

of the sewage impurities dissolved in the same quantity of unfrozen water of the lake. This ice also showed the presence of bacteria in great abundance, retarded somewhat in their growth by the ice, but not destroyed by it. It is perhaps needless to say that this ice was pronounced totally unfit for any purposes where it is liable to come in contact with food or drink. The ice from the Erie canal was also condemned, while there was not sufficient evidence to warrant a condemnation of that from Cazenovia Lake. The report, valuable for what has already been mentioned, is still more so by reason of the numerous references to instances in which impure ice has been the cause of dysentery and other diseases. The earliest of these was that at Rye Beach, N.H., reported by Dr. A. H. Nichols of Boston in 1875, in which there broke out among the guests of a large hotel at that place an epidemic of gastro-enteritis, caused by impure ice from a filthy pond. Another instance of sickness caused by impure ice, referred to in the report, is that of an epidemic of dysentery which occurred in 1879 at Washington, Conn., investigated by Dr. Brown of that place and by Dr. Raymond of Brooklyn. The ice had been gathered from a pond which had been used as a wallowing-ground by the pigs. Other instances are quoted of the injurious effects of impure ice upon the public health, and sufficient evidence given to show, that, in the process of freezing, water does not purify itself. The report, taken as a whole, is a very valuable contribution to this subject, and a complete refutation of the old idea that all ice must of necessity be pure.

COLOR-BLINDNESS AMONG RAILWAY EMPLOYEES.

DR. B. JOY JEFFRIES, at the last meeting of the American ophthalmological society, called attention to the total failure on the part of the Massachusetts authorities to enforce the law passed in that state in 1881, by which railroad companies are prohibited from employing persons who are color-blind, or whose sight is defective, in positions requiring them to distinguish form or color signals, unless such persons have been certified by some competent person employed and paid by the company as not disqualified for such positions by color-blindness or other defective sight. A penalty of a hundred dollars is affixed for each violation of the act. In reference to the enforcement of the law, Dr. Jeffries says that "it is practically as dead a letter as the liquor laws." Numerous cases are cited which have come under the care of the speaker in which the law has been

grossly violated. In one case a brakeman who had been on a road three years had been tested as to his vision by the train-despatcher, who had asked him how many knobs there were on an adjacent telegraph-pole, telling him his vision was as good as any one on the road. Another instance of the manner in which the law is violated was that of a gateman who applied to Dr. Jeffries for a certificate for blindness contracted in the army, in order that he might obtain a pension from the government. Although this man was so blind from atrophy of the optic nerve that he groped his way into the doctor's office, yet he was on duty as a gateman at an important railroad-crossing, having a certificate from the examiner of the railroad company "that he is not disqualified by defective sight." The man himself acknowledged that he was completely blind in the sun, and could not see people at his crossing. A number of instances are given where engineers and conductors were employed by railroad companies, although they were completely color-blind. Something of the same negligence seems to exist in the licensing of pilots. One pilot who could not recognize a colored side-light held in the sun six feet before his face was examined by a marine hospital surgeon, and reported as *partially* color-blind. This enabled him to be further examined by the local inspectors, who passed him by their tests, and the man has a full license. In commenting on this case, Dr. Jeffries well asks, "How many more are there?" The matter is one of such grave importance, involving as it does the life and limb of every traveller by land and sea, that the Ophthalmological society could be of no greater benefit to their fellow-beings than in calling the attention of the authorities to these gross violations of the statute, and protesting against their continuance.

COMMISSIONER HADLEY'S SECOND ANNUAL REPORT.

PROFESSOR RICHMOND M. SMITH, writing in the *Political science quarterly* a few months ago, said, in his article examining the various state labor bureaus and their methods, that "the business of collecting statistics successfully is one which requires a great deal of experience, besides knowledge and administrative ability, on the part of the chief," and for the lack of that experience he found the reports of most of the chiefs defective both in method and in results. When Professor Hadley of Yale college was appointed, two years ago, chief of the Connecticut bureau of labor statistics, it was foreseen that statistics collected by one of his ability and experience in handling

economic questions would be of unusual value. The report, which has just been laid before the Connecticut legislature, amply justifies the expectations entertained concerning it. Guided both by the judgment of the chief and a special resolution of the general assembly, the investigations undertaken by the bureau during the past year were restricted to a few topics, and then made as thorough and searching as possible.

The specific questions under consideration were weekly payment and child-labor; and Professor Hadley's report concerning them may be divided into three parts. The first is a bare summary of results, possibly intended for such legislators as lack either the time or the inclination to study the tables of statistics for themselves. The second part is made up of two essays, — on labor legislation and its enforcement, and on the credit system. The third part consists of the tables of statistics, with a brief explanation of them.

In taking up the subject of weekly payment, Professor Hadley first determined the facts as they are. He found, that, of the factory operatives in Connecticut, a little less than two-fifths are paid weekly, a little more than two-fifths monthly, and about one-fifth fortnightly. Aside from salaried persons, it is found that something more than three-sevenths of the hands are paid by the piece, the remainder by the day. The percentage of those paid by piece-work is much greater among the female than among the male operatives. No connection is found to exist between payment by the piece and weekly payments. The concerns that have not adopted a system of weekly payments offer various explanations of their action. Some make no change from their custom of monthly payments because they find no demand for any change; others believe weekly payments to be impracticable; still others believe weekly payments to be a bad thing for the operatives themselves.

Of the 70,000 hands specified in the report, 20,000 are women, and about 3,000 are children. The number of children really employed, Professor Hadley believes to be greater than shown by the figures. With the children, monthly payment is most frequent. It is an interesting fact, too, that the larger the factory, the greater is the percentage of women employed. The number of children reported, on the other hand, is greatest in mills employing between one hundred and two hundred hands. The employment of women reaches the largest proportions in the manufacture of wearing-apparel; that of children, in textile industry, where the percentage averages about nine. The children are principally occupied in tending machinery. The returns as to the wages of these

children show a scale of wages running from about a dollar a day (paid to hands over eighteen years of age) to thirty-five cents a day (paid to the youngest hands).

Of 65,627 hands, about five per cent are employed 54 hours or less per week, twenty-two per cent from 54 to 59 hours, over fifty-six per cent from 59½ to 60 hours, while sixteen per cent have an average working-day of more than 10 hours. The longer hours prevail generally in the textile industries, though barbers reported the longest hours of all, — 92 hours weekly. The cigar-makers, the only trade in which the eight-hour system was carried into effect, show a decided reduction in this respect. In concluding this portion of his report, Professor Hadley says: —

"We thus reach the conclusion that monthly payments, long hours, and child-labor go hand in hand. This fact is in one sense precisely what might have been expected; yet the results are so noticeable that they will bear repeating. First, practically none of the weekly payment mills have a normal working-day of over ten hours. Second, leaving out cases of fortnightly or mixed payment, a minority of men, a majority of women, and a two-thirds majority of children, are paid monthly. Third, less than one-eighth of the men, but more than one-fifth of the women, and more than one-third of the children, are employed regularly over ten hours a day. Fourth, the counties and industries which show the largest proportion of weekly payment, show the smallest proportions of women and children employed, and *vice versa*."

Now, these three things, — child-labor, long hours, monthly payments, — when found co-existing, indicate a society on a low industrial level. Any one of them may be, in exceptional cases, necessary; but the three in conjunction indicate an evil which the state is justified in attempting to remedy by legislation. The discussion which follows as to the practical difficulties of labor legislation and the proper attitudes of labor organizations toward the law, is in every way commendable, and we regret that lack of space forbids our reproducing the most important portions of it. One or two extracts must suffice.

"To make a law worth any thing at all, somebody must be willing to incur the hardship and odium, and, if need be, actual danger, in order that its provisions may be carried out. If a body of workmen demand legislation, and then, either through apathy or timidity, are not prepared to support the officer of the law in its execution, they are simply encouraging sham legislation. It is perfectly easy for a legislator to vote for a law which will satisfy the demands of extremists

and not accomplish its objects. The more extreme the character of the measure, the surer it is of non-enforcement."

"If organized labor takes a fair legal chance for prosecuting the grievances of individuals, it simply gives those individuals a fair chance before the law; if organized labor does not prosecute such grievances, it gives the employers an immunity from interference at present, but at the risk of almost revolutionary consequences in the future.

"There is nothing to prevent the knights of labor, or a trades-union, from being incorporated under the law of the state of Connecticut at present. Though not generally understood, this is a fact."

"Such legislation may help in raising the standard of the community. But let it be clearly understood that it is a rough process, and not a smooth one; that it frequently bears hardest where we should wish to see it bear least; and that it is hopeless to attempt to enforce it, until those whom it is designed to benefit—or, at least, a large part of them—have risen high enough to reap the benefit, and are sufficiently convinced of those benefits to use their own personal efforts for its enforcement."

The last portion of the report which we can mention is that which deals with the credit system. Professor Hadley discusses in order the practicability and the desirability of weekly payments and the best means of securing their enforcement. To most of his argument we give our hearty assent, though we think even more weight should be given to the objections to weekly payments advanced by certain manufacturers, who submit, that, from the very character of their work, its product cannot be properly estimated and paid for every week. We are glad, too, to see that Professor Hadley appreciates the fact that for the best employees weekly payments would be useless, and for the worst they would be worse than useless. The average workman is the one to be benefited by them. The report summarizes this discussion thus:—

"1°. The system of cash payment is a real advantage to the workman. 2°. The difficulties of weekly payment are not so great as is commonly supposed. 3°. But there nevertheless remain a sufficient number of cases to which a weekly payment law could not well be applied, to constitute a serious reason against making the system compulsory. 4°. The same general result could be reached more surely from another direction, by abolishing the factorizing process. This would necessitate a system of cash payments as a rule, and the exceptions to it would regulate

themselves in such a manner as to involve less difficulty. 5°. We therefore recommend that the legislature pass a law exempting the wages of all mechanics, journeymen, or laborers, from attachment for debt; with such additional legislation as may be necessary to prevent its effects from being evaded by the systematic assignment of wages on usurious terms."

With reports such as this of Commissioner Hadley, and those of Carroll D. Wright of the national and Massachusetts bureaus, before us, we can conscientiously commend the sagacity of Dr. Engel, one of the most eminent statisticians in Germany, and late chief of the Royal statistical bureau of Prussia, when he said that his ambition would be satisfied if he could accomplish in Germany the same work that was being done by some of the American statistical bureaus.

SEDGWICK AND WILSON'S BIOLOGY.

THE old and thoroughly vicious notion that "the power of repeating a classification of animals with appropriate definitions has any thing to do with genuine knowledge," is slowly disappearing before the advance of a rational method of teaching biology; namely, that of bringing the student face to face with the objects of his study. Much of this reform is due to Huxley and Martin's 'Elementary biology,' which appeared some ten years ago. In the book before us two of Professor Martin's former pupils undertake to elaborate and improve his plan of instruction, intending it to serve as a factor in general education or as "a basis for future studies in general biology, botany, zoölogy, or medicine."

After a general introduction, and chapters on the composition of living organisms, on protoplasm (which contains several pages on organic chemistry), and on the cell, then follow the long and very careful accounts of the bracken-fern and earth-worm, the typical examples selected of vegetable and animal life. The anatomical, physiological, and embryological aspects of the subject are (for an elementary work) treated with unusual fulness of detail. The authors have done wisely in not following Huxley and Martin's order of treatment, which begins with the unicellular organisms. This is the logical order, but it is beset with practical difficulties. As a matter of fact, most teachers will agree that beginners take most interest in, and succeed best with, forms which they are accustomed to see around them. The structure and functions of microscopic forms are really much more difficult for the beginner to

General biology. By WILLIAM T. SEDGWICK and EDMUND B. WILSON. Part i.: Introductory. New York, Holt, 1886. 8°