SCIENCE

FRIDAY, FEBRUARY 10, 1888.

THE ANNUAL REPORT of the New York State Department of Public Instruction has been laid before the Legislature by Superintendent Draper. It contains some very interesting statistics and observations. It appears that the department expended during the year, $14,461,774.94, and this sum does not include the payment to Cornell University, the expenses of the regents, or the appropriations to academies; so that even this enormous sum does not fully represent the State expenditure for common schools. Over 31,000 teachers were employed, and only 5,821 of them were males. The average annual salary of a teacher is, in the cities, $687.12; in the towns, $262.44. The number of children of school age was 1,763,115, and the total enrolment was 1,037,812. The average attendance was only 625,610. The superintendent points out that the uneducated class is increasing, and that the attendance in the schools does not keep pace with the growth of the population. The shortcomings of the present compulsory Education Act are pointed out, and some excellent suggestions are offered as to the best way to remedy the difficulty. On the subject of manual training, Mr. Draper seems to be conservative, but still open-minded, and ready to recommend whatever is proven to be desirable. He says, "There has been much discussion during the year relative to the introduction of manual training as a regular branch of public-school work; and several cities, notably New York and Albany, have undertaken a thorough trial of the experiment. It is much to be hoped that it may prove a wise undertaking. There will hardly be two opinions as to the advantages of industrial training, but it must be demonstrated, upon actual trial, that it can be made a part of our common-school work with advantage to pupils, without detracting from the old-fashioned and essential work, . . . before it should be generally taken in hand by the school authorities. The experiments which have been entered upon will be watched with much interest. The test will be a severe one, but it must be met successfully, by a trial in good faith, before the already overfull courses of study in the schools should everywhere be opened to admit what is commonly called industrial training. There is a common misapprehension in this connection. Manual training need not be confined to carpentry work with boys, or making aprons and dresses with girls. Free-hand or industrial drawing may train the hand and the eye more effectually than handling a saw or a needle. It is easily taught, it is inexpensive, and it is practicable. It is the best possible preparation for further manual work. Every school in the State may undertake this without difficulty, and with good promise of excellent results, and then safely wait for the verdict of those who are further experimenting upon the subject. . . . The mission of the public schools is to best prepare the greatest possible number of children for the activities of life, for social and industrial relations, and for the responsibilities of citizenship under such a government as ours. The few must not be favored at the expense of the many. The beginners must have the most care and the best work. What is done must be practical. A philosophy is of small use unless it materializes. Children must be evenly educated in all directions. Just what shall be taught in detail, must depend upon what, in a practical way, promotes the end for which the schools are maintained at public and general expense." After a survey of the field of educational work, Mr. Draper is able to express a favorable judgment on what is being done, and concludes thus: "There seems to be unmistakable promise of an educational re-organization and revival in this State. Public occurrences during the year have forced the subject upon the attention of the people. Our supervisory officers and teachers are coming more and more to realize the importance, as they are striving more and more earnestly to accomplish the organization of a comprehensive, symmetrical, and harmonious State educational system, in which the district schools, the union schools, the high schools, the academies, the normal schools, and the colleges and universities, shall have their appropriate place, and shall not rival or antagonize, but arrange their courses of instruction so as to support and supplement each other, and work intelligently together for a common and beneficent purpose. The fact must be hailed with universal and unfeigned satisfaction among all our people. The promise must become a realization, if our magnificent commonwealth would maintain her foremost position in the sisterhood of States."

THE DEATH PENALTY.

IT will be remembered that the Legislature of the State of New York in 1886 passed an act providing for the appointment of a commission "to investigate and report at an early date the most humane and practical method known to modern science of carrying into effect the sentence of death in capital cases." The commission, consisting of Elbridge T. Gerry, Matthew Hale, and Alfred P. Southwick, has just made its report to the Legislature. Immediately after its appointment, the commission met, and carefully considered the general outlines of the subject, and also examined the entire criminal law, from its earliest history down to the present time, as to the principles upon which the infliction of capital punishment was based, the methods of execution and the reasons therefor; and in its report, which consists of a pamphlet of one hundred pages, it gives a history of the law, beginning with that of Moses. Letters were sent to sheriffs, physicians, and judges, requesting their opinions as to the present modes of punishment, and inviting suggestions. To these letters two hundred answers were received, and, after their perusal and a careful study, the commission decided that electricity was the best means for effecting capital punishment.

The advantages claimed for electricity are, that death is instantaneous upon its application, and that resuscitation is impossible. For the administration of electricity to a criminal, all that would be essential would be a chair with a head and foot rest, in which the condemned could be seated in a semi-reclining position. One electrode would be connected with the head-rest, and the other with the foot-rest, which would consist of a metal plate. The expense of such a chair would not exceed fifty dollars. If the current of electricity is supplied from the electric-light wires, there would be but slight expense incurred to make the connection from the chair with the wires on the outside. An independent application would cost between two hundred and fifty and five hundred dollars.

The commission concludes its report with the following recommendations: that the death penalty must be inflicted by causing to pass through the body of the convict a current of electricity of sufficient intensity to cause death, and the application of the current must be continued until the convict is dead. The execution must take place within the walls of the State prison designated in the warrant, or within the yard or enclosure adjoining. It shall be the duty of the warden to be present at the execution, and to invite the presence of a justice of the Supreme Court, the district attorney, and sheriff of the county in which the conviction was had, together with two physicians and twelve reputable citizens. Besides one, or, at most, two clergymen, and seven assistants or deputy-sheriffs, no persons other than those mentioned shall be permitted to be present. Immediately after the execution, a post-mortem examination of the body of the convict shall be made by the physicians

present at the execution, and their report in writing, stating the nature of the examination made by them, shall be annexed to the certificate, signed by all the persons witnessing the execution, that the sentence was duly carried into effect in accordance with the requirements of the law. After the post-mortem examination, the body shall be delivered by the warden, for the purposes of dissection, to some public hospital or incorporated medical college within the State; or the body may be interred in the graveyard or cemetery attached to the prison, with a sufficient quantity of quicklime to promptly consume it. In no case shall the remains be delivered to any relative or friend; and no account of the details of any such execution, beyond the statement of the fact that the convict was, on the day in question, duly executed according to law at the prison, shall be published in any newspaper.

EXPLORATIONS IN THE DOMINION OF CANADA, 1886.

THE government of the Dominion of Canada, as well as those of the several provinces, are actively engaged in explorations and surveys, and a large amount of material is continuously being added to our knowledge of British North America. In the year 1886 work was in progress in all parts of the Dominion.

In British Columbia Mr. A. Bowman continued his explorations in the Cariboo district. He left Victoria on the 23d of June, accompanied by Mr. James McEvoy as geographical assistant, and on July 3 the party was ready to start into the field. While in 1885 the roads and trails were measured, and the centrally situated mountains were occupied as triangulation stations, geological researches being subordinate to geography, in 1886 great attention was paid to geology. The Goose Creek Mountains and the Selkirk Range, where there are no trails, were traversed with shoulder-packs, relying on the rifle to a considerable extent for supplies. A micrometer measurement of the great Quesnel Lake was carried out, with the aid of a large Chinese boat and an Indian canoe. Bear and Swamp River Mountains and the Dragon Creek Mountains were ascended with a single pack-horse, relying on the axe for progress, instead of a trail. The geographical work was completed by occupying with the transit all the necessary outlying stations, and by measuring with the steel tape two independent base-lines, which will be used as the foundation of the whole of the work.

Farther east, in the Rocky Mountains, Mr. R. G. McConnell has continued previous work in the vicinity of the Canadian Pacific Railway. Work was commenced on the 24th of May, at the gap of the Bow River, and during the course of the summer all the subordinate ranges lying between that point and Gold City were ascended and examined. Although the work was principally geological, our knowledge of the topography of the region was considerably increased, a number of sketches and cross-bearings having been taken from the summits of most of the mountains ascended.

In the district between the Bow and the North Saskatchewan Rivers, J. O. Tyrrell and D. B. Dowling were exploring. Here geology was also the prime object of the expedition; but incidentally the limits of prairie and wooded country in that district have been determined, and careful barometric readings have been taken at numerous points throughout the area examined, in order to lay down on the map approximate contour-lines.

A. C. Lawson continued his researches on the country east of the Lake of the Woods, principally mapping Rainy Lake and the adjacent territory. The main achievement of the season of 1886 was the connection of the township surveys on Rainy River by way of the Manitou canoe route with the Canadian Pacific Railway, and of the canoe route from Lake of the Woods to Rainy Lake.

Of great importance is A. P. Low's and J. M. Macoun's survey of Berens River and Deer Lake. On the 28th of May the mouth of Berens River, on Lake Winnipeg, was reached. Here, having purchased canoes, the season's work was commenced. From its mouth the Berens River was found to trend for one hundred and two miles south of east to Family Lake. Throughout this distance its course is broken by numerous small falls. At Family Lake the river bends sharply to the north, and the survey line runs in a slightly north-of-east direction to the height of land, passing through several lakes. Here the party reached Severn River by a short portage, and followed the stream in a north-east course. On the 19th of June, Deer Lake, which was in part surveyed by Cochrane in 1882, was reached. Descending its outlet for one hundred and seventy-five miles, another large lake was reached, the shores of which were covered with a fair growth of timber. This is called Favorable Lake. Following the river, running out of it for one hundred miles, a larger lake, called Sandy Lake, was entered. After one hundred and fifty miles more, Severn Lake was reached, whence the party proceeded to the Hudson Bay post on Trout Lake, and down Fawn and Severn Rivers to Fort Severn on Hudson Bay. The party then proceeded along the coast to York Factory, and returned, ascending the Hayes River route, to Norway House.

Another extensive journey was accomplished by Dr. Robert Bell. After a brief visit to Manitoulin Island, he went to Sault Ste. Marie, where he hired six *voyageurs* for his northern exploration. These, and the outfit of the expedition, were conveyed to Wabigoon Tank, on the Canadian Pacific Railway, and hence transported over a portage to Sandy Lake, from which the expedition was to start. Leaving the portage on the 6th of July, the general course of the route was north-eastward towards Cape Henrietta Maria, on Hudson Bay. The party first proceeded to Lonely Lake by way of Minnetakie Lake and its outlet. Having descended the upper part of the Albany River, Bell crossed the country northward to the Attawapishkat River, which he descended to the sea. Then he coasted southward on the west side of James Bay until the Albany River was reached. He ascended this river, and its tributary the Kenogamin River, to its source, whence he reached the Canadian Pacific Railway. The whole course from Long Lake to the junction of Albany and Kenogamin Rivers, with the exception of the coast of James Bay, was surveyed. The distances were ascertained by a boat's log, or by the time occupied in traversing them at a known speed, while the bearings were taken by compass. Observations for latitude were made almost every day, and the variation of the compass was also frequently ascertained.

The following part of Dr. Bell's description of his journey is of general interest, as it contains much new information: —

"On arriving at the Attawapishkat, I left my stores and large canoe in charge of one man on an island which I called Nolin's Island, and proceeded with the other men to examine the upward course of the larger stream for some distance previous to descending it to the sea. At about eleven miles above Nolin's Island we reached the lowermost lake of the Attawapishkat, which, the Indians informed me, bears the same name as the river itself. It lies diagonally across the course of the river, and has a length of about nine miles from south-west to north-east by four miles from south-east to north-west. Two miles above Attawapishkat Lake we entered a beautiful lake of much larger size, which, having as yet no distinctive name, I propose to call Lake Lansdowne, in honor of the governor-general of the Dominion. This lake proved to measure about thirteen miles from south-east to north-west by about ten miles from south-west to north-east, and it is the largest sheet of water connected with the river. It contains many large islands, and is much indented with bays. The surrounding country is more or less undulating and hilly, and thus affords a pleasing contrast to the level and monotonous character of nearly all the rest of the region explored during the season. The commencement of the upward continuation of the Attawapishkat River is found in the south-western bay of Lake Lansdowne. This part of the river is described by the Indians as being broad, having, for the most part, a sluggish current, and expanding occasionally into small lakes.

"The Attawapishkat River proved to be somewhat smaller than the Albany, which is not far from the size of the Ottawa above the capital. It descends at an almost uniform rate all the way from Lake Lansdowne to the sea, — a distance of several hundreds of miles. In this distance we did not require to make a single portage, and, from the description of the river above the lake, it would appear to be navigable without portages almost to its source, which has probably an elevation of more than one thousand feet above the sea. Where it flows over the limestone country it is broader and shallower than in the higher parts of its course.

"The seacoast between the Attawapishkat and Albany Rivers is very low and uniform in outline, and without indentations. The water is so shallow that we could touch the bottom with our canoe-