

will be in Montreal. These arrangements include Excursions to Ottawa, Quebec, Newport and St. Hilaire; Steamboat trips on the Harbour and to the Victoria Bridge and G. T. R. Works, and numerous receptions and garden parties. The daily programme will consist merely of morning and afternoon sessions for business, reading of papers and general scientific work, a lecture in the Queen's Hall by some of the most distinguished guests from eight to nine o'clock each evening that is not taken up with some special ceremony such as the inauguration of the Redpath Museum; after which the remainder of the evening will be spent at the various receptions or in resting for the labours of the morrow. The Excursions will be arranged to take place on Saturday and at the close of the meeting.

All the meetings and lectures are open free to the citizens who may, also, become members of the association by causing their names to be presented and by payment of the usual fees. This, however, is not enacted as a necessary condition of attendance at any of the meetings or lectures. There is little doubt but that the meeting in August will be creditable to the American Association and to the City of Montreal. Our guests will come in large numbers and with much scientific work prepared, and we shall be able to afford them every convenience for their labours and ample amusement and relaxation for the intervals of their labours. In this age when science seems to reach everywhere and to affect everything, the gathering together, in our midst, of its representatives and exponents is an event of no small importance, and it is to be hoped not only that the presence of the Association may do good to science in Montreal, but, also, that Montreal by careful preparation and by a fair exhibition of its scientific and economical capabilities may produce a favourable impression on our scientific visitors.

#### THE OLD TIME MILLWRIGHT.

An English writer of a book on mechanical progress pays the following passing tribute to the old millwrights, whose distinctive occupation, like Othello's, has now well-nigh gone. It was very truly remarked that the millwright of former days was to a great extent the sole representative of the mechanical art, and was looked upon as the authority in all the applications of wind and water, under whatever conditions they were to be used, as a motive power for the purpose of manufacture. He was the engineer of the district in which he lived—a kind of Jack-of-all-trades—who could with equal facility work at the lathe, the anvil, or the carpenter's bench. In country districts far removed from towns he had to exercise all these professions, and he thus gained the character of an ingenious, roving, rollicking blade, able to turn his hand to anything. He wandered from mill to mill in search of work, and was everywhere recognized as an itinerant engineer and mechanic of high reputation. He could handle the ax, the hammer, and the plane with equal skill and precision. He could turn, bore, or forge with the ease and dispatch of one brought up to these trades, and he could set out and cut in the furrows of a mill-stone with an accuracy equal or superior to that of the miller himself. These various duties he was called upon to exercise, and seldom, in vain, as in the practice of his profession he had mainly to depend upon his own resource. Generally he was a fair arithmetician, knew something of geometry, leveling, and mensuration, and in some cases possessed a very competent knowledge of practical mathematics. He could calculate the velocities, strength, and power of machines, draw in plan and section, and could construct buildings, conduits, and water-courses in all the forms and under all the conditions required in his professional practice.

CANADA has twenty-one cotton factories aggregating nearly 400,000 spindles.

#### AN OLD STAGER'S EXPERIENCE.

Modern improvements in machine tools, and the establishment of the factory system of labor is developing a different class of workmen from the old school of machinists. It would be difficult to get a supply of workmen now-a-days capable of doing the heavy work that was done at the Soho, at Birmingham, by Bolton & Watt's men, at the close of the last century, with such imperfect tools as were in vogue at the time. Even as late as thirty-five or forty years since, at Niagara Dock, in Canada, good marine engines were made without a planing machine in the shop, and only one slide lathe. They had, however, powerful stiff hand lathes with compound slide rests.

There are marine shops now in the lake cities where large cylinder faces, and heavy wrought iron shafts have key seats chipped and filed by hand. Such shops must develop better chippers and filers than where everything is done on self acting machines. In some of the gigantic eastern shops, where upwards of three thousand men are employed, the hands are more machine-tenders than machinists. I saw an article in a paper, stating that "very few machinists of the present time would be found capable of chasing a true thread out of the solid iron." I should just think they would not. One-half of those that come along now show such extreme awkwardness in the use of hand tools that they can hardly make out to round the end of a shaft or a bolt, and are totally incapable of finishing cast iron in the lathe with a scraper without shattering and jarring. An engine was exhibited at an exhibition some years ago where all the wrought iron was finished with a water-cut and the cast iron scraped—no filing was allowed—in order to show what first-class work was. Look at the flashy color some agricultural machinery is painted, with red, blue and yellow stripes. Whitworth, in the construction of his machine tools, was exactly in the opposite direction. He had them painted in plain bluish gray color, as near the color of first-class cast iron as possible, in order to show off the moulders' work, with beautiful straight lines, terminating in graceful curves. Sharp corners and edges were his special aversion. But he spared no expense in the working parts, as far as hardened steel and perfectly ground, dead true journals could make them durable.

I recollect, many years ago, watching an old stager chasing coarse square threads with a chaser, and he could start a perfectly true thread every time. I asked him the secret of it, and he said: "Practice was what did it." He informed me that he had worked some years at Naysmith's (the inventor of the steam hammer), or Patrickroff, and that his work at that time was principally chasing. Another fitter informed me that "he would not give a button for a man that could not file hollow, and that it was only those that began young and went through a long apprenticeship that could do it."

In England, where most trades have to be learned by going through a long seven years' apprenticeship, journeymen are very jealous of promoted laborers coming in through the cabin window without any preparation. They are just as much opposed to that class as doctors are to quacks, and have just as much reason to be. Naysmith once undertook to take a young fellow out of the moulding shop and put him on a lathe, and the machinists all struck. I wonder what they would think of boiler maker and blacksmith helpers coming into a machine shop and claiming to be erectors?

Boys in a machine shop learning their trade are pretty shrewd, and are generally quick to detect the difference between a skillful and accomplished workman, who keeps well-shaped, clean cutting tools and finishes his work off in a workmanlike manner, and a miserable, rushing, spluttering, file-rasping, dull-toll, chawing butcher, who tries to make up in quantity what he lacks in quality. An apprentice ought always to be encouraged to finish his work so that nobody can make it better, and to take plenty of time at first and then speed and precision will come naturally. A great deal depends on how a boy is started at first. Manual dexterity is only to be acquired by practice and patience. When Mace, the famous pugilistic champion, was asked the secret of his success, he said "It was constant practice with the gloves from the time he was knee high, with all the shapes and sizes of men." The same rule will hold good with an apprentice. Put him next to the vice or lathe of an out-and-out good workman, and let him imitate him in everything, even is to how he grinds, sets and holds his tools; and if he gives his mind to his work and takes pride in doing a good job he is sure to turn out a good one. Who is it that is generally kept at rough, coarse, laborious work? The man who has been trained in a slovenly, rushing