modern languages for the additionals, and has actually founded a modern and mediaeval languages tripos, — the younger universities and colleges will surely follow. To make Latin compulsory, therefore, is, from this point of view, distinctly inimical to educational progress, and is therefore unworthy of an institution which, like the College of preceptors, has in past years done so much to further the modern reforms in middle-class education.

SARA A. BURSTALL, B.A. Lond.

A SURVIVAL OF THE UNFITTEST.

IN his inaugural address before the sanitary congress recently held at York, Sir T. Spencer Wells, the president of the congress, touched upon a subject of great interest to educators. He said, speaking as a sanitarian, that so far as concerns the mental and physical training of children, and giving women the option of other occupations than those of domestic life, he saw no great cause for alarm. It is an age in which education — at any rate, for the middle classes — must be pushed far beyond the limits which our fathers thought wide enough for us. Mere rule-of-thumb work is almost out of date; and there are so many industries in which scientific knowledge and exactness are requisite, that the want of early education cuts off a young man's chances of advancement. A workman must now be something more than a mere machine. He must have head as well as hands, brain as well as muscle; and, as uneducated brains are not worth more in the labor-market than untrained muscle, we must be content to make some sacrifice in their culture. As for the outcry about the dangers of women taking up men's work, it is breath wasted. A great many failures will outweigh the few successes, and bring the balance right.

"For my own part," continued the speaker, "I think women capable of a great deal more than they have been accustomed to do in times past. If overwork sometimes leads to disease, it is morally more wholesome to work into it than to lounge into it. And if some medical practitioners have observed cases where mental overstrain has led to disease of mind or body, I cannot deny that I also have at long intervals seen some such cases. But for every such example I feel quite sure that I have seen at least twenty where evils equally to be deplored are caused in young women by want of mental occupation, by deficient exercise, too luxurious living, and too much amusement or excitement.

"Again: we have heard much of late about overpressure from work in schools. This is one of the novelties of our time. No doubt it exists, and I think it may in part be traced to some of our sanitary success. We have reduced the mortality of early infancy. Many children who would formerly have died off-hand, are now saved, and find their way into the schools. They are survivals of the least fitted. They live, but they are not strong. They have to submit to the same routine, and be forced up, if possible, to the same standard as the rest. But the effort is too much for them. Their frames are not hardy enough to resist the mental strain. They show all sorts of nervous symptoms, disappoint the teachers, and are the types brought forward as victims of the system.

"The vice of the system is that it is indiscriminate. There is no revision of the recruits, and the tasks are not apportioned to the feeble powers of sanitary survivors. This is an evil which will remedy itself in time by the growing-up of a larger proportion of strong children; and the present difficulty may be got over by a little patience and moderation, — a little more regard to sanitary logic. The children must have training before education, and must be put upon something even less than a half-time system."

THE POSITION OF SCIENCE IN COLONIAL EDUCATION.

AT the recent colonial and Indian exhibition, held in London, considerable attention was given to the condition of education in the colonies. At a conference held on this subject, William Lant Carpenter, B.A., B.Sc., whose scientific work is as well known in this country as it is in England, read a most interesting and valuable paper on the position of science in colonial education. Mr. Carpenter's paper is of such value that we reprint the major part of it from the London *Journal of education*. Mr. Carpenter said: —

The colonies to which your secretary desired me to confine my attention were, Canada generally; South Africa (the Cape of Good Hope and Natal); West and South Australia, Victoria, New South Wales, and Queensland; New Zealand and Tasmania, the last of which is unfortunately not represented at this exhibition.

If the term 'education' be used to include, not merely scholastic and collegiate training, but also any organizations and methods for drawing out the minds and faculties of the people, then a review of the position of science in colonial education should include all provisions for teaching it in any degree or form, Science in primary, secondary, and high schools of whatever kind, in technological schools with a view to its applica-

tion to the industrial arts, and in universities or colleges, should come under review, as well as its promotion by scientific bodies or societies; also the means afforded for its cultivation among adults, by means of museums, botanical and zoölogical gardens, public lectures, evening and other adult classes, public libraries, etc. My inquiry has, as far as possible, ranged over all these subjects; but inasmuch as many of them are voluntary and not state-aided, and therefore not subject to inspection and report, it has been difficult in several instances to get accurate information about them.

There appeared to be two methods of presenting the subject: 1°. To take each means of advancing scientific education separately, and consider what is done in that particular matter by each colony; 2°. To take each colony separately, and give a general view of its various methods of promoting education in science. After careful consideration, I decided to adopt the second alternative, since comparisons — proverbially odious, and sometimes based on data not strictly comparable — would thereby be avoided.

This is scarcely the time or place to dilate upon the advantages to be gained by giving science a proper place in education; i.e., recognizing that it is of equal value to literature and art as an educational instrument: your presence here today proves that you have more or less sympathy with such proposals. To those, however, whose sympathy is *less* rather than *more*, I would commend a careful perusal of three Cantor lectures on science-teaching. recently delivered at the Society of arts (and since published separately) by Prof. Frederick Guthrie of the Science schools, South Kensington, whose powerful arguments, and clear, incisive style, can scarcely fail to make a decided impression upon unprejudiced minds. I wish that time permitted me to quote some of his amusing remarks.

In reviewing the whole subject, I have been very much struck with the fact, that, in every colony, education is a distinct department of the state, under a responsible minister of public instruction, the teachers themselves being in many instances civil servants. The advantages of this plan, enabling the minister, as it does, to take a broad and statesmanlike view of the whole subject, are well seen in a speech on public education in New Zealand, delivered on July 21, 1885, in the house of representatives, by the Hon. Robert Stout, minister of education. This case may be considered a typical one, and will be alluded to again in the detailed account of that colony.

Another noteworthy point is the obvious desire, on the part of nearly every colony, to realize Professor Huxley's aspiration[1] for Great Britain, that the state should provide "a ladder reaching from the gutter to the university, along which every child in the three kingdoms shall have the chance of climbing so far as he is fit to go." In most colonies, not even excepting South Africa, this appears to be more or less the case. A state-aided system of scholarships enables a boy in the primary schools to pass through the secondary and high schools, colleges, etc., and finally to study at the Colonial university. Sometimes the same system is so far extended that holders of such scholarships proceed to England, and take university degrees there, frequently in science.

I propose to consider the provisions for education in science in the following order, in each colony, and to take the colonies themselves in geographical succession, beginning with the most westerly: primary, secondary, and high schools; colleges, both special and general; universities, museums, libraries, scientific societies, lectures, and other means of encouraging a knowledge of science among adults.

CANADA.

Province of Ontario (including Ottawa City). — In the public or primary schools, with the exception of a little descriptive geography and very simple object-lessons, no elements of science are taught. The high-school course, however, includes elementary physics and botany, even in its lowest classes. The course of study for all teachers, however, embraces the elements of natural science; and the Normal school at Toronto has, as Dr. Gladstone and I can personally testify, a magnificent collection of apparatus for the teaching of physical and other branches of science, a selection from which can be seen in the Canadian court, educational division. Various denominational colleges teach science to a limited extent; but the chief provision for higher instruction therein is to be found at University college, Toronto, where are three well-equipped laboratories, — chemical, physical, and biological, — the apparatus alone in which cost $27,500, and also three museums. In the School of practical science, connected with this, upon which $50,000 were expended, there are three courses of study, — engineering (civil and mining), assaying and mining geology, analytical and applied chemistry. The Agricultural college at Guelph has a reputation over the whole continent, and natural science is a large feature in its programme. Nearly a quarter of a million dollars were expended on its establishment, and the current annual expenditure exceeds $52,000.

For persons beyond the ordinary school age, there is an excellent organization throughout the

[1] *Fortnightly review*, January, 1878.

province, of the same character as that of the science and art department in South Kensington. Dr. S. Passmore May, the superintendent of mechanics' institutes, who takes the greatest interest in this movement, informs me that no less than sixty branch schools have been established within the last four years, in connection with these institutes. Its headquarters is in the Educational museum in Toronto. Here also is located the famous magnetical and meteorological observatory, established in 1841. The Canadian institute in Toronto, and various societies, more or less scientific in their aim, do good work in encouraging a taste for such studies.

Province of Quebec (including the city of Montreal). — Here the Council of public instruction contains two committees, a Catholic and a Protestant. The educational as well as other organizations are necessarily very often duplicated; but M. Ouimet, the superintendent of the department of public instruction, to whose courtesy I am indebted for much valuable information, informs me that the system has worked well, and without the least friction.

In the primary schools the instruction is almost entirely literary, with the exception of a little geography. Object-lessons, in the English sense of the term, appear to be conspicuous by their absence. A small manual of agriculture is used as a reading-book, but the subject itself is not taught: the idea is to show how to preserve the fertility of the soil. The secondary schools correspond to the French *lycées*, and in their courses chemistry and one or two other branches of science find a place. In the normal schools, also, scientific subjects form part of the training. Perhaps the most important recognition of the proper position of science in an educational course is to be found in the fact, that for the entrance examination to *all* the professions, without any exception, some knowledge of certain branches of science is compulsory. The Laval university at Quebec, for Catholics, and the McGill university of Montreal (of which Sir William Dawson, president-elect of the British association, is principal), both grant degrees in science; and in the latter there is a separate faculty of applied science, which provides a three or four years' professional training in civil, mechanical, and mining engineering, assaying, and practical chemistry, and grants degrees in these subjects. An excellent medical school and faculty of medicine is attached to the university also. The Catholic commercial academy of Montreal, conducted by the Christian Brothers, has a scientific and industrial course similar to that in McGill university; and the Quebec commercial academy, also conducted by the same body, has fairly equipped laboratories, and gives regular courses in science. The normal schools of the province are in each case affiliated to their respective universities. In connection with McGill university, we come across, for the first time, the progressive system of scholarships, reaching down from it to the primary schools; and here should be mentioned the Redpath museum in the university grounds, which is purely scientific in its aims. Except in connection with McGill university, there appear to be no scientific societies. The newly established Royal society of Canada, which draws its members from all parts of the colony, is formed somewhat on the same lines as the French académie des sciences.

New Brunswick. — It is somewhat remarkable that a small colony, mainly agricultural, should possess one of the most perfect systems of instruction in primary schools with which I am acquainted. As early as 1802, the provincial government and legislature recognized the fact that to make provision for the people's education was one of the duties of the state. "From the small beginning then made, there has been developed, by slow degrees, the present public-school system of New Brunswick, one of the most perfect, in principle at least, to be found in any state or country." There is a progressive course of instruction for all schools, in which the subjects appear to have been selected, arranged, and apportioned with a due regard for sound educational principles. It is arranged in two equal divisions, literature and science. Between the bottom of the primary and the top of the high schools there are eleven standards; and yet, even in standard I., in primary schools, plant and animal life, minerals, and geography are among the subjects dealt with, as well as familiar lessons on the conditions of health. Elementary physics makes its first appearance at standard V. Out of a total population, including adults, of 321,000, one-eighth, or 40,000 children, had lessons in hygiene, one-sixth in geography, and one-sixth in useful knowledge of plants, animals, and minerals, in the public schools in 1885. The province spends annually nearly one-third of its total revenue upon education. If local rates be taken into account, the expenditure on the common-school system alone is about £100,000, and this with a total population less than that of Birmingham. The normal school for training teachers was begun in 1847, and the spirit which now animates it may be judged from the following maxim enforced there: "The development of the faculties is of more importance than the acquisition of knowledge." It is in connection with the university at Fredericton, the degrees of which are universally recognized. There is a large

system of scholarships and bursaries in connection with it. A good natural history society exists in St. John, with corresponding members in the country districts. A museum, mechanics' institutes, and similar agencies complete the facilities for the pursuit of science.

Nova Scotia. — In all grades or classes of the elementary schools, the teachers are expected to furnish suitable instruction in hygiene, and what are termed 'Lessons on nature,' or useful knowledge lessons, as well as geography. In grades 3 to 6, these lessons are chiefly biological and mineralogical; while, in grades 7 and 8, elementary physics, chemistry, and agriculture are introduced; and, in order that the teachers may be well prepared for this last, there is a school of agriculture in connection with the normal school. In the higher graded schools, the course includes geography and the elements of mathematics, physics, botany, physiology, geology, and chemistry. There are various colleges, and a university at Halifax, on the basis of that of London, to which most of the colleges are affiliated.

In concluding this brief sketch of the provisions for scientific education in the province of Canada, I feel that it would not be complete without an allusion to the schools for the blind, and for deaf-mutes, all of which come under the superintendents of public instruction, just as they do in the United States. The education of children so afflicted is not a matter of charity, as with us; but it is taken cognizance of officially, and, as I can testify from personal inspection, is carried out in a very scientific manner. What is taught is mainly objective and experimental. It may not be out of place, perhaps, to mention here that we owe the invention of the Bell telephone to researches undertaken by Alex. Graham Bell, in his official position as head of the Normal school for teachers of deaf-mutes, in Boston, Mass., in order to facilitate the instruction of children hitherto voiceless — I can hardly say, speechless.

South Africa.

Cape of Good Hope. — The system is a complete educational ladder, with the Kraal schools at the bottom, and the University of the Cape of Good Hope at the top; and every kind of educational institute is state-aided. I cannot learn that any science-teaching is given in primary schools. In the second-class schools a fairly high standard is aimed at, but how far it is reached may be gathered from the following sentence in a recent report of the inspector-general of schools: "But certainly the greatest want in the school curriculum is the almost general neglect of science-teaching in a scientific manner."

A friend writes to me, "In the schools near Cape Town, of which I had some experience, the idea of science was, getting by rote a few pages of a book on physical geography. At one or two schools, where I introduced simple lessons in physics, with experiments, I was surprised — though it was for this that I hoped — at the quickening of intelligent interest in the work." There is a university, but I regret to say that its examination schemes give no encouragement whatever to scientific training. Public libraries, museums, and botanic gardens exist, and are state-aided, as well as their country branches.

Natal. — A council of education controls state-aided schools of all kinds. The course in all primary schools includes theoretically the elements of natural and physical science. Even in the native schools a little physical geography is taught. In the higher schools, at Durban and Pietermaritzburg, scientific teaching is carried still further. A lady friend of mine, Miss Rowe, an ardent devotee of science, has lately settled in the latter city, at the head of a very high-class girls' school.

Australasian colonies.

In every one of these, the state system of education is compulsory and undenominational. Public instruction is free in Victoria, Queensland, and New Zealand. In proportion to population, Victoria has more children at school than any other colony; but its age-limits, six to fifteen years, are greater. New South Wales heads the list in point of cost of instruction per scholar, with an expenditure of £8 2*s.* 8*d.* each per year, nearly double that of any other colony; but its system of instruction is far the most complete of any, as will shortly be seen.

Western Australia. — Its total population does not amount to 40,000. In 1884 about £10,000 was expended on education. In the schools throughout the colony, whether high or elementary, the rudiments of some branches of science form a part of the teaching. The wealthier classes of society send their children away for education, and this has not tended to encourage high-class teaching of any kind.

South Australia. — The schools are divided into public (or primary) and provisional. In the former, only certificated teachers are employed. Physical geography, object-lessons, and simple drawing all find a place in the compulsory course. The secondary schools and colleges are mainly denominational, receiving 'grants-in-aid,' and in the programmes of many of them science takes a fair position. The colony enjoys the distinction of being the only one of the mainland provinces of Australasia which possesses an agricultural college: it was opened in 1885, under the management of Professor Custance, formerly of Ciren-

cester, and the course of instruction includes chemistry, geology, botany, mechanics, veterinary science, forestry, etc. The university has nine professors, the chairs being thus roughly classified: two literature, five science, one music, one law, in all of which subjects, and in medicine, it has power to confer degrees. The matriculation programme contains many optional subjects, and it would be possible, but not easy, to pass it without any knowledge of science. The bachelor's degree in either faculty involves three years' academical study, with an examination at the end of each, conducted in the best manner, viz., partly by the professors, partly by external examiners. This system obtains also in the Universities of Victoria and of New South Wales. The course for science degrees is distinctively good, and well arranged. This university opened its degrees to women in 1880.

In Adelaide, free popular lectures on scientific subjects are given by the university professors, and are very largely attended. The attendance at the courses on physiology was quite remarkable.

There are one or two scientific bodies or associations, such as the Royal society of South Australia, but they are all more or less connected with the university.

The system of state scholarships, enabling the holders to pass by successive steps from primary school to university, is very extensive, and holders of the 'South Australian scholarship' proceed to English universities every year. The public library, museum, and art gallery of South Australia form one state-aided institution, organized very much on the basis of the typical institution at South Kensington. Its work, however, is mainly literary and artistic, and it is affiliated with the university.

VICTORIA.

In this colony the whole subject of public education was the subject of a royal commission of inquiry, which presented a most valuable report in 1878 (mainly the work of Mr. Charles H. Pearson, M.A.), containing excellent suggestions for the organization of public instruction as a whole. I have been unable to learn how far these recommendations have been carried out, since I have had more difficulty in obtaining recent information about Victoria than in any other case.

In the primary schools, geography is a decided feature, but there are no 'object' or useful knowledge lessons. Of 7,000 children who, in 1884, paid for tuition in 'extra subjects,' one-fourth, or 25 per cent, took science if mathematics be included, but only 5.7 per cent if it be excluded. This speaks well for the recognition of mathematics as the basis of science. For teachers, however, all certificates above a mere 'certificate of competency' require several subjects, from one-quarter to one-half of which are scientific, and some science is compulsory.

All secondary education is under the control of private persons and proprietary bodies, usually connected with some religious denomination. There are eight exhibitions yearly, of £35 each for six years, enabling the holder to pass from state schools through certain approved grammar-schools and a university course.

As the colony owes much of its prosperity to its mines, it is natural to find two excellent schools of mines, — one at Sandhurst (formerly Bendigo), the focus of reef-mining; the other at Ballarat, the centre of alluvial mining. From a personal inspection of both these, a few years ago, I can speak in the highest terms of their efficiency. On Nov. 29, 1880, I wrote in the visitors' book at Ballarat. "The chief thing apparently required to make the school do even better work than it is doing, is that its pupils should come to it with some elementary knowledge of the principles of physical science, such as ought to form part of the necessary instruction in the higher classes of every state school." I have since experienced the pleasure of being informed that these few words, which were printed and widely circulated in the colony, exercised a most important influence for good upon the school.

Determined not to be behind South Australia, the colony has started an experimental farm, and is building an agricultural college in Melbourne. There is also a capital industrial and technological museum, in connection with which lectures are given.

The University of Melbourne ranks with those of Great Britain. Its magnificent buildings were opened in 1855, and women were admitted in 1880. The matriculation examination embraces fourteen subjects, six of which are scientific (including mathematics); but I regret to say that the university gives no encouragement to the study of science, since a candidate may matriculate without passing in either of these six, and, although there are literary honors lists, there are no science honors lists except in mathematics. Science finds a very subordinate place in the arts degree, and degrees in engineering have lately been instituted. Practically all the teaching of natural science in the university is confined to the medical school, one-third of the total number of degrees granted being medical, and one-half arts, the remainder laws. The Melbourne observatory, the Melbourne botanic gardens, and the Melbourne public library are all well known by repute to Englishmen. The zoölogical garden is only recently set on

foot. Eight scientific or learned societies, headed by the Royal society of Victoria and the Royal medical society, keep alive an interest in various branches of science. The Australian health society, with its free lectures in Melbourne, and branch lectures in various provincial towns, does much practical good among the people, and the same may be said of the mechanics' institutes and public libraries to be found in most cities of this colony.

New South Wales.

Just as New Brunswick and Nova Scotia in the Canadian group of colonies appear to have worked out, theoretically at any rate, the most perfect educational scheme, so, in the Australasian colonies a similar place must be accorded to New South Wales. The whole of the present system, which, as usual, is under a minister of public instruction, dates from the act of 1880, which authorized, as state schools, five classes of schools, the recognition of four of which by the state was quite a new thing. These are, 1°, primary; 2°, superior public schools, for additional instruction in the higher branches; 3°, evening schools, for those who had no opportunity for education in primary schools; 4°, high schools for boys, which prepare for the university; 5°, similar schools for girls. In 1885 there were 605 pupils in these high schools, from a colonial population of 920,000. The gross annual expenditure of this act exceeds £700,000; and the total school population is 280,000, or approaching one-third the entire population of the colony.

In every public school, object-lessons, geography, and drawing are taught, even in the lowest classes. In the fourth class of primary schools, object-lessons include "natural history, manufactures, elementary mechanics, and the science of common things;" in the fifth class, "arts and manufactures, the laws of health, social economy, the duties of a citizen, the laws of the state, and experimental physics." Of course, the whole of this is treated in very elementary fashion; but the point to be observed is, that the same idea is carried out in the higher schools, of which I have already spoken. In the Sydney grammar-school, a school *sui generis*, there is now a modern side, in which natural science takes a prominent place. The university is now exceedingly well organized. It grants a B.Sc. and a D.Sc. degree, the latter requiring a research paper. It also grants corresponding degrees in engineering. Its degrees in arts involve attendance upon certain courses of lectures in natural science. I regret, however, to say that its matriculation examination can, if desired, be passed in literary subjects and mathematics alone, to the exclusion of science, which, as is well known, cannot be done in the University of London. The public examinations, however, set on foot to test the education in schools, include a large number of science subjects. In connection with the university are several denominational colleges; and a large and well-endowed new medical school has just been built in the university grounds.

The most remarkable feature, however, in the public instruction of this colony, is the state system of technical education. The subject was being discussed when I was there in 1880, and I remember being invited by Sir W. Manning and Sir Harry Parkes to address a meeting about it in Sydney. Since then it has made extraordinary strides, mainly under the guidance of Mr. Edward Combes, the president of its board of governors. It has followed the principles laid down by the city and guilds of London institute, and arrangements are in progress by which its work will now be tested by the examiners of that body. The Sydney college has 50 classes, in 13 departments, and itinerant lecturers give instruction in 16 of the principal towns of the colony. The number of individual students in Sydney alone last year was 2,634, or more than at the technical institute in Finsbury; and of these, 500 were women. In that year, also, 196 popular lectures were given in Sydney, entirely on scientific subjects, at which the average attendance was 208, the total being 40,767. In this exhibition are specimens of the work of the college. One remarkable feature of it has yet to be noticed: all this excellent work has been done in temporary and hired buildings; the college has actually no permanent abode.

Among the other means for spreading a knowledge of science, the magnificent museum, the exquisitely beautiful botanical gardens, the public libraries, the Royal society of New South Wales, the Linnean society, and similar smaller organizations, must not be forgotten.

Queensland.

The primary schools are divided into 'state' and 'provisional.' There are 425 of the former, and the free course of instruction includes geography, object-lessons, and elementary mechanics. Instruction in other subjects is charged for, and must be given out of the ordinary school-hours. The object-lessons are defined to include "an elementary knowledge of the science of common things — of the materials and processes necessary to produce the most common manufactured products — and of the laws of health." In 1884 there were 52 scholarships from primary to grammar schools, and these again are largely aided by government grants, £90,000 having been thus spent to the end of 1884. From these schools,

since 1878, three exhibitions to the universities have been granted yearly, on the result of examinations conducted by the professors in Sydney. The holders of these scholarships have proceeded to the Universities of Sydney, Melbourne, London, Oxford, Glasgow, and Edinburgh, and in many cases have distinguished themselves there, often in scientific examinations.

TASMANIA.

Little or no elementary science is taught in the primary schools. A council of education takes cognizance of all secondary schools, and conducts examinations for scholarships and exhibitions, and for the degree of A.A. Holders of this degree can proceed to England to study for three years at government expense: 274 students have availed themselves of this, and have taken medical and legal degrees, and entered the church, but none have studied and applied their science in the colony. It is one of the duties of the analytical chemist to the government, to deliver free public scientific lectures in Hobart. The government has under consideration a scheme for introducing technical education into primary schools.

NEW ZEALAND.

I have already referred to the speech of the minister of education of this colony, delivered in the house of representatives in 1885. In general characteristics, the educational system here much resembles those we have been considering. The extent to which science is recognized in the primary schools will be seen from the following facts. With a population of about half a million, there are nearly 1,000 primary schools, in which almost 100,000 children received instruction in 1884: 55 per cent of these learned geography; 60 per cent, drawing; 75 per cent were taught 'object-lessons;' and 26 per cent received lessons in elementary science. The course of instruction in this interested me much, as it is so obviously based upon what has been so successfully worked in the board schools of Liverpool, Birmingham, Leeds, Nottingham, etc., and is being introduced in London also. It is confined to pupils in and above standard IV.; the boys being taught elementary physics, or agricultural chemistry, or botany, and the girls domestic economy, based on such excellent little books as that of Mrs. Buckton. The peripatetic system of teaching these subjects, so well worked in our large cities, cannot, of course, be carried out in New Zealand. The Maori native schools are, on the whole, in a flourishing position, and doing excellent work: 2,226 children are in attendance, and a text-book, 'Health for the Maori,' has been published in English and in the vernacular.

In the secondary schools, academical traditions are still very strong, and in the position of science there is very great room for improvement. Under the guidance of the University of New Zealand, however, the provincial colleges affiliated to it are doing much to encourage the pursuit of science. In Canterbury college, out of six professors, four are scientific, and a similar proportion holds good in the so-called University of Otago, excluding the medical school. I believe a similar state of things exists also in the Auckland college. The University of New Zealand recognizes the claims of science to a greater extent, I think, than does any colonial university. The pass for a bachelor of science is as follows: mathematics, physics, chemistry, biology, and any two out of the five following subjects,—Latin, Greek, English, modern languages, mental science. A candidate can matriculate and proceed to the B.Sc. degree without any more classical knowledge than a trifling amount of Latin, such as the proverbial schoolboy ought to have at his fingers' ends. So anxious is the senate of the university to maintain a high standard for its degrees, that all the degree examination questions are set, and all the answers thereto are revised, by English examiners of either London, Oxford, or Cambridge universities. It is my privilege to be the agent of the university in England, and I am now seeing through the press about ninety examination papers for use in the colony next autumn. Mr. Stout says in his speech, that, "considering her population, New Zealand has as many students receiving a university education as any country in the world, and, relatively to her population, more university-trained men than any country in the world."

So much for the scholastic instruction. In the other great means of educating the people, museums, etc., New Zealand is in advance of the other Australasian colonies. The Canterbury museum, whose curator, Dr. Von Haast, is executive commissioner at this exhibition, excels those of Sydney and Melbourne; and in arrangement of exhibits for scientific purposes, the Otago museum is said to be second to none in the southern hemisphere. Those in Wellington and Auckland have also a well-deserved reputation.

GENERAL CONCLUSIONS.

Finally, I beg to offer a few general remarks and conclusions, founded upon the details which we have been considering. To those of us who are familiar with the very limited extent to which the teaching of science is carried out in the elementary schools of Great Britain, it would appear that its claims to a place in state-aided primary education are much more recognized in the colonies than in the mother-country; and this not merely

because it is the only foundation upon which a system of technological education can be securely built, but for its value in drawing out the minds of the pupils.

In secondary, grammar, and high schools, however, where the academic influence and traditions are still strong, I incline to think that science scarcely occupies a position equal to that now attained in corresponding English schools. I should doubt, for example, whether there is any large high-class school in either of the colonies, where, as in Clifton college, a certain amount of attendance on science classes is required from every boy, no matter what his future is to be, in order that he may comprehend the meaning of scientific method and treatment of a subject. The colonial universities, too, though now generally modelled more or less on that of London, have usually so arranged their matriculation examination, unlike their prototype, that it is possible to pass it in purely literary subjects alone.

A glance through the calendars of the older colonial universities shows again, in a very marked degree, the strong influence of the older academic ideas of Cambridge and Oxford. I noticed this particularly in the case of Sydney, in 1880, where I had unusual opportunities of forming an opinion; and also, at the same time, in some of the provincial colleges in New Zealand. Within the last few years, however, a great change has come over colonial university opinion in this matter. Degrees in science have been instituted; faculties of science have been organized, and placed on an equal footing with those of arts, laws, and medicine. In the case of two, at least, of these universities, degrees in engineering science are now conferred, a proposal to establish which, as some present are aware, is now before the University of London.

Great as has been the progress of public opinion in England during the last few years, on the value of science as an element in education, I am disposed to think that the progress has been greater in the colonies in the same period. Certainly the development of that opinion to its present point has been much more rapid in the colonies than at home. In educational as well as in political matters the colonies are most valuable to the mother-country as localities where experiments in legislation may be, and often are, conveniently tried, the progress of opinion on certain subjects there being in advance of that in England.

To attempt a general review of all the other existing agencies for the promotion of a taste for science among adults would be almost hopeless. They are of the same general character as in England, modified to suit the special circumstances of each case; some of them being carried on, under circumstances of great difficulty and discouragement, by enthusiastic devotees of nature, while others, like the Royal societies of Canada, Victoria, and New South Wales, have achieved a reputation which extends wherever the English language is read.

EDUCATION IN SPAIN.

AN English writer, touching on the subject of education in Spain, complains that so different are the conditions in the various provinces of Spain, statistics mislead when they seem to show that Spain is one of the worst educated countries in Europe. While this is true, he says, of many districts, it is not true in all. The great drawback to the cause of education in Spain is the comparatively small educated public to which appeal can be made. Out of upward of sixteen millions of Spaniards, only four millions know how to read and write, and half a million more can read only. Thus only about twenty-five per cent of the population have any education worth speaking of.

Then, too, a corrupt and corrupting political and administrative influence is brought to bear on education. Nominally, and according to the letter of the law, education is compulsory on all Spaniards between the ages of six and nine. Yet the number of pupils on the school rolls is only 1,800,000, and the actual attendance is less than sixty per cent of the enrolment. The laws are violated in many particulars and neglected or evaded in many more. Of the 23,000 schoolhouses (and it must be remembered that the most of them escape inspection altogether), 7,999 are returned as *no decentes y capaces*.

The teachers' salaries are ludicrously small. Of 15,000 teachers, 1,273 receive less than twenty-five dollars a year, 2,827 receive from twenty-five to fifty dollars, and only half of them have a salary that amounts to one hundred dollars.

Between 1870 and 1880 some progress was perceptible in educational matters. The northern provinces are in advance of those of the south. Alava comes first, with sixty-three per cent of its male population able to read and write. The religious orders and corporations do not play so large a part in the education in Spain as is commonly supposed. In the matter of primary education, the whole number of pupils taught by the religious associations is only 30,879, while the returns from the Protestant schools show only 3,196 enrolled in them.

The chief trouble with Spanish education seems to be that it does not conform to the real needs of the nation. While seventy-five per cent of the total population can neither read nor write, the proportion of university graduates is as high as that in