, 1879.

"By direction of the Secretary of War, the following additional instructions with regard to the examination of the eyes of recruits are published for the guidance of recruiting and medical officers and boards of inspection. \* \* \* This test will be made by means of cards, prepared under the direction of the Surgeon-General of the Army. The black spots on the cards will be circular, four-tenths of an inch in diameter, and the recruit must be able to count them with facility at twenty feet distance.

"At the principal recruiting depots all accepted recruits will be examined for color-blindness by the medical officers on duty. Any defect observed will be noted on the descriptive list of the soldier, but will not, of itself, constitute a cause of rejection, except in the case of enlistments for the Signal Corps. The examination for this defect will be made by the method of Holmgren. Test-wools for this purpose, accompanied with directions for their use, will be issued to the principal recruiting depots by the Surgeon-General.

"By command of General Sherman.

"E. D. TOWSEND,

"Adjutant-General."

By a circular of the Treasury Department, dated June 11, 1879, medical officers of the Marine Hospital Service were directed to examine, free of expense, any seamen owners of vessels presented to them. Such examinations were not compulsory. Since then compulsory examination of the visual power and color perception of pilots has been ordered by the Treasury Department.

[Circular.]

*Examination of pilots for color-blindness.*

[1880.—Department No. 14. Steamboat inspection.]

TREASURY DEPARTMENT,

Washington, D. C., February 17, 1880.

*To supervising and local inspectors of steam-vessels:*

By an amendment of rule 47, rules and regulations of the board of supervising inspectors, adopted at the twenty-eighth session of the board, recently held in this city, and which was approved by the Secretary of the Treasury February 13, 1880, and promulgated in Department Circular No. 13, 1880, it was ordered that all persons applying for either a renewal of license or an original license as pilots on steam-vessels shall be required to undergo a visual examination, in order that it may be determined whether such person can properly distinguish the colored lights used as signals on steam-vessels; and in future inspectors will issue pilots' licenses only upon certificates of surgeons of the United States Marine Hospital Service that applicants therefor fulfill all the requirements of the rule referred to. Under the provisions of Department circular of June 11, 1879, surgeons of the



Marine Hospital Service are directed to make such examinations free of expense to persons applying therefor.

JOHN SHERMAN, *Secretary.*

This circular has now been modified by the following one. They are of importance to all pilots in the United States and those employing them:

ARMY—TREASURY FOR PILOTS.

[Circular.]

*Modification of Department Circular No. 14, relating to examination of pilots for color-blindness.*

[1880.—Department No. 19. Steamboat inspection.]

TREASURY DEPARTMENT.

Washington, D. C., March 9, 1880.

*To supervising and local inspectors of steam-vessels:*

In view of the expense and hardship likely to accrue to pilots living at points remote from stations of the Revenue Marine Hospital Service in visiting such stations for the purpose of being examined as to color-blindness, as required by the amendment to rule 47, rules and regulations of the board of supervising inspectors, Department Circular No. 14, dated February 17, 1880, is hereby so modified as to allow pilots employed at places remote from a marine hospital station to be examined by any respectable resident physician, whose certificate that such pilot is exempt from the disease known as color-blindness shall accompany the license and oath of office of such officer when sent to any board of local inspectors for renewal of his license in the manner provided in rule 42, rules and regulations. Upon the receipt of the certificate a license shall be issued the same as though said examination had been made by a marine hospital surgeon. This modification is not to be applied to applicants for original licenses. They, in all cases, must be examined in the manner provided in Circular No. 14.

A second visual examination will not be required in any case, and inspectors will therefore retain all certificates upon their permanent files for reference in cases of application for renewal of licenses.

JOHN SHERMAN, *Secretary.*

It will thus be seen that there is only enforced examination of pilots in the merchant marine. The Boston and Hingham Steamboat Company was the first, and remains the only, steamboat company which requires a thorough examination and certificate by a medical expert of the visual power and color perception of all its officers and crew who are called upon to distinguish marks, buoys, and colored signals. This in addition to the required examination of their pilots by the medical officer of the Marine Hospital Service.

Surpervising Surgeon-General Hamilton, of the United States Marine Hospital Service, in his report for last year, shows very conclusively the great value of compulsory examinations of all seamen in the merchant marine. Under the regulations of the circular of last year but few sailors were presented for volunteer examination. Surgeon-General Hamilton says:

"In this connection it is proper to state that while the objects of the circular have been approved by the medical profession, the United States shipping commissioners, the Philadelphia Board of Trade, the Ship-Owners' Association, the National Board of Steam Navigation, the Maritime Exchange of Philadelphia, and shipping associations generally, the sailors' boarding-house keepers, disreputable owners and ship-masters, have usually opposed the examinations. On this head, Captain Duncan, the United States shipping commissioner for the port of New York, writes as follows:

"My officers call the attention of all outgoing captains, when opening their articles, to the desirability of such examination, and the facilities for it offered by the Government. A large proportion of captains heartily approve of the system, and promptly declare their intention of adopting it; but most of them quite as promptly ignore it when their crews are shipped.

"The reason is, as I predicted, the 'blood money' landlords will pay more to captains or owners for the privilege of filling their crew lists without than with examination, and a little money of this kind, unlawfully extorted from seamen seeking employment, seems of more consequence than the physical condition of their seamen."

An investigation of this subject shows that the people receiving the money are the class of owners and ship-masters above referred to. Should a boarding-house keeper fail to pay "blood money," his boarders are not shipped; and, as a natural result, nearly all this class of men act, perforce, as middle-men in this nefarious business. A severe penalty visited upon all persons convicted of paying or receiving "blood money" would relieve sailors of an onerous tax, and take away the incentive to the opposition now shown by the "blood money" takers.

The board of commissioners ordered physical examination of the Boston police last year, and the board of fire commissioners ordered a similar examination of the



firemen; in each case the examinations were conducted under the direction of the city board of health. The Boston and Hingham Steamboat Company and the Boston and Lowell Railroad Company required all their employes to be examined for color-blindness by an expert. The proportion of color-blind which has been found in Dr. Jeffries's examinations is as follows: Out of 11,735 men and boys, he found 488, or 4.15 per cent. of color-blind; out of 10,605 woman and girls, he found only six. Dr. Jeffries is of the opinion that the difference is inherent in sex, and has nothing to do with training. If sound and healthy men are necessary for employment in the Army, on coasting lines, and as railroad employes on shore, how obviously necessary that sailors should be seaworthy when beyond the possibility of replacement and out of the reach of professional assistance. The consequences to vessels of being at sea with a disabled crew, or of having on board as lookout a man unable to distinguish signal lights, are too obvious to need elaboration.

ORDER OF NAVY—PETITION—REPORT—RESOLVE BILL.

During the past year examinations of the visual power and the color perception of all sailors entering the United States Navy have been carried out. The cadets entering and leaving the United States Naval Academy at Annapolis are, of course, also tested, as part of their physical examination, by the inspecting medical board. The necessity for a knowledge of the color perception of all officers and men already in the Navy is shown by the following:

"[Circular.]

"NAVY DEPARTMENT,

"BUREAU OF MEDICINE AND SURGERY,

"Washington, D. C., March 30, 1880.

"Upon the receipt of this order and the colored worsteds to be used as tests, medical officers of ships and stations will make a careful examination of all persons in the Navy as to their color sense, the result to be reported to this bureau according to the accompanying form. Quarterly returns will also be made of the result of the examinations of those who shall be hereafter examined for the service.

"The method to be employed is that of Holmgren. Additional tests may be employed at the option of the examiner, in which case the fact is to be so stated.

"PHILIP S. WALES,

"Surgeon-General United States Navy."

INTERNATIONAL STANDARD TESTS AND REQUIREMENTS.

The three Departments of the United States Government that have thus acted in reference to the control of defective vision and color-blindness have not yet established any standard requirements by which their medical officers can be governed in their decisions. The value of such is shown by the result of the following petition presented to the last Congress, which was signed by the professional scientists of our New England universities, as well as ophthalmic surgeons:

"To the honorable Senate and House of Representatives in Congress assembled:

"Whereas a normal acuteness of vision and good color perception are needed in officers and crews for the safe navigation of vessels; and

"Whereas most maritime nations now require a certain standard for these qualities by absolute test, the undersigned would most respectfully petition your honorable body to take into consideration a general law of control, in the Navy and merchant marine, of color-blindness and visual acuteness, and the agreement by an international commission of definite and uniform standards of testing these necessary qualifications."

This petition was presented by Hon. B. W. HARRIS, January 29, 1880, and referred to the Naval Committee, who gave a hearing to the petitions March 3, 1880, and reported to Congress, as follows:

"COLOR-BLINDNESS IN THE NAVY.

"The Committee on Naval Affairs, to which were referred the petition of B. Joy Jeffries and others and the several petitions in aid thereof, has considered the subject, and submits the following report:

"The petitioners are among the best and most scientific men of the country. They take a very deep interest in the subject, and we think they are fully justified in presenting it to Congress and urging action upon it. Its importance cannot, in the opinion of the committee, be overestimated. Vast numbers of human lives and a commerce of immense value depend for their safety upon the perfect eyesight of the men in charge of vessels and railroad trains. Persons who cannot distinguish perfectly the colors of lights, flags, signals, and buoys, or are liable to mistake them; or who, from want of acuteness of vision, cannot perfectly observe the forms of objects at ordinary distances, ought not to be placed in positions of responsibility on ships at sea. A perfect watch at sea requires perfect eyesight. The subject is comparatively new, but not the less important; and, perhaps for the reason that it is new and important, it should have the more careful attention.

"Throughout the civilized world there has been, for the last few years, great at-



tention drawn to defective vision and color-blindness among sea-going men as well as railroad employes.

"Reliable statistics from the best medical experts in Europe and America have proved the existence of color-blindness in about 4 per cent. of men, while in women this peculiar defect is very rare. Color-blindness exists as red or green blindness, one involving the other. Violet or blue-yellow blindness also exists, though more rarely.

"Red and green being the colors which all maritime nations have agreed to show on the port and starboard sides of vessels at night, and red buoys, red storm-signals, and red light-house lights being used, of necessity requires on the part of those navigating vessels a normal or perfect perception of colors, and this, of course, in addition to good eyesight for form, or normal visual power.

"In proportion as the person is color-blind, in that proportion will the red and green lights or signals be indistinguishable from each other, and the person be uncertain which he sees. This defect exists in all degrees of severity, the lightest forms often being the most dangerous, since, if the person who can see a strong red light at a certain distance, while the paler green light cannot be distinguished from the mast-head light, he may be deceived as to his surroundings, and fall into fatal errors, which he cannot account for or excuse himself for, but which may be wholly attributable to color-blindness, of the existence of which he is himself wholly unconscious. Just such a case has been reported.

"Color-blindness is very hereditary. When congenital it is incurable and cannot be palliated by any practical methods. It is also said to be produced by injury, disease, and poisoning by alcohol and tobacco. All these conditions are now recognized in regulations for its control on land and sea.

"Till Professor Holmgren, of Sweden, introduced his method of examination, medical experts had no accurate and quickly-applied means of testing for color-blindness. This is largely the reason why it, and also defective visual power, have been overlooked in the past.

"Now that attention has been so generally called to these sources of danger on land and sea, European governments and railroad corporations have enacted laws and adopted rules of control. In this country only one State (Connecticut) has passed the requisite laws. Some railroad corporations have acted, but, as was also first done in Europe, in an uncertain manner, from lack of recognizing the necessity of medical experts to carry out the examination in a thorough and systematic manner.

"The maritime nations of Europe have introduced these tests into their navies, and some of them into the merchant marine. Our Government has recognized the importance of the subject, as shown by the action of the three departments, Army, Navy, and Marine Hospital Service. In the last it is made compulsory with pilots but not with seamen.

"The supervising surgeon-general of this department has well shown, in his annual report for 1879, the great value of enforced physical examination of seamen, a part of which is testing the color sense and visual power.

"To the medical officers alone of these several departments is intrusted this important duty. They are provided with the Manual lately published by B. Joy Jeffries, M. D., the head petitioner, who has given the subject great attention and careful study, and the material necessary to carry out the test of Professor Holmgren therein recommended. There are, of course, no returns from these departments on these points, regulations having been so recently made. When, as in European navies, the tests have been carried out, about the same proportion of seamen are found color-blind as among railroad employes, namely, from 2 to 5 per cent.

"This dangerous defect in so large a number of persons cannot but explain the cause of many marine disasters otherwise unexplainable.

"A classification in Europe of the reports of 2,403 accidents, between 1859 and 1866, showed:

Want of skill, carelessness of the ship's personnel, or accidents which it was impossible to prevent or avoid	1,562
Error of pilot or captain	215
Want of observation or proper interpretation of the rules of the road	537
Undetermined causes	94

Total 2,408

"Under the last three heads are eight hundred and forty-six accidents which might have been due to color-blindness or defective vision.

"While maritime powers have sought to eliminate the danger from color-blindness by requiring examinations, all have not directed such methods to be used as would render the elimination certain. Moreover, all are not agreed as to the requisite amount of color perception necessary to render a lookout perfectly safe for the vessel the lookout is on as well as for the one approaching. There is also no definite standard of visual power acknowledged as necessary in the navigation of vessels. Mutual intercourse and the comparison of the results of different tests would



enable the maritime nations taking part in it to avail themselves of each other's experience, and readily lead to the adoption of the best methods of examination and the requisite standard of requirements.

"Dr. Jeffries, in his Manual above-mentioned, says: 'The test for color-blindness now being so simple as to be readily carried out by the surgeons attached to vessels, especially naval medical officers, there can be no great difficulty in having an international commission meet and frame the laws or regulations which shall govern all the navies and merchant marines of the great maritime nations at least. It would then be as readily recognized that every officer and man must be able perfectly to distinguish the red and green lights as to know where they belong and what they mean. This author's experience is based on the examination of over thirty thousand individuals, and corresponds with that of all the scientific European observers. The final conclusion in his Manual is: 'An international commission should be called to establish rules for the control of color-blindness on the sea, and the carrying out the same examinations among pilots, masters' and crews of steamers and sailing-vessels in the navies and the merchant marine.'

"It will avail but little if, of two vessels of different nations meeting, but one of them has no color-blindness on the lookout. An international commission would, from the weight of its authority, force examinations even among those nations not participating in it, as well as settle standards, methods, and requirements.

"The committee recommends the adoption of the joint resolution herewith reported as a first step toward the accomplishment of the object in view.

"In the House of Representatives, May 24, 1880, Mr. B. W. HARRIS, from the Committee on Naval Affairs, reported the following joint resolution relating to color-blindness and visual acuteness in persons employed in the Navy and merchant marine:

"Whereas it is important that definite and uniform standards of examination for color-blindness and tests for visual acuteness in persons employed in the Navy and the merchant marine should be established which shall be in harmony with such standards and tests established or to be established by other nations: Therefore,

*"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of State is hereby authorized to designate such officer or officers in the diplomatic or consular service of the United States, and the Secretary of the Navy is hereby authorized to detail such officer or officers of the Navy of the United States as may be deemed qualified for such service, to attend and represent the United States in any international congress held to consider and act on said subject. And such officers so designated and detailed shall join in a report of the proceedings of such congress and of the conclusions reached thereby, if any, to the President of the United States, to be by him laid before Congress, to the end that an international system of examinations and tests as aforesaid may be established by law."

This bill will come up at the next session of Congress. Meanwhile, the attention of other maritime nations is being called to the whole question and the usefulness of the proposed international commission. Each country would naturally include in its representatives, besides officers of the navy and diplomatic service, some professional scientists, who would, from their practical acquaintance with the subject, be able to answer the questions which would arise in such a commission. Naval officers know what is required to be seen, what colors and combinations, &c., and they must depend on the medical experts as to how much visual power is necessary for this, as well as how good color perception. As to the practicability of the various methods of examination, their advice also must be sought, since it is only these medical experts who have tried these methods by the thousands of examinations lately made in Europe and this country.

#### RAILROADS. STATE ACTION.—CONNECTICUT REGULATIONS.

##### *Visual power and color-blindness on railroads.*

In the volume published last year by Dr. B. Joy Jeffries, of Boston, on "Color-Blindness, its Dangers and its Detection," adopted as a manual by the United States Government, on page 177 he says: "The Government can, and no doubt will, carry out proper examinations for color-blindness in the Army and Navy. General national laws can also be enacted as to the merchant marine; international will come in time as a matter of necessity. The difficulties with the railroads are, however, very great. Here the interests and the safety of the community have to contend with ignorance, prejudice, pecuniary considerations, and incredulity born of supposed immunity from danger. These corporations have no surgeons attached to their roads who in their interests could carry out proper examinations to both protect themselves and the community. Even when interest is awakened from acknowledged danger justly feared, railroad managers are very likely to turn to any one calling himself a medical man and rely on his statement as to his ability to examine and pass judgment on their employés. Then, when they are satisfied from his reports that they are safe, and accident happens, color-blindness is proved in the employé before the court and jury, and at once undeserved discredit is thrown upon the surety and usefulness of such examinations. It is, therefore, without



hesitation that I would caution as to the choice of those to be engaged in testing railroad employes for color-blindness. The life-insurance companies of the country recognize this most thoroughly, so much so that examinations for life insurance is almost a specialty."

Time has certainly proved that Dr. Jeffries was right. The United States Government has acted promptly where it could. Just the difficulties spoken of have been met with by the railroads. In Massachusetts the only railroad that has had any of its employes tested by a medical expert is the Boston and Lowell, and the report to the manager in the *Advertiser* of August 14, 1879, conclusively shows the necessity of these examinations. There is, however, no law to prevent the continuance in office of those employes found defective. The public are probably familiar with the failure, so far, of the attempts to have such a law enacted. Very many of the railroads of the country are known to have carried out, or are carrying out, examinations of their employes. But, at present, no access can be had to their official reports. It is hazarding but little to foretell that an experience similar to that of Europe will be met with in this country, viz: total failure to protect stockholders, employes, and the traveling community from the hidden dangers of defective vision and color-blindness through any examinations by other than experienced medical experts, and legal enactments preventing the corporations from employing those found below a requisite standard equally established by competent authority.

#### STATE LEGISLATIVE ACTION.

Connecticut has, through the action of our officials, had opportunity to steal from us the honor of being the pioneer in this work of reform, which must naturally come by the legislative enactments of the individual States, provided the General Government does not step in before the railroads.

The railroad commissioners of Connecticut, in their report, January, 1880, devote much space to the subject, and say: "But, if it has been thought necessary for the protection of life to adopt signal colors of such marked difference to the normal eye as red and green, then the danger of trusting life to the ability of the color-blind eye to detect a difference simply, in quantity or intensity of light, affected by all the variations of the atmosphere and conditions of the individual's eye, will be readily admitted. \* \* \* Examination of railroad employes becomes, therefore, a matter required by public safety. These examinations should not only be required of each applicant for employment, but should be made periodically and systematically; for while those born color-blind can never be cured, those at one time normal-eyed even may become color-blind through injuries, disease, or the excessive use of alcohol and tobacco. And, again, the examinations must be by qualified persons, with suitable tests, for any imperfect examination is worse than none, allowing, as it would, a blind man to act with the confidence of one seeing. \* \* \* Periodic examinations by competent specialists are required on most of the European roads; they should be by law enforced here; for, although some of our railroad companies have, within the past six weeks, turned their attention to this subject and had examinations of their employes made, the examinations should be universal and uniform, carried out thoroughly by skilled experts, and not left to the discretion of any one."

The whole subject was, in consequence of this report, referred to the joint committee on railroads, who granted a public hearing, and from the expert testimony presented were induced to report a bill to the Legislature, which readily passed both branches of the State government, and was signed by the governor. This bill is here given in full, as so important in its relations to the railroad corporations and the public. The rights of the various parties interested are carefully considered, and the exact duties of examiners and officials defined. The rules and regulations emanating by law from the State board of health have just been made public, and we therefore give them in full. They concern directly many thousands of railroad employes in Connecticut, as all there have to be tested before October 1, 1880. It is, of course, a mere question of time when similar regulations shall be legally enforced in all the States and Territories of our country, as is almost universally the case in Europe.

"VISUAL POWER AND COLOR-BLINDNESS—ACT OF LEGISLATURE OF CONNECTICUT REQUIRING EXAMINATIONS—RULES AND REGULATIONS OF THE STATE BOARD OF HEALTH.

"An act directing the examination of railroad employes for color-blindness and visual power.

"*Be it enacted, &c.,* That the State board of health shall prepare rules and regulations for the examination and re-examination of railroad employes in regard to color-blindness and visual power, prescribing the method in which and the intervals at which such examinations shall be made, the maximum fee to be charged for each examination, the form of certificate to be issued by the examiners, and such other regulations as said board may deem necessary. Said board shall send a copy of such rules and regulations to every railroad company and trustee operating a railroad



in this State, on or before the 1st day of July, 1880. Said board may, from time to time, make such changes in said rules and regulations as they may deem best, and communicate the same to said companies and trustees. Said board shall annually in the month of May recommend two or more medical experts to make the examinations above referred to, and the governor shall annually, on or before the 1st day of July, appoint not less than two medical experts, any one of whom shall be authorized to conduct the examination for color-blindness and visual powers, and issue certificates in accordance with the rules of the board of health.

"SEC. 2. On or before the 1st day of October, 1880, every railroad company and trustee operating any railroad in this State shall cause every person in their employ as locomotive engineer or fireman, train conductor or brakeman, station-agent, switchman, flagman, gate-tender, or signalman to be examined at the expense of the railroad company, by one of the examiners appointed by the governor, in regard to color-blindness and visual power, and shall cause a like examination to be made of all persons employed after said date in either of the capacities named above, and shall cause re-examinations to be made in accordance with the rules prescribed by the board of health.

"SEC. 3. Any railroad company or trustee operating any railroad in this State employing, after the 1st day of October next, in any of the capacities specified in the second section of this act, any person who does not possess a certificate of freedom from color-blindness and possession of normal visual power, duly issued in accordance with the provisions of this act, or knowingly employing in any such capacities any person whose certificate has been revoked by the examiners, shall for each and every offense be punished by a fine of not less than \$200 nor more than \$1,000.

"Approved March 25, 1880.

"RULES FOR EXAMINATION OF RAILROAD EMPLOYEES UNDER PRECEDING ACT.

"RULE I. All railroad employes requiring examination under the law of March 25, 1880, shall be divided into two general classes. Class first shall include engineers, firemen, and brakemen. Class second shall include train-conductors, station-agents, switchmen, flagmen, gate-tenders, and signalmen.

"RULE II. Certificates shall be given for each position in accordance with the succeeding rules for examination. Promotion from one class to the other requires re-examination and certificate.

"RULE III. Re-examinations shall be made: First, after any disease of the eyes; second, after injuries affecting the head or eyes; third, after any disease or trouble of the brain, and after long-continued illness, as typhoid fever; fourth, after mistakes or acts which call in question the visual powers; also, whenever directed by the board of health.

"RULE IV. The examiners shall report regularly to the State board of health, and their work shall at any time be open to the inspection of any member or members of said board.

"RULE V. The regulations for conducting the examinations and the standards for each class shall be determined by the board of health, and not by the examiners. New rules and regulations shall be adopted from time to time, as required, and alterations and amendments made.

RULES FOR CONDUCTING EXAMINATIONS.

"RULE 1. For the qualitative estimation of color-blindness the following tests are to be employed: Holmgren's worsteds, the tables of Stilling, Donder's color-test patterns, Pfüger's letters with tissue-papers. Däae tests and Woinow's revolving cards may also be used. For the quantitative test for color-blindness, Donder's reflected spots, Donder's method with transmitted light, Holmgren's shadow tests shall be employed.

"RULE 2. The following are the requirements for a certificate in the first class: (1) healthy eyes and eyelids without habitual congestion or inflammation; (2) unobstructed visual field; (3) normal visual acuteness; (4) freedom from color-blindness; (5) entire absence of cataract or other progressive disease of the eyes. The second class shall have: (1) healthy eyes and eyelids without habitual congestion or inflammation; (2) unobstructed visual field; (3) visual acuteness at least equal to three-fifths without glasses and normal with glasses in one eye, and at least one-half in the other eye with glasses; (4) freedom from color-blindness in one eye, color-perception at least equal to three-quarters in the other eye.

"RULE 3. In the case of employes who have held their positions five years or more, the standards required in each class shall be determined under special instructions from the board of health."

Connecticut is a pioneer in this work in this country, being the first State to pass a law requiring examination of all railroad employes engaged in moving trains. The standards adopted are for the most part those agreed upon at the international medical congress at Amsterdam, September, 1879.

The following is the form of certificate. These are bound in books, the stubs retained for reference and tabulations. The form of regular returns by the examiners to the board follows:



## STATE OF CONNECTICUT.

No. —. State board of health, bureau of vital statistics. Certificate of examination for visual power and color-blindness.

This may certify that I have this day tested carefully the visual power of —, whose signature is attached to this certificate, and find that it is —. I have also tested his color perception, and find that it is —. He is, in these respects, fitted for the position of —.

Given in presence of the examiner.

—, 18 —.

Examining Ophthalmic Surgeon.

[Signature of party examined.]

Stub accompanying certificate and retained by the examiner: No. —; name, —; age, —; height, —; complexion, —; occupation, —; vision, —; color perception, —; railroad, —.

Examining Surgeon.

## POSTAL CARD REPORT FROM THE EXAMINERS.

Report for week ending —, 18—.

No. in class first examined. ....

No. in class second examined. ....

Total

No. with incomplete color sense. ....

No. with complete color-blindness. ....

No. with defective visual power. ....

Connected with which railroads. ....

In compliance with this law and these regulations, two ophthalmic surgeons have been recommended by the Connecticut State board of health and appointed by the governor to thoroughly carry out the examinations. They are Dr. W. H. Carmalt, professor of ophthalmology of Yale University, and Dr. W. T. Bacon, of Hartford. To them is first committed in this country this extremely delicate duty. The results of their work in the report of the State board of health will be most interesting and of great practical value.

The American Ophthalmological Society, at its annual meeting last week at Newport, indorsed by vote these standard requirements of the State board of health of Connecticut in reference to visual power and color-blindness.

It will thus be seen what has been done in the necessary work of reform the past year. It would be an injustice to a fellow-townsmen not to recognize that, to the unremitting though unrequited labors of Dr. B. Joy Jeffries, is the movement in this country due. His services in the cause of science and the community, by his testing all the public school children of Boston above the primary, has been recently admitted by the school board printing his report to them as one of the school documents. The Nation of January 15, 1880, well says:

"The subject offers the most striking recent instance of a strictly scientific inquiry that has suddenly been transformed into a serious question of every-day practice."

The following is the joint resolution introduced in the House of Representatives:

"Joint resolution relating to color-blindness and visual acuteness in persons employed in the Navy and merchant marine.

Whereas it is important that definite and uniform standards of examination for color-blindness and tests for visual acuteness in persons employed in the Navy and the merchant marine should be established, which shall be in harmony with such standards and tests established or to be established by other nations: Therefore,

Resolved, &c., That the President is hereby authorized, by and with the advice and consent of the Senate, to appoint some suitable person qualified for such service to attend and represent the United States in any international congress or convention held to consider and act on said subject; and the sum of \$5,000 is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to be paid, or so much thereof as may be needed, under the direction of the President, in full for the compensation and expenses of the person so appointed; and the person appointed under the provisions of this joint resolution shall join in a report of the proceedings of such congress, and of the conclusions reached thereby, if any, to the President of the United States, to be by him laid before Congress, to the end that an international system of examinations and tests as aforesaid may be established by law.