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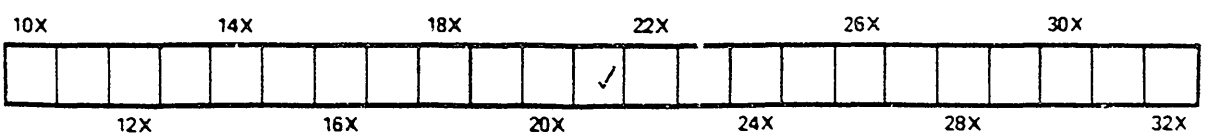

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HOW TO TEACH THE MULTIPLICATION TABLE.

PRINCIPAL S. P. ROBINS, LL.D., MONTREAL.

I pray you, my readers, not too hastily to attribute to me a certain arrogance of mind because I venture to think this subject one that deserves attention for a little while, even amid the many very important subjects that engage your attention as educators. It is one of the beginnings of teaching,—the beginnings where I venture to affirm all the difficulties lie,—the beginnings that are despised by shallow people and neglected by careless people. Frankly I hesitate whether to say that the multiplication table is not taught in schools generally, or to say that it is generally ill-taught in schools. To every rule there are exceptions; but while I must admit that the multiplication table is learned in many schools, I cannot but say that in very many either it is not taught at all, or it is taught badly.

Beecher's rule for making good coffee was "Find out how coffee is made in the principal hotels and restaurants, and then make it the other way." As preliminary to our discussion shall we endeavour to find out how the multiplication table is taught, if taught at all, in most schools, and approve or disapprove as sound educational principles may demand? One method, not yet I understand wholly abandoned, is to put a table-card into the hands of a little pupil with the injunction "Now learn from here to there," "at your seat" or "at home" as the case may be. Then later in the day or on the next day, the teacher hears the pupil recite with all the intelligence and pride of a parrot, seven times one are seven, seven times two are fourteen, seven times three are twenty-one, seven times four are twenty-eight. If painstaking the teacher asks questions upon the table in an irregular order, eliciting some such astounding information as that "seven times three are fourteen, no twenty-eight," and then with more or less sympathy with childhood's troubles, the teacher sends the poor bewildered child back to his seat to learn the lesson better. Do I caricature the method? Will some writer more skilful than I describe the method, so as to bring out more clearly than I can the excellence of its results. Far down the street while approaching a school on a drowsy

June afternoon you and I have heard the sing-song chorus, once heard never forgotten, of three times one are three, three times two are six, three times three are nine, three times four are twelve, three times five are fifteen—a dull, monotonous, heart-and-brain-wearying drudgery, productive of no better intellectual results than were secured in days of old by setting a playful, restless, little tot on a high form, and telling her to keep her eyes on her book. Let us ask ourselves what has the child learned who has by such methods with measureless pains, much disappointment to the teacher and not a few surreptitious tears of the scholar, acquired the multiplication table. He has learned to take truth on authority without inquiring as to foundations, to make the memory a store of meaningless phrases and unconsidered facts and to rest content when he does not understand. But he can now recite the multiplication table, and he has cultivated his power of associating and remembering verbal forms.

Some progressive teachers think they have made all the improvement possible on such modes of procedure as I have described, when they have given a child a set of counters of any kind or an abacus, have taught him to count out nine six times over, then to count the units in his sets of nine, —one, two three, etc., up to fifty-one, fifty-two, fifty-three, fifty-four, and lastly to remember the fact that he has so attained, "six nines are fifty-four." Certainly this is a beter mode of teaching.

Another method that readily suggests itself when pupils have learned to add, and which is frequently used by teachers who aim at better things, is to set down a column of figures corresponding to the numbers in the table, in the example just used six nines in a column, and to add the column, the result being committed to memory.

Now certainly each method just described is a great improvement on merely learning by heart the combination of words "six times nine are fifty-four." The memory of verbal forms is as much cultivated by exercise in the two latter modes as in the first, but, further, this great gain is secured that the child is taught, however imperfectly, that he can discover truth and test statements for himself. Besides he is sure to understand what is meant by six times nine or by six nines. Yet something still beyond is much to be desired. The skilful educator distinguishes carefully the kinds of knowledge which furnish answers to the very distinct questions, What is? How do you know? and How do you account for? "What is?" appeals to memory. "How do you know"? demands demonstration. But "How do you account for it?" calls for explanation, and involves a much more thorough understanding of the subject than do the former questions. Now the pupil who has learned the multiplication table, no mater how mechanically can answer questions on it like the first. What are nine times six? Fifty-four, correctly answers the boy who in some belated survival of the schools of our grandfathers has had the multiplication table flogged into him. But if you ask him how he knows he can at best only reply, "I know it on authority; it was so on my table card."

Pupils taught in the better ways last described can answer two questions satisfactorily. To the second question one replies "I counted it and I know"; the other "I added up a column of six nines and I know." He who is competent to hold an opinion on an educational topic, recognizes at once the great mental superiority of the pupils who can answer both questions; but it is to be feared that not many pupils in our schools can give a reasonable reply to the third question, "how do you account for the fact that six nines are fifty-four"? Now inability to answer such questions as the last is not confined to the multiplication table. In almost all subjects that are taught in schools pupils are able to answer questions of the first kind; in some subjects they can also answer questions of the second kind from experience, usually they can only quote authority; in others, questions of the third kind; in a few instances, questions of all kinds; in not a few, questions of neither the second nor the third kind. It would be most interesting to review from this standpoint the several subjects of our school programmes; here it must suffice to say that in mathematics as generally taught in good schools, answers to the first and second questions are much more satisfactorily given than to the third. For example all pupils who have studied a little algebra will tell you that $-a \times -b = a\ b$; a great many will demonstrate the fact to their own satisfaction and possibly to yours; but you will seek in many directions before you will find an acceptable answer to the question. "How do you account for the fact that the product of two negative quantities is positive?"

Every pupil who has properly learned the multiplication table will tell you first that six nines are fifty-four; secondly that he knows that this statement is true because in some way or other he has satisfied himself by an independent investigation; and, finally, will in a completely satisfactory manner explain how it comes about that six nines are fifty-four. Preparation must be made for the proper teaching of the multiplication table. This preparation consists in thorough teaching while dealing with the preliminary topics. First the intuitions on which arithmetic rests must be clear. The pupil must have in mind a sharply defined conception—as a student expressed it the other day a clear picture—of every small number up to and including ten. Secondly, numeration and notation, not necessarily beyond one hundred, must be quite familiar so that symbols, as 18, 84, and the names of the numbers which they represent, as eighteen, eighty-four, shall instantly suggest to the mind of the pupil their connotation, ten and eight, eight tens and four. Thirdly, he must have learned his addition table in the right way. When learning the sum of eight and five he must have been taught to make the eight up to ten by taking two from the five so that what has been given to him in the arrangement eight and five, he rearranges into ten and three, which latter arrangement he has learned to call thirteen. The reason is obvious. Our system of numeration is a mere arrangement of numbers into tens, hundreds, etc., and addition

is, for the most part, nothing else than arranging into such groups numbers that are given us either only partially or not at all so arranged. To take in illustration one example more. When the pupil is first asked to add thirty-six and seven, he virtually says, "I have three tens already grouped, but I have six and seven that are to be grouped. I will make the seven up to ten by taking three from the six and adding it to the seven. Then I shall have another group of ten that added to the three groups I had before will give four groups of ten, forty, and three more left from the six make up forty-three. Thirty-six and seven are forty-three." I do not say that the pupil uses such words as these or, indeed, any words at all in solving such an example. What I say is this that when rightly taught he goes through a process such as I have described, when first he discovers that thirty-six and seven are forty-three. After a time he has so frequently gone through the process of adding thirty-six to seven and other similar processes that he instinctively says, without consciousness of any process in the act, thirty-six and seven are forty-three. With a mind thus furnished and exercised a pupil is able to approach the multiplication table aright.

A part of that table is already known to him from the intuitional arithmetic with which he is familiar. He sees as he glances at it mentally that four, which presents itself to him in such fashion as this : :, is two twos ∴, that six : : : is two threes ⁘ or three twos ⁝, that eight : ⁝ : is two fours ⁘ or four twos ⁝ that ten ⁙ is two fives ⁘ or five twos ⁙ and that nine : : : is three threes ⁘

At this stage particular attention will be drawn to the commutative principle as applied to the product of two numbers, but without naming or enunciating the principle. It will suffice to point out that any product of two numbers may be stated in two ways. As we have seen that twice three and three times two are the same thing differently expressed, as also two fours and four twos and two fives and five twos, so we may see that any product written rectangularly on the black board may be read in two ways. Thus·····may be indifferently read
·····as four lines of five dots
·····each or as five columns of
·····four dots each; that is four fives and five fours are identical. A similar statement and demonstration may of course, and to the child obviously, be given respecting any other product of two numbers. This fact should be made quite familiar, as its ready use materially aids the pupil in rightly learning the multiplication table. One arrangement of the factors often presents their product to the understanding much more quickly than the other; three nines far more easily than nine threes are seen to be twenty-seven. Besides the number of products to be committed to memory is by this device halved; the work of learning the multiplication table looks to the child like a much less forbidding task when thus abbreviated.

The progressive teacher will keep steadily before him the purpose of the multiplication table. It is in short a regrouping of

groups that are not tens, into groups of ten. If six groups of nine are given us we regroup the nines into tens, find that the result is necessarily five groups of ten and four over, and that, consequently, six nines are fifty-four, —a fact recorded in the multiplication table. From a clear perception of the purpose the true method of teaching the multiplication table will emerge. The teacher must teach the pupil how to do the regrouping rapidly for himself; he should not call upon his pupils merely to remember the results of the regrouping, should not simply expect his pupils to learn by heart the multiplication table.

The twice table is learned incidently in learning to add. Addition, step by step, is the grouping into tens of two given numbers, then of the result and another number, and so on. Among the mental additions to which the pupils of good teachers have been accustomed, such questions will have been solved as what are seven and seven, sometimes stated as two sevens and later as twice seven. The twice table, therefore, presents no difficulty. The tens table has really been learned in learning numeration. The numbers given are already grouped into tens. No regrouping is required. All that is necessary is to recall the slightly modified names of the collected groups; thus forty represents four tens.

The next table to take is five times, because fives are easily arranged into tens. First discuss the even fives; thus four fives equal two tens which are twenty, and so on, up to eight fives are four tens, are forty. Next discuss the odd fives, three fives are ten and five, are fifteen, up to nine fives or five nines, forty-five.

As a group of nine is easily made up into a group of ten by the addition of one to it, nine times is the next easy table to understand. Take three nines thus: Make up two of the nines into tens by adding to each one taken from the third group of nine, leaving of that third nine seven, so that three nines or nine threes are two tens and seven, that is twenty-seven. So proceed upward to nine nines are eighty-one, carefully stating every product in both the direct and the inverse order, thus eight nines must be sometimes asked for as nine eights. Nine times may also be made to lean upon ten times thus: seven tens are seventy, but seven nines are seven less than seven tens, therefore, seven nines or nine sevens are seven less than seventy, that is they are sixty-three. Both ways of looking at nine times should be practised, for skill in numbers largely results from a certain nimbleness of mind in taking quickly many views of the combinations possible among the numbers presented; and although I cannot now occupy the space necessary to exhibit the various ways in which products may be presented, it is to be understood that I strongly recommend a varied presentation.

It is not quite certain in what order the remaining columns of the table should be taken, but I incline to take eight times next. Each eight is made up into ten by adding two. Three eights then will make two tens and leave four over, that is they are twenty-four. Similarly four eights are thirty-

two. Six eights may be made to lean upon five eights, for six eights is one eight more than five eights. But five eights are forty; therefore, six eights are forty-eight. It is well however, to discuss the six eights as the seven eights are discussed. Of seven eights, five eights can be made up into tens by taking five twos, that is by taking the sixth group of eight and two from the seventh group, leaving six of the last group. So then s ven eights or eight sevens are re-arranged into five tens and six, that is fifty-six. A similar examination and re-arrangement of eight eights leads to sixty-four. The few remaining threes may be easily taken by observing that three threes are one less than ten. Therefore, four threes are two more than ten. Six threes are two less than twenty, eighteen; and seven threes are one more than twenty, twenty-one. Because three fours are two more than ten, four fours are six more than ten, sixteen. Six fours are four more than five fours, but five fours are twenty, therefore, six fours are twenty-four. Similarly seven fours are two fours more than twenty, are in fact, twenty-eight. Of the table there remain to be considered only six sixes, six sevens or seven sixes, and seven sevens. Among the various ways that may be proposed of dealing with these, possibly the best is to build them up from five sixes which are thirty, whence six sixes being six more than five sixes are thirty-six; seven sixes are six more than thirty-six, that is are forty-two; and finally seven sevens are seven more than six sevens, are indeed forty-nine.

It is quite possible that a better order of taking up the table may be suggested—especially that a better way of treating particular combinations of numbers may be chosen; but I cannot admit that any way of beginning to learn the table is right, except that of consciously re-arranging into groups of ten the groups as given.

The first recitations of the multiplication table must be deliberate, so that pupils may consciously take the several steps necessary to the re-arrangement, and make no mistakes in replies. Pupils must not be hurried, because that tends to promote guessing, which is far worse than silence. Correctness being insisted on from the beginning, corrections when needed being made by retracing the process with the pupil, not by merely telling him what is the correct answer, speed will soon follow as a result of constant repetition.

Teaching thus, you will be following the important educational method of appealing first to the understanding in presenting complex truths, and repeating the appeal until the results are without consciousness of effort given to the keeping of memory.

The proper teaching of the multiplication table encourages pupils to search for foundations, to ask for reasons, to analyze complex presentations, to re-construct the complex in the understanding, to commit to memory exact truths and then to reproduce them exactly.

The well taught pupil, being asked how much six nines are, replies at once "fifty-four"; being further asked how he knows, says

"because I have frequently arranged six groups of nine into fifty-four"; being further pressed by the question how comes it that six nines when re-arranged make fifty-four, completes his statement by pointing out that because nine is one less than ten, five groups of nine may be made into five groups of ten by the addition of five, one to each group. Therefore, six groups of nine may be made into five groups of ten at the expense of the sixth group, of which sixth group four will remain over when the other five groups have been made up into tens. Six nines are then re-arranged into five tens and four, into fifty-four.

WHERE SUMMERS ARE LONG.

A Comparison of Canadian and European Summers.

J. GORDON MOWAT.

Perhaps no country suffers abroad from misconception in regard to its climate as does Canada. Mr. Rudyard Kipling's well meant but unfortunate allusion to the Dominion as "Our Lady of the Snows"—scarcely an appropriate one to a country where in east, west and south at almost any time in winter as large an area as England is bare of snow, and several times that area has but a scanty covering—is but a natural re-echo of the opinions which have been expressed during the centuries since the snowy gateway of the St. Lawrence was first entered by the French. Exaggerated ideas of the cold of Canada are continually being expressed in books and in leading periodicals, and often by generally well-informed men. A prominent member of the British Association, while sailing down Lake Ontario, referred to the scene he supposed the lake would present when *frozen* over. The late General Benjamin Butler, in an article in a leading American review not long ago, said that Canada could easily be invaded in winter by *crossing Lake Ontario on the ice.* A writer in a popular English magazine tells of the mercury being constantly below zero at Quebec for over four months every winter, whereas a period of two days when such is the case, even in that city, is uncommon. McCulloch's Commercial Dictionary of an old date refers to what are now our boundless wheat fields of the North-West as "situated in an inhospitable climate, and worth very little, excepting as hunting grounds"—an opinion happily well dissipated at the present day. Some of the queer misstatements made are, to say the least, amusing. Sir Francis Bond Head, a former governor of of Upper Canada, in a volume on the country, indulging in a little "romancing" about the climate, said, amongst other things, that often in writing his dispatches to the Home Government, in his warm offices in the Government House, Toronto, he has found the ink cease flowing, and on examination discovered a ball of frozen ink formed under his pen. Another writer on settlement in the mild Western peninsula of Ontario gravely tells of horses having to be cut out of the ice formed from the overflowing of the troughs at which they were

being watered. And the London *Illustrated News*, on the occasion of Prince Arthur's visit to the lake region, comforts its English readers by the assurance that "Canada has plenty of bearskins and deerskins to clothe her own children and the Queen's son, too." Even the most serious and authorative of publications make similar singular mistakes. Chamber's Encyclopædia, for example, in its article on North America, says that the basin of the St Lawrence, *i.e.*, of the Great Lakes and the River, is, in winter, not only relatively, but absolutely, the coldest portion of the continent, its low level constituting a depression into which flows the cold, and, therefore, heavy, air of the interior of the continent. Unfortunately for this theory the basin is in general much milder on the same parallels of latitude than the Mississippi Valley. And, notwithstanding that December, January and February have been known to pass with the water constantly lapping the innermost wharfs of Toronto Bay, "En cyclopædia Britannica," in a tabular statement, unable to conceive the final opening of navigation in the harbor occurring one year so early as Jannary, sets down the opening as taking place in June! It is refreshing to turn from these arctic pictures to the impressions of America given in one of the great London monthly reviews by an Englishman who at St. Paul is assured that the date palm flourishes in the Red River Valley in Northern Minnesota, so very close to Manitoba, as that former gateway to our prairies, St. Vincent. These wrong ideas prevalent as to the Canadian climate have been exceedingly detrimental to the country, and probably have done more to retard immigration, especially of well-to do agriculturists, than all other causes combined.

Many Canadians, too, influenced by foreign misconceptions so often expressed, underrate the relative merits of our seasons when compared with those of northern and central Europe. This wrong impression of the comparative length of the summer is aided by the fact that in the most thickly-inhabited portions of old Canada, such as southern and eastern Ontario, fall wheat harvest is generally over in July, and all cerals, excepting maize, are garnered but little if any later. Partly, too, the very considerable and sensible difference in temperature between May and June, and between August and September aids this error, though May in several Canadian localities is as warm as the English June.

Then, too, both at home and abroad, the impression made by a cursory glance at the maps of the two hemispheres tends to the disadvantage of Canada. The Gulf of Mexico, in the minds of most, is associated with the latitudes of the Mediterranean. New Orleans is contemplated as being in about the same latitude as Marseilles or Nice, and Algiers and Morocco as Cuba. The general absence in North America, through occasional severe winter frosts extending as far south as the Gulf of Mexico, of certain characteristic trees of southern latitudes further confirms this impression. Hence we have "Far north Canada," and hence, too, even southern Ontario is mentally removed far up into the latitudes of north Germany and the south of England, and prejudged adversely whenever the length and generous warmth of its summers are thought of in relation to those of France, Austria, south Germany, and even

of countries somewhat further north.

A little readjustment of mental impressions in regard to relative latitudes will do much to correct ideas in regard to our summer seasons, and also in regard to our winters, though it is always to be borne in mind that our position on the eastern side of a continent makes our winters colder than those of the west of Europe in the same latitudes, just as the winters of China, Korea, and Japan and the East of Asia generally are colder than those of similar latitudes on the Pacific coast of North America.

The Mediterranean, where it laves the delta of the Nile, is further north than New Orleans, while the same south shore of that sea curving past Tunis is as far north as southern Illinois, and only 250 geographical miles farther south than Pelee, in Ontario. The northern part of the Mediterranean is largely in the region of the Great St. Lawrence lakes; its most northern shore, in the Adriatic, corresponds in latitude with the north shore of Lake Huron, leaving Lake Superior the only one of the great lakes wholly north of the Mediterranean. Lake Erie in latitude corresponds with the Mediterranean off Barcelona, in Spain, and reaches south to within a few miles of the latitude of north coast of the Ægean. Lake Ontario has the latitudes of the Gulfs of Lyons and Genoa washing the south coast of France and the neighboring coast of Italy.

Lake Huron's southernmost parallel is that of the north point of Corsica. The Adriatic nearly corresponds in latitude, general direction and shape with Lake Michigan. Canadian Pelee, in Lake Erie, is a little farther south than Rome and lies in the same latitude as Braganza, Portugal; Valladolid and Saragossa, Spain; Ajaccio, Corsica; Adrianople, Turkey; and Mount Olfar, Asia Minor. Farther north than the southernmost land in Canada (lat. 41° 42°) lies the whole of France and Austria-Hungary (including Dalmatia), three-fifths of Italy, and all of Turkey-in-Europe (with its Danubian valley) excepting Illyria, southern Macedonia and southern Thrace. Greece is the only country in Europe wholly south of Canada.

London, western Ontario, has the latitude of the Pyrenees, and of Vittoria and Pampeluna, Spain; Hamilton, that of Corunna and Bilboa, in Spain and Perugia, in central Italy. An east and west line through Toronto passes through the sea slopes of Asturias, Spain, and through Toulouse, in the south of France, and leaves the far-famed Nice and Florence a few miles on its northern side. Ottawa and Monteeal correspond in latitude with Milan and Venice, and are farther south than Lyons. Ontarians regard Lake Nipissing as "away up north," but its latitude is that of Poitiers, central France, and of the Lake of Geneva. Lake Temiscamingue on the Upper Ottawa, and Lake Constance, Switzerland, and Buda-Pesth, the capital of Hungary, are in the same latitude. Quebec represents almost exactly the central latitude of France and the northern verge of Italy, though in winter clad with a thick mantle of snow. Victoria, British Columbia, Port Arthur, on Lake Superior, and Chicoutimi, on Lake St. John, at the head of the Saguenay, have the latitude of Brest, and leave Paris farther north, and within fourteen miles of the 49th parallel, the southern boundry of Manitoba and the Northwest Territories. Prague, Bohemia, is a few miles farther north than Winnipeg, and Brussels, the capital of Belgium, a similar distance north of Regina.

The latitudes of sunny France do not fail at Calais and Dunkerque until, going north in Canada, Calgary, on the slopes of the Rockies, in the west, and in the east, Moose Fort on the tidal waters of James' Bay, are reached. London is fifteen miles further north than Moose Fort. Berlin is exactly as far north as Fort Albany at the northern extremity of Ontario. Battleford corresponds very nearly with Berlin and Leicester in latitude, Edmonton with Dublin, Port Simpson, B.C., with Belfast, and Dunvegan, on the Peace River, with Edinburgh.

As a whole Ontario lies in the same latitude as France and Austria-Hungary, extending a little more to both north and south than either. These European countries cover the latitudes between Lake St Clair and James' Bay. Switzerland lies in the Lake Nipissing and Temiscamingue latitudes, Germany in those between Temiscamingue and York Factory, Hudson Bay. The Saskatchewan Valley, Manitoba, and the southern and central part of British Columbia are in the latitudes of central and northern Germany. Great Britian stretches over all the parallels of British Columbia, from the latitude of Kamloops and Winnipeg northward. The St. Lawrence basin in Quebec, New Brunswick, and northern Nova Scotia, are in the latitudes of central and northern France.

The position of much of Canada in the most favored latitudes of Europe might well create a presumption that at least its more southerly portions possess a comparatively genial climate. This presumption is well sustained by the examination of the records of both the western and eastern parts of the Dominion. Even allowing for the well-known fact that the eastern side of every continent or large island in the temperate zone is colder in winter than the western, the narrowness of America, compared with the eastern continent, and the existence of the great lakes as a check on the drift of cold from the interior, makes the St. Lawrence reigon generally much milder in winter than Chinese territory in the same latitudes. A discussion of the marvellous variety of climates, which, not only the Dominion, but several of its provinces, especially Ontario and British Columbia, and, within these, even very limited districts, present tempting and interesting as it would be, is impracticable within the space of this article. Enough may, however, be shown to prove that in at least a very important portion of Canada, embracing a population of millions, the climate possesses great and substantial merits, even though these are little known and appreciated abroad.

The Canadian area here selected for comparison is that between Lake Erie in the south and Lake Temiscamingue in the north, and from Montreal and the Lower Ottawa Valley in the north-east to Lakes Huron and St. Clair in the west and south-west. From north to south it measures about 450 miles and nearly 600 from north-east to south west. Though many thousands of square miles of it surface are yet virgin forest, it includes all but a few score thousand of the people of Ontario, and has a population of about 3,000,000, or half the population of Canada. Though including the neighborhood of Montreal and a strip along the Quebec side of the Ottawa, it lies almost wholly in Ontario, and may for climatic comparisons be designated south-eastern Ontario, as one of the regions—south-eastern, north-eastern and western—into which the irregularly triangular

province is naturally divided. In the elevation of its meteorological stations above the sea it ranges from nearly 200 feet at Montreal to about 600 feet around Lakes Erie and Huron, 800 to 1,200 in the Muskoka and northern inland districts, and to about 1,600 on the high interior sloping from Lakes Huron and Erie to a culmination on the uplands south of the Georgian Bay.

The comparisons made with Europe are in regard to the average length and heat of summer, a matter of very practical importance in the comfort of the population, and especially in regard to agricultural capability. The mean temperatures given are mostly derived from records of the Canadian and European Meteoroligical Services, and are for periods of fifteen years or more. For comparing the duration of summer heat, it is not easy to choose, to the satisfaction of all, a standard of monthly mean temperature lower than which no mouth may average, and yet be regarded as a summer month. Lord Byron once, ill-naturedly perhaps, remarked that England was a country without a summer, but his remark would apply with equal truth to the British Columbian coast and San Francisco, and a long stretch of coast near the Golden Gate. A British standard seems for obvious reasons to be appropriate for comparisons of British seasons with Canadian, and as Englishmen, Irish or Scotch would resent the suggestion that the June of their respective countries is not a summer month, the June of a south of Scotland town, Lanark, may by way of compromise be selected as a standard. The mean temperature of June at Lanark is 54°. The town is inland and about 600 feet above the sea, or about the same as the Huron and Erie coasts.

The following mean monthly temperatures for the five warmest months at British stations are fairly representative of the climate of Great Britain: *

*Cheadle, in the middle latitudes of England, is about the same elevation as Port Dover on Lake Erie. Braemar is a little lower than Stratford or Guelph in Ontario, and Dartmoor slightly higher. The other stations are comparatively little above sea level.

Scotland.	May.	June.	July.	Aug.	Sept.
Lanark	48°	54°	57°	56°	52°
Aberdeen	49	54	58	57	53
Edinburgh	49	55	58	58	53
Braemar	46	52	55	54	50
Ireland.					
Armagh	50	56	58	58	54
Belfast	51	57	59	59	54
Dublin	51	56	59	60	55
Waterford	51	57	60	60	55
England.					
Carlisle	51	57	60	59	55
Cheadle	49	55	59	58	54
Leeds	52	58	62	61	56
Leicester	51	58	61	61	56
Oxford	53	59	62	62	57
Lond n	53	58	62	63	59
Dartmoor	47	52	56	56	52
Brighton	53	59	63	63	59
Exeter	53	59	63	63	58

The following are mean monthly temperatures of places in Quebec and Ontario:

	May.	June.	July.	Aug.	Sept.
Montreal	55°	64°	69°	67°	59°
Rockliffe	52	61	65	61	56
Pembroke	54	64	69	67	58
Ottawa	55	65	70	65	60
Cornwall	55	65	69	67	59
Parry Sound	51	62	66	63	57
Gravenhurst	53	64	66	65	57
Peterboro	58	66	70	68	59
Kingston	53	63	68	67	61
Goderich	54	66	69	68	61
Durham	54	65	68	66	58
Stratford	55	63	68	65	58
Woodstock	54	65	68	65	59
Toronto	52	62	68	66	59
Hamilton	56	66	72	71	62
Stoney Creek	55	67	70	69	61
Brantford	55	66	68	67	61
London	56	66	70	67	60
Dover	54	66	69	68	61
Simcoe	57	66	72	69	61
Windsor	59	68	73	71	64
Pelee	58	69	76	73	66

These figures scarcely require comment. Of the five warmer months, only May and September are as warm in the most southern localities in England as in the coolest Ontarion localities south of Lake Nipissing. May in the Ontarion region is almost everywhere warmer

than the Lanark June, and in Essex, one of the Lake Erie counties, than July in Lanark and Edinburgh. September in much of settled Ontario is warmer than July in Scotland or Ireland, and in the warmest localities than July in London. The three midsummer months south of the Laurentians are warmer—much warmer—everywhere than in Britain; the excess in July over London is eight degrees at Ottawa in the north-east, and 14 degrees at Pelee in the south-west.

Both in duration and heat the summers of the Ontarion region, therefore surpass those of Britain. By the minimum standard of a south of Scotland June, Ontario southward from Lake Nipissing and the Upper Ottawa has very generally five months of summer heat to three in Scotland and four in Ireland and England. By the standard of an English Midland June (Leicester's, 58°) or an Edinburgh July, almost the whole Ontarion region has four summer months against one or two in Ireland, Scotland and part of England, and even by the standard of a Leicester July (61°) much of Ontario has four months to none in Ireland or Scotland. If an average south-eastern Ontario June (64°) be selected as the minimum standard of a summer month, no part of Great Britain can be said to have summer at all.

To find parallels to the summers of Ontario, we must go south of the English Channel. All these summers are represented in France and Austro-Hungary; and the cooler ones also in Switzerland and Germany. The following are mean temperatures for places in these countries. The French meteorological stations are arranged according to latitude, proceeding southward:

France.	May.	June.	July.	Aug.	Sept.
Arras	55°	61°	64°	65°	57°
Paris	55	61	66	65	59
Lamballe	51	59	62	63	59
Brest	55	60	64	65	61
Epinal	55	62	66	64	58
Mirecourt	55	62	65	65	59
Orleans	58	64	69	67	61
Nantes	57	61	66	65	60
Poitiers	57	62	66	65	61
Bourges	57	64	63	67	61
Limoges	57	62	67	66	59
Lyons	59	66	71	69	61
Grenoble	58	64	69	68	61
Albi	60	65	72	73	65
Nice	61	69	74	73	68
Toulouse	59	65	71	70	64
Montpellier	62	68	74	74	68
Lescar	58	68	68	67	63
Marseilles	61	68	72	72	66
Foix	56	62	67	67	60
Switzerland.					
Geneva	53	62	67	65	59
Berne	55	60	65	63	57
Austro-Hungary.					
Hermannstadt	57	64	67	66	58
Klagenfurt	56	63	67	64	57
Gratz	59	64	68	66	59
Salzburg	54	62	65	63	57
Buda Pesth	59	67	71	69	61
Erlau	59	67	71	68	59
Vienna	57	64	69	66	59
Prague	55	63	67	66	59
Cracow	53	62	66	63	57
Germany.					
Munich	52	59	64	62	55
Bayreuth	52	60	63	61	54
Berlin	55	63	67	64	59
Hamburg	52	60	63	62	57

Comparisons of these European mean temperatures with those of Ontario may surprise the reader, showing, as they do, that Canada has climates which are as warm in summer as many parts of the south of France, and summers as long as in the central departments of that country.

Haileybury, in the Lakes Nipissing-Temiscamingue region, has a mean of about 63° for the three midsummer months, and 59° for the five warmest. The latter mean is higher than that of Munich or Beyreuth, and the former than that of London or of L'Orient, and about the same as that of Berne and Brest (62°.7).

Parry Sound, 64° and 60° for the two periods respectively, is as warm in the mid-summer months as Paris, and for the longer period as Epinal, in the famous Moselle Valley, or as

Zurich or Salzburg. Gravenhurst, on Muskoka lake, one degree warmer than Parry Sound in both periods, corresponds very nearly, in summer heat and duration, with Geneva on Lake Leman and Basel on Lake Constance.

Ottawa and Vienna (about 65°.6 and 63°), Montreal and Besancon, about (66°.6 and 62°.5), Orleans in the Loire Valley, and Grenoble in south-eastern France, correspond very closely in the mean summer heat for either three or five months, and have the summer climate of very many of the Ontario counties.

Peterborough, in the eastern midlands of Ontario and farther north than Toronto, has a higher temperature (68° and 64°), differing but very little from that of Lyons on the Rhone, Toulouse near the Mediterranean, or Lisbon, Portugal, for the three mid-summer months, and being a little higher for both three and five months than Belluno, in north-eastern Italy.

Toronto is cooled in summer, especially in May and June, by the deep lake to the south, but the mean of a fifteen year period of observation in the two cities shows it to be over 2 degrees warmer than Paris in the three mid summer months, and over one degree warmer for the five warmer months of the year. It nearly corresponds in summer heat with Nancy, Poitiers, Limoges, and Foix, scattered from north eastern France to the base of the Pyrenees.

Hamilton may be considered hot in summer. It is as warm in September as Toulouse, and warmer in June, July and August. Its July (72°) is as warm as that of Marseilles, and only two degrees cooler than that of Jerusalem, and five cooler than that of Alexandria, Egypt. The mean temperature for the five warmest months (65° 4) is that of Toulouse and Lyons; the mean of June, July and August (69°.6) is about that of Albi, southern France, and Como, Italy, and falls short only one degree of that of Marseilles. Hamilton's summer fairly represents the summers of the famous Niagara peach district.

London, in the West Midlands counties, averages 67°.5 for the three mid-summer months and 63°.7 for the five months of summer. It is warmer than Vienna, and while the same for the five warmer months as Grenoble, about 100 feet lower in elevation above the sea, is a degree warmer for the mid-summer trio.

Foix, in the extreme south of France, and in the same latitude as London, Ont., and Durham, 80 miles farther north in latitude, are, respectively, about 1,421 and probably about 1,415 feet above sea level. The mean temperature for the June, July and August period is 65°.2 at Foix and 65°.7 at Durham, while for the five warmer months of the year the means are, respectively, 62°.4 and 61°.6. Durham, it is worthy of notice, is warmer for latitude and elevation than one place in France.

Windsor (lat. 42° 19') at the north-western angle of Essex county, which lies in latitude 41° 42' to 42° 20', between the shallow, readily-heated west end of Lake Erie and the equally shallow St. Clair. It is farther south than any point in France. Its mean temperature for the five warmest months, of the year (67°) is that of Albi (70 miles from the Mediterranean and at the same elevation above the sea—600 ft.—as Windsor), and is half a degree higher than that of Lisbon, Portugal, and not half a degree lower than that of Marseilles. For the three mid-summer months its mean (70°.7) is that of Marseilles; for July it is

half a degree higher than that French city, which, though a degree of latitude farther north, is hundreds of feet lower in elevation.

Pelee Island, the southernmost township of Canada, may be said to have for six months of the year the heat of southern France; for May there is as warm as at Grenoble, and October (54°.1) as at Albi, or as at Perugia, in southern Italy. October is warmer in Pelee than June in Lanark, Scotland, and May than Lanark in July, September than July in London, Beane or Brest, and June than July in Vienna, and August than July in Marseilles. Pelee in July (75°.7) is warmer than Marseilles (72°), Nice and Turin (73°.8), Constantinople (73°.9), Jerusalem (74°.1), and Tangier, Morocco (74°.8); not one degree cooler than Naples (76°.5), Rome and Algiers (75°.6), not two degrees than Alexandria (77°.5), nor five degrees than Bombay (80°.8), and is only about seven degrees cooler than Calcutta (82°.8)*. It has the same mean temperature in July as Modena, Italy, and Kandy Ceylon. Pelee is as warm as Marseilles in September, but is warmer in June, July and August. Its June is that of Nice, but Pelee is hotter there also in July and August. The mean of Pelee for the five warmest months of the year is 68°.1, which is higher than that of Marseilles (67°.8), and a little lower than that of Nice (68°.8). For the three mid-summer months the mean temperature of Pelee (72°.5) is higher than that of Marseilles (70°.7), Turin (71°.4), or Nice (71°.7), and is about the same as that of Constantinople (72°.6).

*The following are North American mean temperatures for July, obtained from varying periods of years: San Francisco, 58°.1; San Diego, 67° and Los Angles, Cal., 68°.5; Sandusky, 74°.1; Toledo, Ohio, 74°.4; New York, 73°.6; Philadelphia, 76°.1; Washington, 78°.7; Pittsburg, 74°.6; St. Louis, 79°.6; Chicago, 72°.2; Bermuda, 78°.7; New Orleans, 82°.6; Havana, 83°.7.

It is France, probably more than any other country in Europe, that the agriculturally-occupied portion of Ontario resembles in summer heat. A longer summer season than much of the Ontarion region has is, in France, to be found almost wholly in the south, and there only at comparatively low elevation above sea level. The resemblances are not merely in the mean heat and duration of summer, but also, generally, in the daily and seasonal ranges of temperature, the degree of variability of weather from day to day, or week to week, the large amount of brilliant sunshine, and very largely, too, in rainfall, and its distribution in short but tropical downpours, accompanied by heavy thunder and lightning. The average daily range of the thermometer in both countries varies much in localities; in some places, especially inland, exceeding 25 degrees; in others along the coasts, being below 20, or even 15 degrees. The average daily maximun in July in the Ontarion region varies from about 78°. as at Toronto, to 85° as at Hamilton, and this in large measure irrespective of latitude. The average monthly maximum for the five warmest months, in many places, exceeds 90°; the seasonal maximum at Toronto is 91°, at Hamilton 97°, and in the Ottawa Valley it is about 95°, or about the same as in the valley of the Rhone. Occasionally, 90° is exceeded in April and in October, and all the intervening summer months have exceeded, at times, 100° in the shade. The highest registered at Hamilton is 106°, which is higher than is reached at New Orleans. Intensely hot weather rarely lasts more than a few days at a time; though, occasionally, it is prolonged for weeks. Nor are very warm nights common in the cooler lake borders. Even in the warmest

localities during the hottest weather the mercury rarely fails to fall to 75° before sunrise.

The rainfall on the Mediterranean coast is much lighter in summer than in Ontario. Elsewhere, inland, on ordinary elevations above the sea, it is about the same as in Ontario. Ontario has no mistrals, chilly mountain winds or siroccos; and strong gales are rare before September or October, and in the midsummer months chilly winds are very rare, rnd in most years are unknown. Tornados are rare, and are not so destructive as in the Mississippi Valley. Liability to summer frosts varies greatly; at Pelee the continuous exemption covers seven months. Generally they are less frequent than in most of England, and occur as rarely as in inland Northern or Central France. Drought is as in France; sometimes the meadows of Ontario are parched by the drought and heat till they become yellow as a puma's skin, but failure of crops from this cause has not been known within sixty years. The plesantness of the season is greatly enhanced by the brilliant sunshine experienced day after day for weeks together, and the glorious skies and sunsets—beautiful in variety of tint and cloud form—which have been justly regarded as equal to those of Italy.

With its long France-like summer, Ontario grows luxuriantly many of the vegetals associated in the British mind with the warmer climates of the world. The egg-plant yields well almost everywhere; the pea-nut grows; cotton without special fertilizers has been grown in Pelee for many years; the sweet potatōe grows in very many counties, and reaches a weight of several pounds; while the watermelon flourishes as in the tropics, and the tomato, as a great field crop, is a not inconsiderable source of revenue to farmers. The tomatoe grows on the highest lands of the province. Sorghum is a successful crop. Maize, which is grown on 200,000 acres, and in every county, gives a higher average yield per acre than any western or southern state of the American Union excepting Missouri, It and the tomato flourish luxuriantly at elevations abovethe sea level which in Britain would not allow wheat to ripen.

That the fig and the almond, with scarcely any protection against severe winter frosts, succeed at a few places as orchard trees, and the apricot and the nectarine are grown in orchards in several counties, is rather an indication of not very severe winters than of summer warmth. But the peach is grown on the Georgian Bay, over 200 miles farther north than the southern limit of Ontario, and inland at an elevation of over 1,000 feet above the level of the sea. From the heights of Grimbsy on Lake Ontario many scores of thousands of peach trees are seen at one glance, or a larger number than may thus be seen anywhere else in the world. In quality the fruit surpasses that of Calfornia. The area in Ontario adapted for peach culture exceeds nine thousand square miles. The wild vine trails over the river-side trees almost everywhere. Many species of the grape, including the European *vinus vinifera*, are cultivated in large vineyards, which are found in the Ottawa valley as well as on the Lake Erie slopes. The yield of wine per acre is greater than in Calfornia, and twice as large as in France; the area suitable for viticulture embraces over 25,000 square miles.

Amongst forest trees indications of the climate are found in the success of the tulip tree in much of the province. The pseudo-papaw, with its banana-like fruit, is a forest tree in

the Niagara peninsula, although not found as such north or west of a line from the west end of Lake Erie to western Texas. In southern Ontario can be grown five out of seven known species of magnolia, including one of the largest, a species having flowers ten inches in breadth.

In view of the facts here presented it must be admitted that the climate of Canada has, in parts at least, much to commend it to the intelligent, capable fruit growers and country gentlemen of Britain and Europe.—

The Canadian Magazine.

TOM BROWN'S SCHOOL.

MARJORY MACMURCHY.

We came to Rugby on the railway from London, and at first I hardly remembered that it was to this same town that "Tom Brown" with whose story every school boy the world over is familiar, came riding one frosty morning on the coach. Do you remember how glad Tom was to get the coffee? But when we reached the door of the old George Inn and looked up the street, there was the gate where Tom and East and little Arthur used to go in and out. After that, although we had friends in Rugby and had come to see them in the first place and not the school, one could not help feeling that it was a dream world one had happened on, and not an everyday English town, where people bought and sold and thought of other things, as if no one had ever read Tom Brown. The cobbled streets seemed different from other streets, since a crowd of school boys with whom one was quite familiar, had clattered up and down them, when they went to the pastry cook's. But the school gate, standing open although it was July, and the school boy who came to the gate and stood there for a moment looking down at the George Inn, as hundreds and hundreds of school boys must have stood and looked before him, made it seem as if one had opened the pages of the brown book again, and had seen at the beginning the little cut of Rugby School.

The friend we had come to see was an old Rugby boy, and the first thing he said when we met was: "I have been waiting till you came to go over to school. There ought to be something on over there this afternoon. You must let me show you the school, I am an old boy, you know."

In five minutes we were going in through the gate, pausing as the long green play-ground with its great trees opened out before us, and then turning in silence to find the chapel close at hand where Tom Brown came back when he heard far away that Dr. Arnold was dead. It was the same chapel in which all these generations of boys had knelt and prayed, and where, as the author of "Tom Brown" says, "many of them heard words that they would never forget."

I suppose most of you have thought sometimes how strange

it is that buildings and trees, and even books and clothes, should last for years and years after the people who have looked at them and used them have gone away. That is the way one feels at Rugby. There are the walls that have sheltered so many people; there are the desks where the boys have learned their lessons and on which they have carved their names; there is the playground that has rung with their shouts; and yet of the boys themselves there is not even a shadow.

And yet although, in one sense, that is true, in another sense it is not true. Take, for instance, the example of Dr. Arnold. You can imagine that you see him passing in his cap and gown, as Tom Brown and his friends used to see him on his way to the chapel. He is not there; and yet Rugby is what it is because he was there: and not a boy, I suppose, has ever lived within its walls, that has not made the school a better or a weaker place because he has been there,—made it a finer place for a boy to go to school in, or made it a place where a boy may make a mistake more readily than he would have, if some other boy had not wilfully made a mistake before him.

But that July day, when we stood under the trees (you must remember how they used to play football about these trees; they do yet, I suppose, but not in July), the green playground was thronged with boys, big boys and little boys, and a great many of medium size that reminded one of Tom Brown, all practising cricket very seriously, with instructors who were showing them how to stand, and how to hold the ball and the bat, and in fact everything that you can imagine about cricket, and a great deal more than I had ever imagined in my life before. You never saw boys play more earnestly, and you could understand more plainly than if they had told you so, that, when they played in a match, they meant to win if they could.

One of the boys bowling was a little lad from India. He was a son of one of the King's subjects, (he was one of the Queeen's subjects when I saw him), and as we passed, his instructor praised him for some particular throw he had made. It was not more than a word; but he was pleased, that young India-boy, and looked down to see if he was standing in the best regulation way before he bowled again.

We were more than satisfied; but our friend, who was an old Rugby boy, as he took us from one part of the field to another, kept saying that there was nothing on, nothing to see that day, no match, he had hoped that there would have been a match. In vain we assured him that to us it was just as good as if there had been a match. He couldn't understand that, and his face brightened as he heard from a building at one end of the grounds the sound of applause. Oh! here was something at last. There must be an uncommonly good game of fives going on before they would make a noise like that. So he hurried us into the little gallery for spectators, sure that at last he would have something to show us that was really worth seeing, even in the estimation of an old Rugby boy. I thought it was, but it was

nothing of the kind that he had expected.

In the gallery into which we were taken were there or four big boys, not the largest kind that goes to Rugby but the next; and with all their might and main they seemed to be applauding two little chaps who had come in to have a quiet little game of their own, when everyone else was hard at cricket. Whenever one goes into a new place it takes a couple of minutes to see what things mean. In the first place, the play didn't seemed to be very wonderful, although we didn't understand much about fives. In the second place, if ever big boys were indulging in mock applause, these big boys in the gallery were doing so that day, although the jeers had softened a little when the "old boy" and his friends came in. Last of all, you never saw redder cheeks than those that belonged to the little players.

"Why, they don't know anything," said the old boy, "they're only guying them." He was disgusted, I can assure you.

But I want to tell you what I saw. How many small boys of eight or nine, or even ten, of your acquaintance, would keep on playing a game as well as they could under these circumstances? They wouldn't cry of course, boys don't do that. But do you thing any of them would get angry and show it? How many of them would stop playing altogether? Not these boys at Rugby! There they went on, doing their best, making bad shots. They knew they didn't know how to play, but they were going to know some day. They weren't angry, although I think their teeth were set. No one could have told that they minded, except for those red cheeks that showed so plainly because they were fair. Sensible little chaps, they thought nothing of it but went on playing. Already at Rugby they had learned a little how to take the world: do their best and don't mind if people make fun of you. You have to learn, and that is the only way to do it. Many a day since I have seen them playing, with what a poet has called "the eye of the mind"; and always, when I think of them, I am sure that Rugby is still "Tom Brown's" School.—The King's Own.

THE PRESENT STATUS OF EDUCATION AS A SCIENCE.

BY SUPERINTENDENT A. V. GREENMAN.

There is perhaps no fact which brings so much of disrespect upon the cause which we represent as the oft-repeated charge of a lack of unanimity among our representative men both as to the aim of education and the principles upon which its methods are based. In this assumed condition the people find a real grievance and the public press a perennial source of criticism. We are complacently told that pedagogy is the unprofessional profession, that its titles are held merely by courtesy, that there is no philosophy of education, indeed, we are asked humbly to survey the melancholy spectacle of a vast army of instructors following a thoughtless routine or

the vague promptings of instinct. Nor do the criticisms stop here. A popular writer of a dramatic turn of mind startles the public with an article entitled "The Slaughter of the Innocents," and even Mr. James Russell Lowell, who it will be remembered after his long sojourn at the Court of St. James was called "The Man Without a Country," publicly declared that the United States was "the most common schooled and least educated country in the world."

In reply to these charges shall I be considered either presumptuous or discourteous, if I say that, education in this country suffers from a criticism more superficial than that which attacks any other cause. This condition arises, in the main, both from ignorance of what is really going on in the schoolroom, and of the great body of literature underlying the theory and practice of the day. Aye, even the names of the great apostles of education, whom we so highly honor, are buried in an oblivion equal to that which surrounds the kings of the Egyptian dynasties. The limitations of a school system among federal states and under a democratic form of government seems never to have occurred to our critics. The sins of political boards of education dominating the selection of teachers, determining the choice of text-books, and directing in all important particulars the policy of the schools are, strangely enough, interpreted as indicating a lack of unanimity both as to the aim of education and the principles underlying its methods. Could the public get at the real inwardness of the situation it might, even now, witness the humiliating spectacle of many an enlightened teacher protesting like Galileo of old for an eternal principle, and like that venerable but somewhat shifty philosopher, recanting rather than suffer decapitation.

That the principles of education have all been evolved and enunciated, that they exist in the form of axioms, definitions, and laws, expressed in appropriate formulae, no sane man will for a moment pretend, nor indeed will such a condition exist, until that far off day when, as Bayard Taylor expresses it,

> The sun grows cold, and the stars are old,
> And the leaves of the Judgment Book unfold.

Surely, at this stage of the world's development, incompleteness is not a cardinal sin. That more recently discovered facts will ever appear to discredit many an established hypothesis is but a repetition of the history of growth in all departments of knowledge, and should be regarded as an indication of life. Uncertainty, too, when it arises from humility, when it means an "open mind," is a most wholesome attitude, and very nearly realizes that childlike disposition which, as a great authority has said, is not only the condition upon which the "kingdom of heaven" may be entered but the kingdom of science as well. It is quite true that during the past quarter of a century world-wide changes of a political and social nature have occurred resulting in a modification of well established forms of school work, but so far as a change of principles is concerned, little of a revolutionary character can be cited. The in-

crease of wealth, the rapid settlement of the country, the increased leisure of its inhabitants, the marvelous inventions which have made possible the manufacture of material used in school work, have placed in the hands of the teachers of to-day a control of resources never before dreamed of. But so eminent an authority as Professor James of Harvard University, assures us that in psychology little of consequence has been discovered since the days of Locke, and I feel confident that this association will sustain me in the statement that to a majority of educators both in this country and England, the newest works upon the science of education are translations from Herbart, who was born in Germany one hundred years ago. Despite the hue and cry against "fads," now fortunately but little more than an echo, despite the contempt which your practical man feels for the recent movement in child study, despite the tears of the sentimentalist for the twentieth century child destined to be but material for pedagogical experiments, the educator of to-day is as conservative as is consistent with progress and is conscientiously following the biblical injunction "to prove all things and hold fast to that which is good." This proving all things, however, not only implies the retention of that which is good but results in the testing and rejecting of that which is faulty, a process which works some hardships, to be sure, but which in accordance with the nature of things is an absolute essential to development.

As to whether pedagogy has been sufficiently developed to claim for it the standing of a science we are bound to admit there is much difference of opinion even among educators. The difficulty of this investigation appears at once when we attempt to arrive at a definition of the terms involved. It is not my intention to ask you to consider the fine spun distinctions made by philosophers in the definition of the word "education." It seems impossible to satisfactorily cover the ground unless one is willing to indulge in a series of verbal gymnastics like that of Herbert Spencer in his famous definition of evolution. Whether one accepts the psychological definition," a development of all the mental powers" or the sociological one of "getting adjusted to civilization or dissatisfied with both finds rest in W. T. Harris's lucid statement, "the elevation of the species into the genera," it matters but little. I shall take it for granted that the members of this association in reality agree in their understanding of this word and that they are essentially correct.

With the word "science," however, our difficulties are greatly increased. There is perhaps no word in the English language, unless it be that much abused title, "professor," that means so little or may mean so much. Indeed, there is hardly a department of knowledge or sphere of activity, from the lofty planes of logic, and theology, to pugilism and football, that is not termed a science.

Huxley tells us that science is "organized common sense" and Spencer defines it as "partially unified knowledge," a definition which Mr. Nicholas Murry Butler recent-

ly declared to be amusing, doubtless because of the incompleteness involved in the word "partially." In our classification of the sciences, however, the same idea is involved, for we have what are known as the "exact sciences" a distinction which involves the existence of inexact sciences, an admission which in the minds of many undermines the chief significance of the term, but the truth of which is sustained by the fact that much of that which was accepted as science yesterday, is today recognized as untenable. It is perhaps for this reason that a distinguished authority claims that only such statements of truth should be regarded as science as contain a "verifiable element," meaning by this "ascertained numerical relations." In illustration of this statement he says that if we withdraw from the law of universal attraction the formula "inversely as the square of the distance and directly as the mass" it becomes pure metaphysics. If so severe a test as this is to be applied to all departments of knowledge seeking admission to the sciences, there can be but little question as to the standing of pedagogy.

Before submitting it, however, to so rigid a standard, it might prove a useful and suggestive diversion, to consider the features of the so-called "learned professions," medicine, theology, law, when seen in the white light of "ascertained numerical relations." "Similia similibus curantur," lisps the homeopathist. "Contraria contraria curantur" shouts the allopathist. "Treat symptoms not diseases," says the former. "Treat dieases not symptoms," sternly replies the latter. "Banish all drugs, water, water everywhere," demands the hydropathist, while a perfect babel of tongues arises from the conflicting claims of numerous other schools, the representatives of which refuse either to recognize or consult with one another. Surely there is a suggestion of "uncertainty" and "lack of unity" in the above and a careful study of the action of so-called "specifics" furnishes little to relieve the situation. It is true that there may be a science of surgery, but you are all familiar with the account, of a certain operation scientifically performed, indeed a perfect operation. The incisions of the knife were exact to a line, arteries and veins were skillfully tied, all the means of excluding germ life were successfully applied, but the patient, why, the patient died! And yet none was found to dispute the claims of science, nor to detract from the dignity of the physician either by questioning his title or lessening his fee.

An examination of the tenets of the theologian will reveal a condition but slightly different from that first described. The Calvinist and Arminian still hold opposing views, and the general lack of a unity of faith finds expression in scores of warring sects. The higher criticism and the discoveries of science are certainly resulting in very different interpretations of scripture and the most profound theists of the day no longer claim with Locke that the existence of God is susceptible of demonstration but base their unshaken beliefs upon the hypothesis. There is doubtless a science

of law, but what is more common than for the court of appeals to revise the rulings of the circuit court, the supreme court, the court of appeal, while even the decision of the supreme court have not escaped revision.

It will appear from the above and from much of a similiar nature that will suggest itself in this connection that a majority of the great departments of knowledge are very far from being susceptible of numerical verification. The reason becomes apparent as soon as we compare them with the sciences of mathematics. In geometry for example the elements are absolutely simple. Dealing with a single element, space, which possesses but a single property, extension, the train of reasoning proceeds unfaltering step by step to a certain goal, but if in place of the simple element, space, we substitute a clod of earth, we have at once a substance to deal with which possesses the universal properties of matter beside many that inhere in it alone. If in place of the clod of earth we take a plant, an animal, or highest of all, a man, the complexity is multiplied almost beyond expression. It will appear from the foregoing therefore, that if we limit our grounds of certainty to that which is susceptible of numerical verification we shall be confined to the narrow limits of mathematics, a conclusion belied by a vast majority of all the acts of practical life, and which would place us in a world like that which Swift so unmercifully satirizes in his Lilliputian Tales. The fact is that the most practical, the most precious knowledge which we possess is not capable of demonstration, is not true beyond the possibility of a doubt. We base our own safety and the safety and happiness of our children not upon that which is certain but upon that which is probable. We content ourselves with inductive reasoning, all the time being conscious that our conclusions are based, not upon axioms but upon an assumption, viz.: "the assumption of the invariability of natural law." We also add to our knowledge by using the hypothesis, that hypothesis being accepted which accounts for the facts, and accounts for them more satisfactorily than any other. It is by these processes rather than by mathematical demonstrations, that knowledge has been increased from the alchemy, astrology, and superstition of the ancients to the accurate vision of civilized man.

As we turn then to pedagogy, and, in the light of the foregoing discussion, consider its claims to a place among the sciences we must admit that we find the condition decidedly perplexing because of the complex nature of the elements with which it deals. It rests primarily upon psychology, and finds its aim in ethics, it is affected in no small degree by the facts of physiology and the teachings of art, and must command such a grasp upon the content and correlation of the different bodies of knowledge as will make it possible to prescribe to the pupil as he passes through the different changes incident to childhood, youth, and early manhood the nutriment adapted to all conditions and circumstances. But it appears at once that these sciences upon which pedagogy rests are them-

selves but partially developed. In ethics one author makes the aim happiness, another utility, a third moral character. Pythagoras holds that the chief end of man is "to be like God," a statement which resembles very decidedly the answer of the first question of the catechism. When broadly interpreted, however there is not essential unity in all these aims of happiness, utility, moral character, and, so far as the different curriculums growing out of them are concerned, is not the difference chiefly one of emphasis rather than value, a matter whic the social conditions of each generation will instinctively settle for itself? As to psychology, there is, to be sure, incompleteness and numerous warring theories, but there certainly is sufficient truth upon which experts agree to answer Professor James' definition of a science, namely, "a provisional beginning of knowledge." Moreover, the different, warring theories are gradually unifying, noticeably the "germ theory" and "architectural theory" both of which have been shown by Professor DeGarmo not to exclude each other but to be essential to a perfect science of education.

Indeed, we shall find, I believe, that our chief difficulties are of a meta-physical character and have to do with ultimate causes rather than practical matters. When we ask ouselves the question, "why is it that we organize our knowledge into science," we find that our reasons are decidedly practical. We deduce from an accumulation of data bearing upon any subject laws and principles in order that we may forecast efforts from given causes or trace causes to their effects: we thus become prophets of the future and interpreters of the past. We scatter the clouds of superstition, we avoid the costly errors of other times, we place progress upon an assured foundation. It seems to me that such a body of knowledge as can be acted upon with practical assurance should be termed a science and that pedagogy realizes these conditions. You will not expect me, however, to state its principles and laws, nor to name the author or authors who have compiled them in a single volume. It exists like the English constitution "unwritten" in a sense, but resident in its famous state papers, "the Magna Charta," "Bill of Rights," etc. You will find it in Socrates and Aristotle, Plato and Comenius Pestalozzi and Froebel, Locke and Herbart and Bain, The Reports of Committies of Ten and Fifteen, The Educational Creeds of Harris and Dewey and Hinsdale, the able reports of the Commissioner of Education and the frequent publications of the pedagogical departments of the great universities. In each and in all combined you have substantial unity, real light, practical science.

Joseph Cook in one of his lectures tells an interesting incident in the life of Napoleon First: "One day riding in advance of his army he came to a bridgeless river which it was necessary immediately to cross. 'Tell me' said he to his engineer, 'the breadth of this stream?' 'Sire, I cannot,' was the reply, 'my scientific instruments are with the army and we are ten miles in advance of it.'—'Measure the breadth of the stream instant-

ly.'— 'Sire be reasonable.'—'Ascertain at once the breadth of this stream or you shall be desposed of your office.'—The engineer drew down the cap piece of his helmet till the edge of it just touched the opposite bank, and then holding himself erect turned upon his heel and noticed where the cap piece touched the bank on which he stood. He then paced the distance from his position to the latter point and turned to the emperor saying, 'this is the breadth approximately.' Now the determination of the distance was based on the scientific certainty that the radii of a circle are equal, exactly as it would have been had his instruments been there."

Members of the association, the swollen floods of ignorance obstruct our progress, the instruments of exact measurement are not as yet in our possession, but the principles of action are sufficiently well known, we have long since approximated the distance, the work of construction is well advanced and all that now remains to be done is the erection and splicing together of the spans, and the announcement from authoritative sources that a thoroughfare lies this way.—School and Home Education.

THINKING IN SYMBOLS.

N. C SHAEFFER.

Man is the master of a thousand arts. He invents machines to do his work and yokes the forces of nature to propel his machinery He also uses labor-saving machinery in the domain of thought. How thoroughly mechanical some of nature to prepel his machinery. He are, is evident from a glance at the machines by means of whi dition is performed in banks, counting houses and the various bureaus of the State and National Governments.

The best name to signify the devices by which man saves labor in advanced thought, is the word symbol. Symbols are of three kind, suggestive, substitute and expressive. These technical terms of course mean very little until the teacher knows their application. As soon as their meaning is understood, they throw a flood of light upon school work.

When the National Educational Association met at Charleston, the citizens could not help reminding their visitors from the North that at one time during the siege of their city, the Confederates had learned how to interpret the signals of the Federal army. Apparently they did not know that towards the close of the war Grant's signal corps knew every signal of the Confederate army, so that often Grant's troops were in motion to counteract Lee's orders as soon as he gave them, whilst the signal code of Grant's army was changed every day for fear that the enemy might discover its meaning. Every one of these signals was a symbol suggestive of an idea. As soon as the symbol had conveyed its corresponding idea, all thought of the symbol was dropped and the activity of thought went forward without fur-

ther reference to the symbol that had started the train of thought.

It is said that the Potomac River and its banks have been mapped like a checker board and that guns of various range of calibre have been located at suitable points. Should the war vessel of an enemy enter the mouth of the river for the purpose of attacking the National Capitol, mysterious signals would be sent to the officers in charge of the guns, indicating the location, speed, and direction of movement of the enemy, whereupon a gun would be elevated at a given angle, loaded with a given projectile, fired with a given kind of powder, and the enemy's vessel would be struck by a projectile from an unknown source. The signals would be nothing more or less than suggestive symbols whose office is fulfilled when the corresponding idea has been lodged in the mind.

The grips and countersigns of a brotherhood belong to the same category. As soon as these have suggested the presence of a brother, they drop out of the mind, and the stranger is treated with fraternal kindness so long as he chooses to abide. The colored lights and other signals used by railways, the various clicks of the ticker in a telegraph office and a myriad of other devices are used by man to assist him in thinking the thoughts which lie at the basis of our civilized life.

The school uses these suggestive symbols to a limited extent. The ringing of bells facilitates school work although it does no more than suggest regulations in the government of the school. More important and more serviceable are the substitute symbols of mathematics and other sciences. The ten digits of the arabic notation, the signs of operation and the devices for designating known and unknown quantities in algebra, the equations and formulas of analytical geometry and calculus are so many devices for saving labor in the investigations of that which has been definitely quantified. The technical terms and formulas in chemistry, physics and all kinds of scientific and engineering work, enable the human mind to reach results that would otherwise involve incalculable if not impossible labor. Who likes cube root in arithmetic? Fourth root by ordinary methods is a burden too grievous even for cranky schoolmasters to bear. As soon as logarithms are understood, it is as easy to extract fourth root or any higher root as it is to extract square root. How long will teachers commit the folly of expecting pupils to think complicated problems in fractions and arithmetical solutions of different problems in algebra, when labor could be lightened and thinking made easier by putting the pupil in possession of the labor-saving devices of sciences beyond the common branches?

The most useful of all the symbols is the expressive symbol. The words of a sentence are like the panes of glass in a window; the greater their perfection the more exactly and completely do they enable us to see what is back of them. French plate glass is so perfect that in looking at an object we see it without distortion or modification and we are not conscious of looking through glass. When language is at its best it is

like French plate glass; we see the thought which it conveys and never notice the medium of communication. Great orators make you think of what they say, and you do not notice their language, their gestures, the peculiarities of the delivery. When teaching is at its best, the pupils concentrate all the energies upon the truth that is to be mastered; and any reference to mistakes in grammar or pronunciation serves to break the line of thought by drawing attention away from the thing to its symbol. The best teachers do not try to teach everything in one and the same exercise. This remark must not be understood as signifying that the details of language are to be ignored or neglected. Once a week, if not oftener, a servant makes the pane of glass the object of chief regard. Every speck of dust is removed and every effort is put forth to make it as perfect and transparent as possible. Likewise there are periods when language should be made the object of chief regard, when the chief aim of teacher and pupils is not the evolution of thought but its expression in the best form possible.

The writer visited a school room in which a window shade hung down over the blackboard. It was a queer use of a well-known fixture. The teacher was dictating a master piece in English Literature. As soon as the dictation was ended, the window shade was rolled up, and there stood upon the blackboard the same selection with capitals, puctuation marks, and paragraphs in their proper places. Every pupil began to compare his own work with the perfect model before him and to scrutinize his mistakes with a critic's eye. How much better this was than the method of correcting errors which keeps the teacher at work until midnight and sends her to the school room fatigued and nervous from insufficient sleep, with papers ready for distribution, the pupils momentarily glancing at the errors corrected, only to forget all about them when next they put pen to paper.

A superintendent revolutionized the schools under his care by dictating at the annual examination for provisional certificates some lessons from a First Reader. As soon as the teachers discovered their own inability to write out without mistake an exercise dictated from an ordinary reader, they put the school readers to a new use. Pupils were no longer expected to learn spelling, punctuation, capitalization, and the like when all their mental energy barely suffices to think the thoughts and truths of which language is only the expressive symbol.

This classification of symbols comes from one of the great universities of Great Britain. There was a time when the university professors aped the style of Hegel and other philosophers. Now-a-days they write to be understood. It will be an auspicious day when all the teachers at our universities recognize that there is science at the basis of the teacher's art, and strive to use, in their lectures and writings, expressive symbols as transparent as the best French plate glass. — Ohio Educational Monthly.

ANTARCTIC EXPEDITIONS.

This month or next, three or four expeditions will sail from north-western Europe for the Antarctic—a British, a German, a Swedish, and probably a Scottish. The south-east and south-west passages were among the early Portuguese and Spanish discoveries, and so no great commercial impulse forced adventurous voyagers far into the Antarctic, as it did into Arctic Waters. From time to time whalers in the eighteenth century penetrated far to the south. Captain Cook dispelled the belief in a vast southern consouth. Ca, tain Cook dispelled New Zealand. Towards the middle of last century the great expedition of Sir James Clark Ross added much to our knowledge of these southern seas, and penetrated to 788 10| S. south of New Zealand. Borchgrevink reached 40¦ farther south in the same region in 1900. The Belgian ship Belgica spent the winter of 1898 in the ice south of South America.

None of these visitors, however, have seen more than the outskirts of the Antarctic, the veriest fringe of a region as large as Europe. The distance from Graham Land, the farthest north point of Antarctic opposite South America, to Wilkes Land, the farthest north point south of Australia, is over 3,000 miles, and almost as far as from the English Channel to the Equator.

The edge of the ice was encountered as far south as 788 34¦ by Borchgrevink, south of New Zealand; and on the opposite side, south of the Atlantic, Weddell reached 748 158 in open water. The distance between the two shores of a possible continent here cannot be more than 1,850 miles, very nearly that from the north of England to the Tropic of Cancer.

The known Antarctic lands approach or extend beyond the Antarctic circle in three regions—(1) In Wilkes Land, south of Australia; (2) Graham Land, south of South America; and (3) Enderby Land, a little to the east and south of Africa. Between (1) and (2) the Pacific Ocean stretches far to the south beyond latitude 78.8, where Ross reached his farthest south, and this we may call the Ross Sea in the widest sense. Between (2) and (3) similarly the Atlantic extends far to the south beyond Weddel's farthest in 74.8 S., and this is the Weddell sea. Between (3) and (1) there is no similiar extension of the Indian Ocean, which is thus more limited by land in its southern as in its northern bounds than either of the other oceans.

Hence it is easy to remember the main features of the Antarctic region. The northern protrusions of the land lie opposite the southern limits of the continents, and the narrowest where these are narrowest (cf. Graham Land and South America) and broadest where these are broadest (cf Wilkes Land and Australia). The great seas between these projecting lands are widest where they are the limit of the widest ocean, for the Ross Sea is part of the Pacific, and they are narrowest, and perhaps extend also farthest

south, where they are part of the narrowest ocean, which extends farthest north, for the Weddell Sea is part of the Atlantic. The southern limits of the Indian Ocean, like the northern ones, are formed by a series of peninsulas (or it may be islands in the south).

The vast Antarctic region is covered with ice which forms an ice wall at the margin, from which great table-shaped ice-bergs, 200 to 300 feet above the sea, break off. We do not know what underlies the ice, whether a great continent or a number of archipelagoes. The few rock specimens obtained and the deposits dredged from the bottom of the surrounding seas are mainly crystalline, those from Wilkes Land resembling Australian rocks. Active volcanoes exist in Victoria Land and in Graham Land. Dr. Ritter has suggested that Wilkes Land is a continuation of Australia, and the Erebus and Terror volcanoes a continuation of New Zealand. The Pacific, we know, is bounded by "a ring of fire." The Graham Land volcanoes may be a continuation of those of the Andes, and Professor J. W. Gregory has suggested that the South Pacific coast may also be bordered by volcanoes.

The British expedition has been organized by the Royal and Royal Geographical Societies. It will sail in a vessel specially designed and built at Dundee, where whaling vessels are still made. It has been named the Discovery, and its sphere of operations will be in the southern margin of the Pacific and the lands south of Australia. The ship will sail to either Melbourne or Lyttelton (Christchurch), New Zealand, whence if will proceed with three years' supplies on board to the edge of the pack and force its way, probably in December, to open water in the south. During the period when the sea is unfrozen, after fixing on a suitable place to winter, probably on the east of Victoria Land, the ship will proceed eastward to inspect the great ice barrier along which Ross sailed for 300 miles, see if land exists at its eastern limit, and then return to winter quarters. Here either the ship will remain with all her company or a party will be landed to spend the winter somewhere between Capes Johnson and Crozier, while the ship will make a magnetic survey of the South Pacific beyond the ice, returning to Lyttelton or Wellington in time to proceed to Victoria Land the following season. From this land station parties will set out eastward towards the magnetic pole, southward towards the geographic one and to explore the volcanic region. In the southern autumn of 1903 the party will leave the Antarctic and return home after completing oceanographic and magnetic work in the South Pacific. It is hoped that enough money will be subscribed to permit a relief vessel being dispatched in 1902. The expedition will be commanded by Captain Scott, R.N., and two members of the Jackson-Harmsworth expedition are on its staff—Lieutenant Armitage and Dr Koettlitz.

The German sphere of influence lies south of the Indian Ocean. Proceeding by Cape Town to Kerguelen Island, the German ship will sail eastward, probably to 90°, in order to make oceanographical studies in still unknown seas, and then it will proceed southward to

the west of Willkes Land. The little-known region round Kemp and Enderby Land will be explored and the return journey will be made through the Weddell Sea. The leader is Dr. Von Drygalski, who is distinguished for his studies of Greenland.

The Scottish expedition, which will probably start in September in a whaling ship, will be fitted out mainly for oceanographical work. The leader will be Mr. William S. Bruce, who has had previous experience of Antarctic as well as of Arctic exploration. The expedition will go to the Falkland Islands, which will be its base, sail eastward as far as the Sandwich group, E. S. E. of South Georgia, then strike southward, taking soundings on the meridian of 308 east, across the Weddell Sea, and land a wintering party on the east of Graham Land. The ship will then sail northward, spend the winter in oceanographical work and return for the wintering party the following summer.

Dr. Otto Nordenskjold, whose excellent work in Tierra del Fuego is well known, will command the Swedish expedition. The region of the South Shetlands and Erebus Gulf will be specially studied.

The Scottish and Swedish expeditions will remain in the Atlantic, the German one will be chiefly concerned with the south of the Indian Ocean, and the British one with the south of the Pacific Ocean. The School World.

Note.—The Royal Scottish Geographical Society published a special Antarctic number in October, 1898, which contains an excellent map and valuable bibliography. The same map accompanies a reprint of Sir John Murray's Royal Society paper on Antarctic Exploration, issued by the Royal Geographical Society. Sir Clement Markham's addresses to the Royal Geographical Society contain many references to Antarctic exploration, and in the July number of the Geographical Journal he reviews various ways of penetrating the South Polar regions. Mr. Burns gave an account of the proposed Scottish expedition in the Scottish Geographical Magazine for June, 1900.

EDITORIAL NOTES.

Deliver not the tasks of might
To weakness, neither hide the ray
From those, not blind, who wait for day,
Though sitting girt with doubtful light
That from Discussion's lips may fall
With Life, that working strongly, binds—
Set in all lights by many minds,
So close the interests of all.

ENGLISH AT TRINITY UNIVERSITY.

It took all of the Colleges in Canada, no less than in England, years to see that our own language and literature were as worthy of study as those of foreign countries, whether ancient or modern, the idea being commonly held that, in some way or other, every person with any claim to being an educated man or woman managed incidently to acquire a knowledge of the best authors and, therefore, of the best modes of expression. Trinity clung with more tenacity to this idea than any of the others, till it became clear that facts did not justify the theory.

Four years ago, several members of the staff offered to conduct classes in English for both pass

ation would establish a regular course in literature and the history of the language as well as the practical use of it. The Corporation very wisely accepted the offer thus generously made by a staff already hard worked, and a comprehensive course of study was drawn up, mainly by Professors Rigby and Young. Competent judges have spoken of it as one of the best courses in English, if not quite the best, to be found in any Calendar in Canada. And, what is more, the whole course has been lectured upon, something which can not always be said, unhappily, of courses of study as they appear in Calendars.

With improved financial resources, the university authorities have taken a long step forward this year and, in so doing, have relieved of their heavy burden the gentlemen who for four years past have, free of expense to the university, been doing faithfully this piece of extra work for the purpose of making the university even more attractive than it was. The distinguished and scholarly professor of philosophy, the Reverend Dr. Clark, who is known all over Canada, and beyond, as a public speaker and lecturer, has been placed in charge of the department of English, with Mr. H. C. Simpson, M.A., of Magdalen College, Oxford, as his assistant, while in his old department of philosophy he has the Reverend E. L. King, B.A. (Manitoba), as his fellow and lecturer.

Any college that has Dr. Clark at the head of its department of English literature may well call itself fortunate, as anyone may judge who has heard him lecture on Tennyson, Carlyle, Burns, or The Water Babies, to mention the titles of only a few of his public lectures. As a lecturer on purely literary subjects he is probably without a peer in Canada to-day.

Having been obliged to learn English and to put off his native Aberdonian accent, as the worthy professor himself said in his opening lecture, there are few better able than he to point out to Canadians, the path to be pursued in order that they may attain to distinctness of enunciation, purity of accent, correctness of grammar, and general cultivation in the matter of speaking and reading. College courses but seldom take account of anything but writing compositions and a heaping up of catch phrases which are made to do duty for literary criticism. Against these, and like things, the professor has set his face. His lectures are being attended not only by regular students, but by a large number of occasional students also.

Trinity has always been a literary centre, as witness Mr. Gilbert Parker and the late Mr. Archibald Lampman. May it become so more and more under the new order of things which its Provost and governing body have just inaugurated under Dr. Clark's guidance.

We are glad to see that the public press is directing the attention of the public to the question so admirably dealt with by Prof. A. H. Young in the October issue of this magazine. Pupils in our secondary schools can and do ac- and honour students if the Corpor-

quire the power, thanks to the training they receive in these institutions, of translating freely and well into English either French or German. Mr. Young thinks, and we are in full accord with him that a people such as we are with French and Germans in the midst of us, should become a bilingual people. At least that this should be true of those who have the privilege of attending our high schools and collegiate institutes. So mote it be. We "keep the flag flying," but we can do it though we sing and shout in French and German.

The question of authorized text-books in our school, we confess is a difficult one to manage satisfactorily. But, it is plain, that if the Government authorizes the use of certain books in our schools, it must take on itself the burden which authorization entails. Leaving aside, for the present, the question of cost, what should we expect to find in the texts Authorized by the Government? For the sake of trade and life, we must have accuracy of information, the information should be presented in simple and clear language. This much at least the teachers and pupils and parents are entitled to. The information contained in these books for use in our schools varies considerably within narrow limits of time, in some of them much more than in others. In arithmetic, geometry, algebra, etc., though the mode of presentation may change, the knowledge of the subject changes only very slightly. The changes in the sciences are much more rapid and more pronounced than in the languages. In geographies dealing as they do, with new or unexplored lands, the mass of the new information is great and various. Therefore, the necessity for frequent revision in these school texts is absolute. We have only to think of the state of our knowledge in regard to the Continent of Africa and the Dominion of Canada, now and what it was twenty-five years ago to assent to the truth of this statement. There is no need of our furnishing reasons as to why the Minister of Education should place the latest information in respect to Canada and Ontario at the disposal of our public school men. We take that to be self evident. The doing of this public duty by the Government of the Province or the Department of Education does not in the slightest degree, interfere with the need there always is, and always will be, of the teacher vitalizing the information thus supplied to him for his classes. It is the business of the book to narrate, (accurately); of the teacher to illustrate, explain, supplement and to inspire the pupil to self activity.

Now and again we see notices in the press of teachers retiring from the work of teaching; some after an experience of thirty, forty, or fifty years, but of those who withdraw after a few years work in the school, not a word is heard, and yet the number of the young must be a very large one. They pass from our schools in silence Was the object of their beginning teaching gained by two or three years' experience of school-work? Can anything be done to retain the

services of capable teachers in our schools? It seems to be the general opinion of the public that the teacher comes to the limit of his capacity at an age when a man in any other vocation is in the full tide of his mental vigor and usefulness. It is not clear why this opinion prevails, unless it be that teachers in times past ceased to grow sooner than men in other callings. It is also a common notion that close and constant association with the young and immature tends to arrest the growth of the teacher. We doubt if this was the truth at any time, but it is self evident, that it cannot be so now; for there is no calling which stimulates new mental growth more than that of the teacher. Men and women are young so long as they continue to Grow.

"For the soul is dead that slumbers,
And things are not what they seem."

The article, "Where Summers are Long," by Mr. J. Gordon Mowat, we published a few years ago and by special request it is now reprinted. Of all the articles we have seen on the climate of Canada, Mr. Mowat's is the best. Every writer emphasizes the snow and cold to be found in some parts of Canada, and passes by the very fine weather we have in the Dominion for months each year, with a very slight notice indeed.

Mr. Mowat has performed for us good service by comparing our seasons with those in Europe. The comparison is very favorable to Canada. We know the article has been useful in the past, teachers and others making use of it in order to instruct and enlighten those destitute of reliable information regarding this part of the Empire.

COMMENTS.

Mr. Frank Pedley, the Superintendent of Immigration Branch of the Department of the Interior, gives interesting information regarding the various people who have settled in Canada during the last year. Take the figures, says Mr. Pedley, for the past year, which closed on June 30th, and we place about 50,000 settlers in Canada during the year, principally in the Canadian Northwest. To be exact the number was 49,162. Of these 31,162 arrived on ocean ports, and the balance, 18,000, came from the United States, those who came from the United States are among the best settlers for the Northwest. Of those who came by ocean ports 9,331 were English, 9,333 Irish, 1,476 Scotch, 520 German, 838 Scandinavian , 492 French and Belgian, and 17,572 from other European countries.

As we changed our year to end on the 30th of June this year instead of the 31st of December as formerly, it would be difficult to compare the present year with any previous one. However, the returns as already said, are very much larger than in any other year, and the prospects are that the year which we have entered

upon will be very much larger than the preceding one. In 1896 for instance the arrivals in Canada by ocean port were 16,835. At that time no record was kept of the arrivals from the United States. In 1897 there were 19,304 immigrants who arrived at ocean ports and 712 who entered Canada from the United States. In 1898 there was showed a big increase, when 22,751 reached Canada by ocean ports and 9,119 came from the Unite States. In 1899 there was a further increase, there being 32,598 who came by ocean ports and 11,945 from the United States. For the six months from January, 1900, to June 30, 15,352 arrived at ocean ports and 8,543 from the United States. It was then that we changed the departmental year from the calendar to the fiscal.

The English, Irish and Scotch immigration have remained pretty much about the same for the past five or six years. We get about the same number each year. For instance, the arrivals from England in 1887 were 9,393, and for the year just closed they were 9,331. There was an increase in the number we received from Ireland, but it still remains small. Scotland, like England, sends us about the same number every year. There was a small increase last year.

The English speaking immigrants, and to a certain extent those from the Scandinvian country and from France and Germany are settled in various parts of Canada, but chiefly in Manitoba and the Northwest Territories. The other nationalties from Europe incline to settle more in communities.

Many Canadians repatriated from the United States, settlers from France and others who contemplated leaving the country, but who were induced to remain in Canada, form a flourishing settlement in the Lake St. John district. Settlers are also going into the Lake Temiscamingue, Nipissing and county of Pontiac districts. The newly opened up lands in Northern Ontario are being rapidly filled by a most desirable class, chiefly from the United States, and prospects are brightening from year to year.

The reports from the general colonization agent in Western Canada, and from other official sources tend to show that all these settlements are in a flourishing and prosperous condition. In most of the western settlements large areas have been cleared and broken and good crops of wheat, oats and barley have been raised. In many cases the settlers have excellent gardens and the crop of potatoes has been large. Their houses show improvement in structure, and altogether the newcomers can be described as doing exceedingly well. The home-seekers from all over the world are turning to Canada, enquiries are increasing in number and on every hand are signs that the desires of the Canadian people and the demands of the outside world will alike be satisfied.

CLEVER BIRD-OUTLAWS.

Some of our young naturalists may not be aware of the fact that the magpie, the crow and the bluejay are related to one another. Ernest Harold Baynes, writing in the Hartford Times, tells us that

"family traits, particularly bad ones, are difficult to hide, even under fine raiment, and the blue-jay in spite of his azure plumage,' contiually betrays his relationship to the above mentioned birds.

Like them, says Mr. Baynes, he is highly intelligent, inquisitive, but cautious, fond of fun, noisy, and mischievous.

He may be seen in the woods at any time of the year, and he never looks better than on a bright winter morning when the snow is on the ground. He evidently feels well on such occasions, and his hearty "Hey! Hey!" is heard all along the wooded hillsides. Occasionally we see him flying across the open with lowered crest and tail straight out behind, and again we flush him from the ground, where he has been unearthing some beech-nuts or chestnuts. These nuts are a favorite food of the blue-jay in winter, and he shows considerable ingenuity in getting the husks off. His favorite method is to wedge the nut into a crevice in the bark of a tree, a crack in a fence post or some other convenient spot, and then bring the point of his bill to bear upon the leathery shell until he splits it off. When he can find no convenient crack or crevice to serve him as a vise he places the nut upon a branch and holds it within his claws while he hammers away at it. But his blows are not delivered as rapidly as those of the woodpecker, and the individual strokes can easily be counted. Acorns and Indian corn are managed in the same way, and these with other seeds form part of his fare at this season.

When fall comes the blue-jays travel about in companies; noisy crews on the continual lookout for fun and mischief. Now they are teasing an owl, which one of them has discovered trying to get a quiet afternoon nap in a dark corner of the wood; now one fellow imitates the fierce screams of a distant hawk, apparently for the amusement of his comrades, who break in with a mocking chorus of "Hey-hey-hey" between the attempts. But let the hawk swing past close to them and they'll generally be so still that no one would guess there was a blue-jay within ten miles of the place. When he is about, they, like the Indians, know that they must "be good or they'll be dead."

Sometimes, however, a foolhardy member of the band will fly around the bird of prey, and, perhaps to scare his companions, will shriek as though the hawk had got him. Now and then such a one pays dearly for his folly, for the hawk does get him sure enough, and his playmates with dismal cries fly off and leave him to his fate.

But the blue-jay is not too busy with his own affairs to keep in touch with things going on around him, and it is not an easy matter to get near without his being aware of your approach. He does not always act in the same way. Sometimes the first glimpse of a man is enough to make him silent as a bat; but on the other hand he is just as apt to raise an alarm which will send the forest people scurring in all directions. Many hunters have made a point of shooting every blue-jay they came across, because the noisy birds

warned the deer and other game of the approaching danger. Wolves, foxes, and raccoons can scarcely walk abroad in the daytime without the jays being aware of it, and these animals are often annoyed by the jeering mob of bluecoats who follow them about in much the same spirit in which bad boys follow a peddler to snowball him.

On very cold, windy days the blue-jay is not quite so chipper, and he is then apt to be found in some sheltered spot, such as the heart of a thick cedar bush, and he will often allow one to come close up to his hiding-place before fluttering out.

In the spring a great change comes over him. He is just as much of a villain, but he doesn't brag about it. The fact is, he has a mate, and pretty soon he will have a nest that he doesn't want disturbed. So he never mentions it, as a catbird would do, and if you were to pass it twenty times you might think it was an old one, for any thing he would tell you to the contrary

It is usually built in the crotch of a small tree, often a scrub oak or a cedar, and is made of twigs and rootlets, those forming the lining being much finer than the rest. The eggs, from four to six in number, are generally pale green or brownish grey, heavily marked with shades of brown. During the period of incubation the parents are very quiet, and when you approach the nest the sitting bird either slips off silently while you are yet some distance away or else lies close to the eggs until you are almost near enough to touch her with your hand.

But behind all this quietness there is a lot of villainy going on. While one bird is on the nest the other is often out robbing the homes of birds smaller than himself. Through his natural inquisitiveness he soon learns the secrets of all the other birds in his neighborhood, and visits their nests, as Audubon says, with as much regularity as a physician would call on his patients.

But while we deplore his rascality we have the sort of admiration for him that we have for a clever outlaw. He is bad, but he is brilliant, and, moreover, he is very handsome.

One hundred teachers from the public and high schools of South Essex assembled in annual convention in the public school building of this town on Thursday and Friday last to listen to and discuss papers and addresses bearing on their professional work.

For some years past it has been the practice of the managing committee of this association to secure the services of some one of the leading lights of the profession in this province to give a series of addresses at the annual convention which should form the "piece de resistance," so to speak, of the literary menu provided for the occasion. This year they were fortunate enough to secure for this purpose the learned and able principal of the London Normal School, Mr F. W. Merchant M. A. His series of lectures, four in number, given at intervals during the two days' session of the convention, on the methods best suited to develop the pupil's mind, as well

as on the inner workings of this mysterious entity, were themselves models of clear and forcible teaching. The one thing kept prominently before his hearers throughout these addresses, amid all the details of pedagogical philosophy with which they were filled, was that the efforts of the teacher must in all cases be directed to securing the truest development of his pupil's mind, to the neglect of all short-cuts and paths leading to knowledge so-called, which either his own or the pupil's indolence might urge him to take. The pupil's will power should be cultivated by leaving him scope for the exercise of this faculty in the preparation of his lessons. Graded schools, he considers, are often productive of much harm to the pupils attending them in that the tendency in such schools is for the teachers to remove the difficulties occuring in the lesson by explanations previously given to the class, so that there is little for the pupil to do except to memorize the facts thus conveniently arranged for him. Hence those vital qualities of a well-developed character, independence of thought and perseverance, are apt to be lacking in pupils trained in this way.

The officers of the association, for the coming year:—President, Inspector Maxwell; Vice-President, Mr. Wightman; Secretary-Treasurer, Mr. Fuller; Committee of Management, Messrs. McMaster, Manning and Pumaville. --The Post, Leamington.

"A capital convention" was the unanimous voice of those who attended the annual meeting of the Durham County Teachers' Association in the High School Assembly Room Friday and Saturday, 25th, 26th, October.

The most spirited discussion of the convention ensued in which Dr. Tilley, Principal Gilfillan, Rev. H. B. Hayden, Editor James, Secretary Groat, Messrs. Tamblyn, F. Wood, W. J. Inch and T. G. Bragg, B.A., took part.

The result was the almost unanimous adoption of this resolution offered as an amendment to a motion proposed by Mr. Groat—

Moved by Dr. Tilly, seconded by Mr. Wood and resolved: That this association is not in sympathy with the introduction of the Bible in our schools as a text book in view of the many difficulties surrounding the question.

The election of officers resulted as follows:—President, Thos. Gillies, Port Hope; 1st Vice-President, D. L. Somerville, Bethany; 2nd Vice-President, Miss Howson, Salem; Secretary, F. J. Groat, Hampton; Treasurer, Jas. Gilfillan, B.A.; Executive Committee, Bowmanville—R. D. Davidson; Port Hope. F. Wood; Newcastle, J. W. Bradley; Darlington, W. J. Stacey; Cartwright, I. B. Barclay; Clarke. O. D. Austin; Manvers, Miss Ella Coulter; Hope, Miss Dodds; Cavan, Miss F. M. Ellenor; S. Monoghan, G. Byers; Millbrook, Mr. Fleming; Auditors, R. D. Davidson and Miss B. McWain.

Rev. Mr. Hayden and Mr. M. A. James on behalf of the citiens of Bowmanville thanked the Association for the excellence of the program given at the evening session Friday.

On motion of Principal Gilfillan, seconded by Miss Moorcraft the

Trustees of the Methodist church were thanked for placing at the service of the Convention their Sunday School hall for Prof. Shaw's entertainment. The entertainer was also heartily thanked for the rich treat he gave the large audience...—The Canadian Statesman, Bowmanville.

Professor Clark, speaking at the annual convocation dinner of Trinity University last month, stated that in his belief there was no power which had less of personal aggrandizement in the wars it had undertaken, and in the actual accessions of territory it had secured than had Great Britain. The cause of the British Empire was, of course, the cause of human civilization. There was no country that did not owe its constitutional government to the lesson taught by England.

These statements we believe to be emphatically true. And in order to be true for all time, the necessity is, to continually incorporate with the laws of the empire, the law of true liberty. "All things whatsoever ye would that men should do, unto you, even so do ye also unto them."

SCHOOL HYGIENE.

Helen MacMurchy, M.D.

The Board of Education of Philadelphia has issued instructions that all children who cannot show good vaccination marks are to be excluded from the public schools of that city.

On October 4th, 1901, an influential deputation from the Manchester and Salford Sanitary Association appeared before the Manchester School Board to ask them "to consider the advisability of teaching Hygiene in the Schools." The deputation were well received.

The American Public Health Association rightly considers that the course in Hygiene for school teachers should be directed rather to the laws of health than to the study of the temperance question.

The Board of Education, of Orange, New Jersey has appointed a medical Inspector who is to visit each school daily and examine all all pupils referred to him by the teachers.

THE WOMEN'S HEALTH PROTECTIVE ASSOCIATION OF NEW YORK.

The association has made a lively crusade against permitting fruits and vegetables to be exposed for sale on the sidewalks by retail grocers and others; it has effected reform in this matter already, and it is its intention to take active steps to suppress the evil practice. The visit of the association to the almshouse on Blackwell's Island resulted in some reform. Among those were fly screens in the Hospital for Incurables; abolition of an open sewer; alterations suggested in the Hospital for the Blind; an improvement in the quality of meals. This

association also has been to the front in agitation and legislation for the regulation of the sanitary condition of bake shops and for the increase of public parks and playgrounds for children. In school hygiene it has been most encouragingly successful during its seventeen years of existence. So long ago as 1890 it established the School Hygiene Committee. Another committee, that on slaughter houses, has seen a marvellous change in the conduct of these necessary but repellant spots. From being the most overworked, this committee, which had at the start to develop a public opinion to coerce the managers of these establishments, has now very little to do, so excellent are the conditions of the abattoirs as a result of the work of the society. It has also rendered great service in the crusade against expectorating in street cars, for it was at its request that the board of health first issued prohibitory notices It was also in response to agitation on the part of the society that the cocoa matting was discarded. The association, moreover, is vigilant in the enforcement of laws against expectoration, and it is at the present taking special active measures in ferry houses and ferry boats. This society has rendered excellent service in its attempt to remedy existing conditions in regard to dumping garbage; and all this public service, every branch of which affects the well-being, and in some instances the life, of citizens, is so quietly performed that it is safe to say that not one in 10,000 of New York's inhabitants knows that there is so vigilant a society watching over his interests in vogue.

BOOKS AND MAGAZINES.

To accommodate readers who may wish it, the publishers of THE CANADA EDUCATIONAL MONTHLY will send, postpaid, on receipt of the price, any Book reviewed in these columns.

The November St. Nicholas contains the first of a series of longer stories complete in one number. The first is "Tommy Remington's Battle," by Burton Egbert Stevenson.

The New York Municipal Campaign is given the first place in The American Monthly Review of Reviews for November. There are character sketches of Seth Low and E. M. Shepard, and an article by Dr. M. M. Maltbie on "The Issues of the New York Campaign.

The Philistine for November contains an enthusiastic article on "The Kindergarten," by Fra Elbertus.

The contribution to the November number of The Ladies' Home Journal that will probably arouse most interest is an article by the editor, Mr. Bok, on "The Beginning of Married Life."

The announcement number of The Youth's Companion appears in a most charming cover in red and green. "Servant Folk in India," by Sara Jeannette Duncan, is one of the many interesting contributions from well-known writers which are promised to appear in 1902.

The October number of The Studio, the first part of a new volume, contains eight supplimentary plates. Amongst these

may be mentioned specially, F. E. Laszlo's Portraits of the German Empress, Prince Hohenlohe, and the Baroness Dierghardt; and the exquisite drawing of a child by Le Sidanes. The article on "Old English Glasses," by Percy Bate, with illustrations, is most worthy of attention.

The contents of The Monthly Review for November include:—"Abdur Rahman"; Humiliation, Real and Imaginary"; "Great Britain and Germany," by R. B. Holdane; "Ireland and the Government"; "A Plain Man's Politics," by William Archer; "Tammany Hall," by Sydney Brooks; "Wealth, Poverty and Socialism in Italy"; "The Modern Thoroughbred, His Past and Future," by T. A. Cook; "Some Nurseries of the Twentieth Century," by E. H. Cooper; "Maksim Gorky," by R. Nisbet Bain; "Makar Chudra," by Maksim Gorky; and "The Happy Valley," by Percival Ford.

The Living Age for November 9th, contains a lengthy article by Miss Ada Cone, taken from The Contemporary Review, on "The Art Problem in the United States" n

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E. C. Stedman s "Mater Coronata," writen for the Yale Bicentennial, is published in the November number of The Book Buyer. There is also an intersting portrait of Swinburne reproduced from Literature.

Scribner's Magazine for November contains chapters one and two of F. Hopkinson Smith's new story, "The Fortunes of Oliver Horn." The serial opens with all the attractive qualities of Mr. Smith's work. "The Pines of Lory" is concluded in the same number, and Frederich Palmer has an account of "Marquis Ito, The Great Man of Japan."

The more interesting contributions to the November number of The Cosmopolitan include:—"Elsie's Dance for Her Life," by S. R. Crockett; "The Isolation of the Anglo-Saxon Mind," by Edmund Gosse; "Mrs. Lawton's Little Dinner," by Carolyn Wells; and "Forfeit to the Gods," by Thomas A. Janvier.

The complete novel in the November Lippincott. "One Woman's Life," is singularly amateur in its treatment and construction. There are two short stories, however, in the same number which display to much advantage the ability of knowing how to write. "The Courting of Gabriel Seabury," by Mabel Nelson Thurson, and "Ballanafad," by John O. Sears.

The November Century begins a year during which the Magazine is to be specially devoted to humor, rather an undertaking for any number of editors. However, Mark Twain contributes two short stories that seem to answer the purpose. "The Indiscretion of John Henry," by Walter Leon Sawyer is a good humorous story, and humorists are treated historically by W. P. Trent. "Songs of the Second Youth," three poems by Mary Adams, are exquisite both in feeling and expression.

We have not space to do more than mention the many excellent contributions to The Atlantic Monthly for November: "The Solitude of Nathaniel Hawthorne," by Paul Elmer More; "Reminiscences of a Dramatic Critic, IV.," by Henry Austin Clapp; "The Lover," by Ellen Duval; "To a Crow," by Evelyn Phinney; and "Allee Same," by Francis Aymar Mathews.

In the Riverside Art Series, published by Houghton, Muffin and Co., the latest issue is a charming account of "Landseer and His Work," by Estelle M. Hurll. pp. 93. Price, 35 cents.

Mr. Gilbert Parker has entered what is a new field for him in Canadian fiction in his "Right of Way," published by The Copp, Clark Company of Toronto. So far his most successful story has been "When Valmond Came to Pontiac," in which his poetic imagination found its best expression. The work in "When Valmond Came to Pontiac" was even throughout, unbroken by the lapses in continuity and inspiration that have marred his longer novels, "The Seats of the Mighty," and "The Battle of the Strong." But in "The Right of Way," Mr. Parker has depended on the power of his characterization, not on historial picturesqueness. This is why his latest work can be described as being a new field for him. The treatment of the character of Charley Steele possesses a distinction that places "The Right of Way" above all Mr. Parker's previous work. The conception of the story is not carried out as faultessly as that of "When Valmond Came to Pontiac"; but it belongs to a higher class of literature, in which it is to be hoped Mr. Parker will continue working.

Riverside Biographical Series; Alex. Hamilton, by C. A. Consant; Washington Irving, by H. W. Boynton; price 50 cents each. Houghton, Miffin and Co., Boston. The design of this series is to give a biographical history of all the eminent men of the United States. The volumes are convenient for school supplimentary reading.

Publications Received:—

MacMillan and Company, London; Agents in Canada, The Copp, Clark Company:—

The Kipling Reader, pp. 205. Nature Study Readers, parts 1 and 2, pps. 433. Rural Readers, parts 1 and 2, pps. 223. Cicero Pro Archia, G. H. Wall, pp. 94.

George Bell and Sons, London:—

Cicero de Senectute, edited by A. S. Warman, pps. 176.

At the Clarenden Press, Oxford:—

Scenes from Sophocles, Ajax, edited by C. E. Lawrence, pp. 64.

French Grammar and Primer, Academic &c. &c., by Aurthur H. Wells, M.A. The Clarendon Press, Oxford. A useful book.

English Spelling and Dictation, 1s 3d Thomas Laurie, Paternoster Row, London. Out of 1972 failures in the Civil Service Examinations 1866 candidates failed in spelling.