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THE INFLUENCE OF LANGUAGES UPON NATIONAL CHARACTER.

BY REV. JAMES ROY, LL.D.

(Continued from page 120.)

TO no country in the world do these questions come with such force as to Canada. To her the problem of the languages is more important than that of race. The different races of her population could easily assimilate, were it not for the inheritance of two forms of speech within the one organism. French, by the accident of political government, plays a part in Canada which it could never play in the United States. There, in the absence of special privileges, and overwhelmed by the greater majority of the English-speaking people, it would, in time, disappear. Here it has scope for its ambition; and, by the simple fact of the multiplicity of births, it is driving English more and more from Quebec, and is extending its sway over the eastern portion of Ontario. What is its character? What are its capabilities for developing the character of a people? How does it compare with English in these respects? What is its bearing on the permanence of the Dominion and the future of the continent? These questions are forcing themselves upon the attention of Canadians. To show their importance, nothing more will be necessary than to quote a somewhat lengthy passage from an address given before *L'Institut Canadien de Québec*, in 1878, by the Rev. Père Mothon. In the extract, the significant use of the term "Canadian" as synonymous

with "French" will be noticed. After alluding to the occupancy of new ground by the constantly multiplying population of the French, the writer says:—

"Not only does our race extend by taking possession of new territories, but it invades the Anglo-Saxon race itself. It pushes it back, and recovers from it, step by step, by a peaceable conquest, the soil of which the fate of arms had formerly deprived it, in New Brunswick and Nova Scotia, where four or five counties, only a short time ago completely English, are already in the power of the Canadians. At Ottawa, where, fifteen years ago, there were but few French, these now form one-half of the population. In the Eastern Townships this irresistible encroachment is, perhaps, more striking than anywhere else. In the diocese of Sherbrooke, for instance, in a locality wholly English, there arrive one day some Canadian families from the old parishes. Soon they multiply. They induce their relatives and friends to settle near them. The nucleus grows and grows continually. The English, the day they feel themselves no longer masters, abandon the locality, and settle elsewhere. Their lands and houses pass into the hands of the newcomers; and there is not a year in which several of these parishes, which went to sleep the night before English and Protestant, do not wake up some fine morning Catholic and Canadian. Where, gentlemen, is this peaceful conquest going to end?"

In view of the possible effects of this increase, which Père Mothon understates rather than exaggerates, it may be well to add his counsels to his French readers: "Preserve with a jealous care, not only our religion, but that which is the life-blood of every nationality, our customs and our language."

What kind of a nationality will this language produce? I must here give, from Père Mothon, an anthropological myth which he learned from an old negro on the banks of the Mississippi. When the Creator had determined to make a certain number of men to form nations in the world, and had exhausted all the available earth, he found that two men had yet to be

created. For want of earth he decided to turn animals into men, and, stretching out his hand, he first grasped an ant. Out of this creature, plodding, systematic, persevering, frugal and intelligent, he made a man. This was the first Englishman. Then, feeling the need of yet one more nation, whose origin should not be from inert clods, like other nations, but from a living animal, he caught a butterfly and made a man out of it. This was the first Frenchman. Père Mothon pays a most eloquent tribute to the qualities of the English ant; and he acknowledges the correctness of the old negro's portraiture of the French butterfly—brilliant, light, restless, airy in theories and aims, and often incapable of long-continued effort. The genius of the language must perpetuate the characteristics of the people; yet the world cannot afford to lose its butterflies; and who can blame the butterfly for wishing to perpetuate his beautiful existence? French literature, too, is not a thing to be ashamed of. For the philologist, it furnishes fields of interest in its connected yet separate *Languè d'Oc*, and *Languè d'Oui*, as well as in romances, and *fabliaux*, *vaux-de-vire* and *sirventes*. In history it has treasures from Villehardouin to Guizot. It has theologians and preachers from Calvin to Lacordaire. In tragedy and comedy the names of Racine and Molière must live while nerves can thrill, or mirth provoke a laugh. Its philosophers can make the most abstruse subjects clear. If Montaigne is sceptical, and La Rochefoucauld is cynical, who combines amusement and instruction with his sarcasm like La Bruyère or Boileau, and who has rescued the Roman Church from the charge of necessary antagonism to evangelical piety like Fénelon? Are there many who combine historic fact with philosophic generalization like Montesquieu? If Voltaire has passed near the verge of Atheism, who has such keen and delicate raillery as he? Time fails for mentioning the works of Chateaubriand, and Béranger, and Lamartine, and Balzac, of Taine, and Gautier, and Victor Hugo.

It is well said by Mr. Goldwin Smith that "It is certain that six months' study of French will now open to the student

more of Europe than six years' study of that which was once the European tongue."

Passing from Europe to Canada, if the productions of native authors in law and theology, in biography, and science, in history, and poetry, and fiction, such names as Garneau, Faucher de St. Maurice, Benjamin Sulte, Joseph Marmette, Chapman, etc., are less known than they should be, and if antagonism to England shows itself where it can give point to a "parish standard" of patriotism, yet French-Canadian literature is, at least, free from the charge of moral impurity.

After all, there is a darker side to this. No type of literature is more popular and influential than fiction; and it is well to remember a sentence from Prof. Goldwin Smith on what he calls "the bad tobacco of the mind." He says: "As to French novels, Carlyle says of one of the most famous of the last century, that after reading it you ought to wash seven times in Jordan; but after reading the French novels of the present day, in which lewdness is sprinkled with sentimental rose-water, and deodorized, but by no means disinfected, your washings had better be seventy times seven."

But the French language bears about with it a danger more insidious and far-reaching, because less sure to provoke disgust and a reaction. The history of Canada presents Frenchmen as some of the foremost in contending for popular government, when English-Canadians were content without it; yet a philological examination of French, and a wide survey of French history, shows that the language lacks the elements that train to a self-mastering and progressive individualism, without which popular government cannot be permanent. By its genius, by its Latin affinities, by its history and literature, French leans to the purely authoritative religion of the Church of Rome. That multitudinist form of religion puts no high estimate, in religious life, on individual intelligence, and is, therefore, everywhere followed by illiteracy and its concomitant evils. The skilful manipulation of the returns of education in the census of 1881, in the interests of French Canada, and to

the disadvantage of Ontario, cannot overthrow this statement; for the falsity of the returns cannot be hidden from any one who knows the facts. As the French language spreads in Canada, Canada must more and more come under the influence of the Roman Church, and be moulded to the character it fosters.

Compare, then, with it the genius and tendencies of the English tongue. English has its disadvantages. It is less musical than some other languages. It is offensively sibilant. It lacks, as Dr. Charles Mackay, in his "Lost Beauties of the English Language," has shown, the sonorous predominance of vowels of which the Scottish dialect, by its abbreviations, is capable, and the almost Italian sweetness of Scottish diminutives. Guizot is justified in saying that English is not rationally, uniformly and systematically constructed; and it cannot, therefore, train to such a love for the mere surface-beauties of logical consistency as makes the Frenchman forget the practical consequences of his airy theories, and the hidden fallacies of his beautifully-stated premises. The English language compels the Englishman to be practical, even at the cost of apparent logical consistency. It is rich and flexible, as Guizot acknowledges. In its foundation it is Teutonic, and trains, as Madame de Staël admits, to Teutonic strength of individualism and reason, without giving to these features an exclusive prominence. By its Latin and Norman elements it demands appeal to authority, and thus counterbalances the individualizing and rationalizing Saxon elements. Its vocabulary, absorbing into itself new terms from every quarter, is adapted to every kind of human employment. In the mouth of an orator, it can express either the most tender and pathetic descriptions and appeals, or the fiercest and sternest denunciations. By its combination of Saxon monosyllables and flowing dignified words of Latin derivation it can round its periods with most mellifluous rhythm. By its well-marked accentuation, its power of inversion, and its capabilities of rhyme, it is adapted to the finest poetry. Even in verses

whose misty sense eludes the grasp of thought, or in those poetic word-plays from which all sense is absent, it can charm by the melodious, bird-like harmony of sweet sounds. In its literature it covers the whole round of human thought and presents names that are unrivalled. While ink and paper last it will stand forth allied with the names of those who were the champions of both liberty and law. It is tied to the chariot of no blighting tyranny. To aspiring thoughtfulness in lands of heathen darkness it is the only channel through which flows, in due proportion, all that is true in science, profound in philosophy, wise and just in law, and healthful in religion. The welfare of the world lies chiefly in its hands. Its preservation in Canada, as the predominant means of promoting our civilization, is of the most undoubted importance. There are far-reaching influences at work that threaten that preservation in the future. Not to politics must we look for the power to uphold the interests that centre in the English language, but to religion, the deepest source of human action, for good or ill. Let the different sects of English Christians find a common ground of union in the principles of the time when spiritual life was not lost, and when unity was still preserved; and, united on such ground, the English-speaking race will preserve for future generations that healthful type of Christianity which exists nowhere else but where our English speech prevails.

AVALANCHE PATHS.

BY PROF. A. P. COLEMAN, UNIVERSITY OF VICTORIA COLLEGE, COBOURG.

A CROSS the Columbia, a few miles from my camp, rose a peak of the Selkirks, not of the first rank perhaps, yet large enough to fill a wide space on the retina and cut off with its dark bulk a great arc of the sunset color in the evening. The faint summer haze, like a veil that gives suggestiveness to beauty, softened yet revealed the broad outlines of its structure with a delicate distinctness. Beneath the fresh snow of the

summit was a broad treeless zone of softly varied, yellowish green, interrupted by expanses of rock and traversed by downward sloping ribbons of richer green along the water courses. These strips of rich green reached like grass-grown lanes far down below timber line, and divided sharply the purplish waves of the monotonously dark evergreen forests, which swept roll after roll to the banks of the muddy Columbia, only here and there showing the gleaming white of a waterfall.

It struck my inexperienced eyes that these seeming strips of full herbage meadow strung on the white thread of a stream offered ready-made paths up the mountain.

It was not long before the idea was put to the test. Two of us, after some little adventures, rafted over the Columbia and undertook the ascent of our unnamed but majestic neighbor. We chose the nearest of the green lanes as our point of attack, and trudged some hours through the woods of pine and spruce before reaching it. The green half light of the forest gave way to the broad daylight of a clearing, and we stood at the lower end of our path. But what a path!

Sharply edged by tall grey ranks of standing trees was a perfect field of destruction. Huge trunks still covered with bark, or bare and weather-beaten, lay shivered and broken and tossed in confused heaps like piles of dead after a hard-fought battle.

The small river whose course we had followed was buried deep out of sight for a mile or more, but could be heard roaring and gurgling among rocks and hindrances below like a baffled wild beast. Sometimes it sounded choked and distant; at others, a glimpse of polished green water, or oftener of white foam, gleamed from between the logs, and the roar grew loud.

In places a dense growth of lithe bushes or young trees had sprung up and half hid the ranks of fallen trees. These, with tall ferns among the sharp-angled rock fragments of the steep mountain slope, made an indescribable tangle and torment for burdened prospectors to cross. The avalanche track, or snow-slide, as unimaginative westerners choose to name it, was

perhaps a quarter of a mile in width, but cost us two long hours of some such labor as Satan's when, with "head, hands, wings and feet," he made his earthward way through chaos. This was my first acquaintance with the strange ruin wrought by an avalanche. It was evident that men of our stride were never meant to walk in its path.

Somewhat higher up a great bank of sullied snow from last winter's slide still filled the gorge, bridging with its wide dripping arch the echoing stream below.

There are many such tracks among the Selkirks down which snow torrents find their way year after year. Some are broad flood grounds of the winter snows which change their course from time to time. Others are narrow and definite, steep-banked canals cut through the forest and following the same gorge or cañon year after year. From the bottom of these tree-walled channels nothing can be seen but a strip of sky, an inverted river of grey cloud or blue ether. The brook following the gorge is often dammed or embanked with logs and gravel, or bridged in all sorts of adventurous ways.

The snow brought down by slides may last far through the summer, or even from year to year till covered with earth and debris. Vegetation is curiously delayed near these slowly melting masses of snow. Ferns hopefully unroll their fluffy green crosiers when all others are casting their brown spores. Belated Scotchcaps and other berry bushes flaunt in full bloom when their neighbors have long ago dropped their ripe fruit.

Geologists have followed step by step the work of the slow-footed glacier, but have almost ignored the swift snow torrent of the avalanche. There are many glaciers creeping down the ravines of the Selkirks, but as agencies of change they are probably far surpassed by the snowslides, which overthrow forests, dam up rivers, and form temporary lakes that burst and flood the lowlands. They bring down with them vast amounts of rock and debris, changing the whole face of the valleys invaded.

Few things so powerfully impress the imagination as an

avalanche. Not éven an earthquake or tornado works more sudden and resistless destruction. For months the snows have been falling from the clouds born of the warm Pacific, till broad fields often a hundred or more feet thick rest uneasily on their steep beds. At length, shuddering, they lose their hold, and with wide-swelling rush and roar of accompanying winds and upwhirled snow-clouds dash down—down, through forest and over precipices, headlong into the valley! When the thunderous roar has echoed itself out among the valleys and cañons, and the whirls of snow dust have fallen, a wide swarth has been mowed down the mountain side, and what was forest of a thousand years' growth lies heaped and buried under the snow. Fortunate it is if no prospector's cabin in the lonely gulch has been swept with its owner into the sudden ruin!

THE SCIENCE OF EATING.

BY PROF. C. C. JAMES, M.A., ONTARIO AGRICULTURAL COLLEGE, GUELPH.

WE must "eat to live" if we would "live to eat." The rich epicure, in his living to eat, loses sight of the former fact; while the great majority of mankind, in their struggle to obtain sufficient to eat to live, are still more regardless of the second. A just and scientific consideration of the relationship of the two facts, eating and living, and an appreciation of their intimate dependence, the one upon the other will give us more satisfaction and enjoyment in our eating and, consequently, in our living.

Right eating and right living go hand in hand. By "right living" we do not include all the higher mental and moral possibilities of life that can be read into the expression, but we rather restrict it to the lower, though important, living of man as an animal. And yet we must not restrict it too rigorously; a careful thinking over the subject may allow us to include here much of the living frequently termed "moral." Heaviness of heart and depression of spirit may not always be dis-

connected with heaviness of pastry or depression of dough : a family broil can sometimes be traced back to the kitchen : the hissing, seething temper may have been generated beneath the lid of the kettle, while the dark, frowning countenance may have been burnt in the neglected coffee pot.

And there is also the bright side—wolves before dinner, lambs after. There are two different worlds upon this earth, that before eating and that after. You could at times not recognize the one as being even the kindred of the other, so wonderful is the influence of a little food upon the whole life of a human being. Favors are not granted by hungry men. Morals are seen to change with the dinner hour.

We can give two reasons valid enough for introducing this common, vulgar subject of "eating." First, it is a universal practice ; nay, further, it is a universal necessity. In it all men, as being animals, are interested. Even gods and goddesses of ancient Greece, supernatural though they were supposed to be, quaffed wine and nectar from golden goblets as they counselled together in the banqueting house of Zeus. Second, upon the food eaten and its digestion depends the condition of the body, and upon the condition of the body partly depend mental growth and vitality. We have said we might go further and trace the influence of food upon the moral actions. No one will deny that insanity, murder and the most horrible of crimes are often bottled up ; but perhaps we do not always trace the misbehavior and insubordination of a child to the tempting green apple. Who shall tell of the latent moral or immoral energies hidden 'neath the clammy crust of a pie, or chopped up in the heterogeneous compilation of things good, bad and indifferent (as well as different) vulgarly called "hash"—that all-embracing meal of a dozen courses served in one ?

From the progenitors of the human race, who are represented as falling morally through flattery and food, have sprung such diverse peoples as the stunted, blubber-eating Esquimaux ; the sharp-featured, nervous, active, omnivorous American ; the

yellow-colored, rice-and-tea-loving Chinaman; the deep-thinking, portly, beer-drinking German; the burly, determined, beef-eating Englishman; the fierce-looking, decivilized, man-eating cannibal. Climate, occupation, and natural surroundings have doubtless been important factors in thus differentiating mankind; but no one can deny that food has also been very influential. If its effect upon individuals is so marked within narrow limits, its effect upon great numbers, after long periods of time, must be more marked and lasting.

No apology, then, need be added for introducing the subject of "the science of eating." We know that there is an *art*—every one is a living proof of it; but is there a *science*? Wherever there is an art there must be a corresponding science, undeveloped, developing, or developed. A science exists wherever the question "why?" can be asked. Let us ask a few "whys." Why do we associate "ham and eggs," "bread and butter," "porridge and milk," "meat and potatoes," "crackers and cheese," "pork and beans"? Why does the French cook arrange his *menu* upon a certain fixed plan of courses? Why are we not served in the following order: coffee, meats, fruit, fish, cheese, vegetables, pickles, milk, soup? If every new dish presented to us called up a mental interrogation, and every mouthful swallowed emphasized it, we would wonder, not whether there *is* a science, but *what* the science is.

The choice of foods, their arrangement in courses, and their preparation, have all arisen to a great extent from a gratification of the palate. Experience, not scientific reasoning, has guided man. But an experience that results in the pleasure and development of man will always be found to rest upon true scientific principles. This is not overthrown even when the experience has been partially the result of necessity, as in the case of the rice of the Chinaman, the potatoes and buttermilk of the Irishman, the bacon and corncake of the Southerner, the oatmeal and herring of the Scotchman, or the brown bread and mackerel of the New Englander.

The development of physiological chemistry, or of chemical

physiology, has been slow and difficult. We shall enumerate only a few of the leading facts so far recognized.

An average man of 150 pounds weight will be made up chemically as follows:—

Water	93.0 lbs.
Protein	22.5 "
Fats	23.5 "
Carbo-hydrates	0.2 "
Mineral matters	10.8 "
	150.0 lbs.

Animal and vegetable compounds are first divided into two classes, *nitrogenous* (those containing nitrogen, as well as carbon, oxygen, hydrogen, sulphur, and sometimes phosphorus) and *non-nitrogenous* (containing carbon, oxygen and hydrogen). The nitrogenous compounds, of which cheese (casein), white of eggs (albumen) and lean meat (fibrin) are familiar examples, are also known under the names of *albuminoids* and *protein*. In the animal frame the protein constitutes the flesh, muscle, tendons, etc.—the machinery of the body. The composition of protein is, nitrogen, 16 per cent.; carbon, 53.5 per cent.; oxygen, 22.5 per cent.; hydrogen, 7 per cent.; sulphur, 1 per cent.

The non-nitrogenous compounds are divided into two classes, the fats and the carbo-hydrates. The latter are compounds of carbon and water, and are found in the sugars, starch and cellulose. But little is found in the body (in the glycogen of the liver), sugar especially being readily soluble, and therefore not of a permanent or stable character.

In the fats the carbon, hydrogen and oxygen are united in proportions different from those of the carbohydrates.

The mineral matters are found mainly in the bones, and consist principally of calcium, phosphorus, chlorine, fluorine, potassium, sodium and magnesium compounds. Salts are necessary for the building up of the bony structure or framework, and are therefore most requisite in the case of the growth of children. But there are other uses of the mineral matters which have not yet been determined. Animals fed on pure nutrients entirely free from mineral matters become languid, droop, and finally

die. Prof. M. Foster, F.R.S., writes, as quoted by Dr. Fothergill, of London, England: "All food contains, besides the potential substances which we have just studied, certain saline matters, organic and inorganic, having in themselves little latent energy, but yet either absolutely necessary or highly beneficial to the body. These must have important functions in directing the metabolians of the body. The striking distribution of them in the tissues, the preponderance of sodium and chloride in blood-serum, and of potassium and phosphates in the red corpuscles, for instance, must have some meaning; but at present we are in the dark concerning it. The element phosphorus seems no less important, from a biological point of view, than carbon or nitrogen. It is as absolutely essential for the growth of a living being like *Penicillum* as for man himself. We find it probably playing an important part as the conspicuous constituent of lecithin;* we find it peculiarly associated with proteids,† apparently in the form of phosphates; but we cannot explain its role. The element sulphur, again, is only second to phosphorus, and we find it as a constituent of nearly all proteids; but we cannot tell what exactly would happen to the economy if all the sulphur of the food were withdrawn. We know that the various saline matters are essential to health that when they are not present in proper proportions nutrition is affected, as is shown by certain forms of scurvy. We are aware of the peculiar dependence of proteid qualities on the presence of salines; but beyond this we know very little."

The constituents of the body, then, can for all present purposes be divided into five classes—water, nitrogenous compounds, fats, carbo-hydrates and mineral matters. Water is the all-important, universal solvent found in all parts of the body, and serving as the vehicle of transport or communication between the body and its food supply. The mineral matters represent the solid framework of the machinery, giving a general plan to the structure. The nitrogenous matters are the

* Lecithin is the principal food of the nervous system ($C_{44}H_{89}N PO_9$).

† Proteids, another name for the digestible albuminoids; after digestion in the stomach they are termed peptones.

pulleys, the bands, the ropes and all the delicate appliances attached to this framework. The fat and carbo-hydrates are the fuel, a certain amount being necessary to maintain a workable temperature (bodily heat), and a constant supply being demanded to keep the machinery running.

Each of these constituents must be daily supplied, and in the proper proportions, the amount varying with the condition of life. Thus the extra heat required in winter demands more fuel—more fat, sugar, and starch foods. The movement of muscles and limbs produces a certain friction, a wear and tear, which demands a constant supply of nitrogen compounds: the man of sedentary habits needs but little nitrogen, the man of manual toil demands “strong food,” such as meat, eggs, cheese. Upon this over-supply of nitrogen compounds depends most of the cases of indigestion. “High living” is nothing else than a too liberal use of nitrogenous compounds. It is very easy for the body to dispose of an excess of sugar, starch or fat, but its efforts to utilize a surplus of nitrogen compounds too often result in blood-poisoning, rheumatism, gout, and the thousand and one other diseases resulting from indigestion.

The daily average ration required for an average developed man is about as follows:—

Protein	4.2 ounces.	Lean steak	8 ounces.
Fat	2.0 "	Butter	1 "
Carbo-hydrates ..	17.6 "	Bread	20 "
Mineral matters ..	0.8 "	Potatoes	30 "
Water	71.4 "	Water	37 "
	<u>96.0 ounces.</u>		<u>96 ounces.</u>

Milk is a complete, natural food, consisting as follows:—

Water	87.4 per cent.
Cheese or nitrogenous compounds.....	3.4 "
Butter or fats.....	3.8 "
Sugar or carbo-hydrates	4.8 "
Mineral matters.....	0.6 "
	<u>100.0</u>

It is perfectly adapted, we see from the above, for the development of the body, blood, bone and sinew.

For comparison with the above, and also for reference, we add the composition of some of the common articles of food. The analyses are from reliable English and American sources, and may be taken as being accurate average results. The figures are all percentages.

FOOD.	Water.	Nitrogenous Compounds.	Fats.	Carbo-hydrates.	Mineral Matters.
Beef (accord'g to partchosen)	27 to 76	12 to 23	0.9 to 59	..	0.7 to 13
Veal " "	72 to 79	19 to 20	0.8 to 7.5	..	?
Mutton " "	49 to 62	15 to 18	19 to 35	..	0.7 to 1
Bacon or Ham.....	10.0	3.0	80.5	..	6.5
Chicken (lean)	72.2	24.5	1.9	..	1.4
Turkey (medium).....	66.2	23.8	8.7	..	1.3
Goose (fat).....	38.0	15.9	45.6	..	0.5
Milk (whole).....	87.4	3.4	3.8	4.8	0.7
Milk (skimmed).....	90.7	3.1	0.7	4.8	0.7
Milk—Buttermilk.....	90.3	4.1	0.9	4.0	0.7
Cheese.....	93.2	0.9	0.2	5.0	0.7
Butter.....	31.2	27.1	35.4	2.4	3.9
Eggs (hens').....	9.0	1.0	87.5	0.5	2.0
Cream.....	73.7	12.5	12.1	0.6	1.1
Codfish.....	63.1	95.1	29.0	2.4	0.4
Whitefish.....	82.6	15.8	0.4	..	1.2
Mackerel.....	69.8	22.1	6.5	..	1.6
Salmon.....	73.4	18.2	7.1	..	1.3
Oysters.....	61.4	24.2	13.0	..	1.4
Wheat Flour.....	87.3	6.0	1.2	3.5	2.0
Graham Flour.....	8.3 to 3.5	8.6 to 13.6	0.6 to 2	68 to 79	.3 to 1.5
Oatmeal.....	13.0	11.7	1.7	70.9	2.7
Rice.....	7.7	15.1	7.1	67.7	2.4
Cornmeal.....	12.4	7.4	0.4	79.3	0.5
Wheat Bread.....	14.3	8.4	3.5	71.9	1.9
Graham Bread.....	32.7	8.9	1.9	55.5	1.0
Soda Crackers.....	34.2	9.5	1.4	53.3	1.6
Beans.....	8.0	10.3	9.4	70.5	1.8
Peas.....	13.7	23.2	2.1	53.7	3.6
Potatoes.....	15.0	22.9	1.8	52.4	2.5
Turnips.....	75.5	2.0	0.2	20.7	1.0
Carrots.....	91.2	1.0	0.2	6.0	0.7
Cabbage.....	87.9	1.0	0.2	8.9	0.8
Cauliflower.....	90.0	1.9	0.2	4.9	1.2
Melons.....	90.4	2.5	0.4	5.0	0.8
Pumpkins.....	95.2	1.1	0.6	1.4	0.6
Apples.....	90.0	0.7	0.1	7.3	0.6
Pears.....	84.8	0.4	..	12.8	0.5
	83.0	0.4	..	12.0	0.3

In the above table the "indigestible fibre" is omitted in the case of the vegetables. It varies from 0.9 per cent. in potatoes to 5.4 per cent. in peas.

A perusal of the table will show us why some combinations which experience has taught us to be so wholesome are sufficient foods, viz., porridge and milk or cream, ham and eggs; bread and butter, pork and beans, beef and potatoes, crackers and cheese; and also why a diet of oatmeal, brown bread, eggs, lean meat, and cheese would be sufficient to give even a coal-heaver a violent attack of indigestion.

Out of the elements found in the earth, air and water the plant builds up its structure, rearing its stalk and weaving its fibrous coverings from compounds made from the carbonic acid gas of the air and from water, and within it secreting its important stores of vegetable fats and nitrogen compounds. Upon these man is forced to subsist; and from the albuminoids, fats, sugars, starch, and mineral matters of the plant he builds up the muscles, adipose tissue, and bones of the body, and by hidden processes evolves the various all-important secretions. In the formation of these complex compounds from the blood the animal is superior to the vegetable. Plant life can form many life-compounds, but animal life is necessary to produce the higher compounds necessary to brain and nerve.

"So far as we know, it is in the preparation of these complex matters for the blood and the nervous system—neither of which exists in plant life—that animal synthesis exhibits itself. Bone is the infiltration of lime into ordinary cartilage; but hæmoglobin (the coloring matter of the blood) and lecithin are complex bodies, built up in the animal organism. Starch, sugar and fat are built up from carbonic acid and water; albumen from these and free ammonia in the air. All are synthetically built up by vegetable life, and appropriated by animals. Animals evolve energy by the union of these substances with oxygen; they pull to pieces and oxidize the construction of plant life, and in doing so evolve heat and force. But the oxygen-carrying hæmoglobin, the force-liberating lecithin,

are essentially the creation of animals themselves, who build them up from less complex substances."—(Fothergill.)

We have noticed the composition and requirements of the body and the source of supply; the next point of discussion is the transference of the one to the other, the change from vegetable to animal, or from food to living matter. In this there are two stages: first, the preparation of the food; and, second, its assimilation, its digestion. We have not space now to take up the chemical preparation of foods and to discuss the science of cookery, but shall leave that for another time; we shall now refer to the digestion of foods and mention a few of the simpler facts discovered and now accepted by medical men and chemists. In this department the physiological chemist is certainly placed at a great disadvantage, his field of study lying within his own living body, almost beyond his farthest reach.

In referring to the subject of digestion we pre-suppose some acquaintance with physiology on the part of our readers. Digestion means "separation," "splitting asunder," "dissolution." The digestion of food, then, is the splitting up or separation of the food into small particles, and their chemical change into soluble form so that they can pass through the membranes of stomach and intestines into the lacteals and blood-vessels. In a few words, we can define digestion as "the dissolving of the food in the alimentary canal." There are two processes at work side by side: the one, physical, whereby the food is disintegrated as in chewing; the other, chemical, whereby insoluble compounds are changed to soluble, as in the case of the conversion of starch into sugar by the saliva. The chemical changes are due to the action of ferments in the various secretions. We shall trace the process more minutely. First comes *mastication*. The food in being chewed is divided by the teeth into small portions convenient for swallowing, and also in order to expose greater surface to the action of the juices. The movement of the jaws forces out the saliva secretion, principally from the glands beneath the tongue. This saliva contains a ferment termed *ptyalin* which acts upon the starch of food, converting

it into sugar, thereby changing an insoluble compound into a soluble. The fats and albuminoids here suffer no change beyond that of disintegration. The chemical change due to *salivation* is quite simple: starch is a compound of carbon and water, and is changed to sugar simply by the addition of more water; it is a process of hydration. The action of the saliva ferment is completely destroyed by the presence of any acid. Tea contains tannic acid; a mouthful of tea, then, will stop the digestion of bread, crackers, potatoes, or anything of a starchy nature. Pickles, vinegar, salads, acid fruits, tea, wines, brandies, everything of an acid nature, should not be allowed to moisten starch food either before entering, or while being masticated in the mouth. The rule of "tea after eating" is based on scientific grounds. The eating of pickles to prevent fatness may be successful in one way, but a disordered digestion may be the result.

By the tongue the food is rolled into a ball or bolus and dropped into the throat. Then comes the process of *deglutition* or swallowing. The throat or gullet is composed of rings of muscles; the expansion of the lower and the contraction of the upper forms a little cavity into which the bolus drops; this cavity moves downwards and the food must follow. This action, the peristaltic motion, is involuntary, and generally works all right; but sometimes the presence of an intrusive or dangerous member of the digesting corps causes a hasty retreat, the muscular action commences at the wrong end, and the poor unfortunate, willy-nilly, "un-swallows himself."

The bolus transported to the stomach is introduced to a new secretion, the gastric juice, whose chemical influence is due to the presence of muriatic acid and a compound termed pepsin. The acid arrests the saliva digestion, and, aided by the pepsin, transforms the albuminoid or nitrogenous substances into soluble compounds called peptones. The "churning" of the stomach further disintegrates the fats and other parts of the food, and the chyme thus formed passes into the intestines through the pyloric ring. First it meets the bile from the liver,

whose influence is a little uncertain, but one of the effects seems to be the partial emulsion of the fat. The starch, the albuminoids, and the fats have now all been acted upon, but the completion of digestion remains for the action of the pancreatic juice, the last and most important. It is very complex, containing *diastase*, which completes the starch digestion; *trypsin*, which acts upon the albuminoids; and a third agent which acts upon the fats.

The digestive action is now complete so far as we can trace it. The substances soluble in themselves, such as sugar, do not require the influence of any ferments: the insoluble starch has been changed into soluble sugar by saliva and pancreatic juice; the albuminoids have been digested into soluble peptones by the gastric and pancreatic juices; the fats have been emulsified and chemically changed by the action of bile and pancreatic juice; various mineral compounds have been dissolved in the digestion fluids; the remaining undigested and indigestible portions of the food pass on through the intestines.

So far the changes have been, apparently, quite simple. We would like to trace the further progress of the food, its passage into the lacteals, its chemical changes in the blood; to watch the conversion of peptones into the peculiar disc-shaped corpuscles that float along the canals of the body, carrying their freight of life and reconstructive material to all the ports and shipping stations—a journey interesting but impossible to us as yet.

The albuminoids form the most interesting and important class of nutrients; of them we know but little as to their chemical composition. Efforts have been made to formulate them; the most reliable, perhaps, is that of the eminent chemist, Hoppe Seyler, who gives the following composition to albumen:

O _{20.9}	H _{6.9}	N _{16.4}	C _{52.7}	S _{0.8}
to 23.5	to 7.3	to 16.5	to 54.5	to 2.0

In digestion the albuminoids are converted into peptones; the chemical change is somewhat uncertain, though Foster writes as follows: "Judging from the analogy with the action of saliva

on starch, we may fairly suppose that the process is, at the bottom, one of hydration."

We have before slightly touched upon the functions of the different nutrients. The protein is the basis of blood, muscle, connective tissue, etc., and is therefore required for its full development and also to restore all loss by wear and tear. In excess it is changed into fats and carbo-hydrates or burned as fuel. The fats and carbo-hydrates are burned as fuel in the body, the excess being deposited as fat, a reserve supply of food and also a "packing" for the muscles. The excess of fats and carbohydrates is quite easily disposed of, without any great strain upon or danger to the various organs of the body; but the excess of nitrogen compounds has a long and very intricate course before being disposed of in the body. To this cause can be traced many indispositions and diseases. In endeavoring to get rid of the excess of protein the delicate organs are over-worked, and the "high feeding" results in gout, rheumatism and many local diseases of the kidneys and other organs. Underfeeding may also result in disease. Upon this proper relation of nitrogenous foods to non-nitrogenous foods depends to a great extent the general health of the body. In determining it there are so many factors that no general rule can be given, but a proper consideration of the principles of digestion will give anyone great help towards its determination.

The great importance of this subject, when considered from a medical standpoint, no one can deny; and a careful consideration of it will show that it is becoming the most important department of medical treatment. To the person who wishes to be his own doctor is here presented a field for study and experiment that is all-important and practical. Not only is the prevention of disease possible, but also in many cases the cure of disease by a right application of the principles of dieting. The dietetic treatment is rational, practical and economical.

FIVE HUNDRED MILES IN A BIRCH BARK CANOE

BY REV. HUGH PEDLEY, B.A.

(Continued from page 138.)

WE had been two weeks all but a day in coming through from Muskoka. We had now to make arrangements for the balance of our trip. Russell had to return home at once, and the poet had only another week to spare. As Russell had to take his canoe with him, and mine was too small to carry the three of us, we were prevented from taking the canoe route to Lake Nipissing, and therefore determined to reach that point *via* the C. P. R. from Mattawa to North Bay. Midnight of Tuesday found us at the station with all our belongings. A little later on the train arrived and we started on the journey. At Renton Station Russell left us. We were very sorry indeed to part with him. Again and again, during the remainder of the week, we thought of him pursuing his lonely journey, and we pictured him to ourselves as seated at last in his home with his boys at his knee, and half-a-dozen neighbors gathered in to hear the tale he had to tell.

It was about two o'clock in the morning when we reached North Bay. The lake was not more than a hundred yards from the station, so, shunning all the enticements of civilization, we shouldered our bundles and made for the beach. There was any quantity of driftwood lying on the shore, affording material for a magnificent fire that sent its reflection far out upon the water. Within the circle of its genial warmth we spread our tent on the ground for a mattress, and rolling ourselves in our blankets were soon fast asleep. This was our introduction to the far-famed Lake Nipissing.

We stayed in this neighborhood until early the following Monday morning. During this time we exchanged our small canoe for a very much larger one, visited the little town a number of times, and made several acquaintances. Two of these are worthy of mention. One was Mr. Huntingdon, the Methodist minister, who had a practically unlimited circuit.

He was a fine specimen of manhood, and had just this one trace of folly about him, that he persisted in wearing that anomaly in the backwoods, the regulation clerical black coat. Barring this indiscretion, he seemed a shrewd, clever, go-ahead man. He told us of long journeys, of hard work, but of success in his work, of churches built and congregations gathered. One thing seemed to trouble him a great deal more than any theological difficulty, viz., the vermin that often infested the places he had to sleep in when on his travels. He told us that often on going to bed he would empty the coal oil from his lamp, and give himself a thorough lubrication. It was rather suggestive of the verse in the Scotch version of the Psalms :

“ Like precious ointment on the head
That down the beard did flow,
Even Aaron’s beard, and to the skirts
Did of his garments go.”

I could not help thinking, What if a lighted match were to come near Mr. Huntingdon’s head! Wouldn’t there be an explosion of Methodist fire? The other gentleman we met was Mr. Sereny, a lumberman well-known in the Ottawa region. He was kind to us, sitting down for nearly half-an-hour with a map before him, and giving us careful instructions as to how we should get down the French River. That interview has a pathetic interest now from the fact that last winter a despatch appeared in the daily papers giving an account of his death. He was visiting one of his shanties on the south shore. There he took sick, and at night, in a fit of delirium, left the shanty. They missed him in the morning, found his tracks in the snow, followed them out to the open water where they ended. There was no return track. He must have found his grave in the lake he knew so well. Such, too, is the end of scores of Canada’s hardiest sons.

The remainder of the week we spent restfully in camp. Our tent was pitched on a rocky point that jutted out from the sand beach a mile or two above North Bay. Behind us was the forest, and here the land looked more favorable for farming

purposes than any we had yet seen. The soil was light but free from rock, and therefore quite workable. Between our camp and Lake Temiscaming lay the tract of country upon which the recently organized Settlers' Association in Toronto has fixed its eyes. In front of us lay the lake. Looking eastward we could follow the shore line all round that end; but as the eye followed on westward the land gradually faded away in shadowy points and fringes of pine until nothing was left but the meeting of water and sky. About ten or twelve miles to the south the bold outlines of the Manitou Islands were to be seen. Day after day this great sea stretched before us its well-nigh unruffled surface. In time of storm we were told it would be nothing but a mass of foaming breakers for miles from the shore, but we never saw it in its surliest moods.

Just here, sitting on a ledge of rock and looking out over the moonlit expanse, I would like to interject a few words of historical commonplace, and a glimpse of historical vision. We hear much in this country of French domination, and of the French Catholic Church with its vast resources of men and money; and it is not easy to tell what part this great element is to play in moulding the fortunes of the Dominion. This at least we know, that it is a mighty power, that it holds one solid Province almost completely under its control, and that it makes its influence felt from New England manufacturing towns in the east to the valley of the Saskatchewan in the far west. Now, wherever you find any system, and especially a religious system, firmly intrenched, you may be sure that somewhere in the past there has been toil and suffering. If Congregationalism is strong in New England it is because of the sublime endurance of the little band of Pilgrims that in 1620 crossed the wintry sea. If Methodism has a strong position in the Western States it is due to the simple faith and dauntless courage of the pioneer itinerants. If the faith of Calvin and Knox has an unchanging grip upon the hearts and consciences of the Scottish people the explanation is found at the graves of the Covenanters in the Grassmarket. Wherever some stalwart tree of religious faith

uplifts its lofty trunk and widespreading branches, defying every storm, we may count it certain that at some time or other the roots have had their baptism of tears and blood. This great French Church is no exception. Superstitious it may often appear, arrogant and domineering may be at times its attitude; but one thing is sure—it has EARNED its mighty power. This fact my vision is designed to illustrate.

Sitting there on the shore I seem to see fleet after fleet of birch canoes passing to and fro. Dusky arms ply the paddles and strong voices fill the air. Who are these? The Huron tribes fitting for either trade or battle between the distant St. Lawrence and their home on the Georgian Bay. Now I notice one flotilla coming from the east, and in one of the canoes is seated a white stranger with large melancholy eyes and long curling hair. Who is he that thus ventures life and limb among these savage wilds, and still more savage men. It is Samuel de Champlain, born in 1567, sailor and soldier, gentleman and Christian, seeking new fields of conquest for the Crown of France and the Cross of Christ. Again I hear the sound of voices, and the soft splash of paddles. Who are the strangers now that crouch in the canoes among the half-naked savages? Who are these men with their black gowns, their wide hats, their rosaries and prayer-books; these travellers with their faces pinched by hunger, their feet worn and bleeding with wading rivers and crossing portages? They are the Jesuit fathers Brebœuf, Lallement, Davost, and Daivel, scholars and nobles of France. Why are they here? Why have they left the ease of the monastery, and the learning of the library? For nothing less than to bring all this continent with its roaming tribes under the banner of the Holy Catholic Church. Whither are they going now? Down through the solitudes of the French River which we are soon to visit, then southward past the myriad isles of the Georgian Bay, until at last they build their chapel and plant their altar among the Huron villages. To what are they going? To long years of exile, to conflicts with the demons of cruelty and superstition, to hunger and disappointment, and

then to a most horrible death. Brebœuf yonder, the man of the iron frame and the kingly countenance, is to outrival in his death the martyr-agonies of all the ages. He is to stand during four long hours while the painted fiends torture him, cutting off his lips and forcing a burning iron down his throat, hanging about his neck and on his bosom a necklace made of hatchets heated red, pouring scalding water upon the wounded head and blistered frame, cutting strips of flesh from the living body, and then, ere the brave heart had ceased to beat, tearing it from its citadel, and devouring it in the hope of being inspired by its heroic courage.

So they pass, these Frenchmen of two hundred and fifty years ago. Call them fanatics if you will, zealots, enthusiasts, yet they were sublimely faithful; and these wild scenes through which they passed seem to palpitate still with the sweetness of their memory.

Midnight of Sunday was just passed when we snatched a hasty meal, put everything into the canoe, and under the light of the full moon paddled to North Bay. Here we bade adieu to our poet friend, and as he sped homeward on the C. P. R. we two held on our way down the lake. Hour after hour we paddled on past the dim and silent shores. Daylight came, and in the grey light we saw an Indian camp with its closed tents, and nine bark canoes lying side by side on the beach. Several miles further on we saw another camp where about a dozen braves, squaws and papooses were squatted in a circle on a flat rock eating their breakfast. Incited by their example, we landed soon after, took the breakfast for which some twenty miles of paddling had prepared an appetite, and then stretched ourselves under the shade of a tree for an hour or two of sleep.

We were now near the mouth of the Sturgeon River, the largest stream entering Lake Nipissing. Here we camped over Tuesday, and took the opportunity of going up the river to see the Hudson Bay Post and the little village of Sturgeon Falls. Here, too, we encountered old Joe Restoul, a half-breed trapper, who, in exchange for some superlatively fat pork, gave us ten

or twelve pounds of superlatively fine moose steak. We also met with a pessimistic individual who, on being informed of our intention to descend the French River without a guide, was kind enough to tell us that, in the first place, we would never find our way into the river; and in the second place, if we succeeded that far, it would take us all summer to find our way out. I wonder if he hadn't some axe to grind. Guides receive two dollars per diem and their board.

On Wednesday morning early we left our camp, and took a straight south course across the lake. About two hours of steady work brought us among a maze of islands on the other shore. Here we turned eastward, and, keeping as near the mainland as possible so as not to miss the entrance, paddled on through labyrinths and archipelagoes of extraordinary beauty. By noon we reached the river, and here we took our dinner. My companion was imperturbable, but for my own part I must confess that it was not without misgivings that I contemplated the part of our trip now before us. We had nearly seventy miles of river to traverse, but with little expectation of seeing anyone who could help us to find our way. There were numerous blind channels in which we were liable to get involved. There were portages to be found. There were falls and rapids to be avoided. However, we had resolved to make the venture, and were not to be easily daunted. We hoped that afternoon to make the fifteen miles of river that lay between us and the first rapids. This we were successful in accomplishing. The stream flowed in places through a maze of rocky islands, and seemed almost as wide as the St. Lawrence below Kingston. Towards night we heard the roar of the rapids, and, turning into a little sheltered nook that had been indicated to us by Mr. Sereny, we, after some little difficulty, found the portage track. A large wooden cross was erected near, perhaps to mark the last resting-place of some wanderer in the wilds. Across the portage was a long narrow bay, and in a little cove of this we camped. It would have been a difficult matter to stretch our tent there on the bare rock, so we hauled our canoe up and slept with our heads under its shelter and our feet to the fire.

By noon of the next day we reached a succession of falls and rapids; some of the latter we ran in our canoe. Paddling down the stream you hear ahead of you the roar of waters, and perhaps see the white crests of the waves at the foot of the rapids. Being without a guide you must not dare the descent without first making a careful survey, otherwise you might find yourself borne onward with irresistible force to the brink of a cataract. To avoid needless risk, therefore, you turn into the shore while the current permits, and walk down the bank some distance to see if there is a clear channel. This rapid I am thinking of now had one disagreeable feature. It was a double rapid. There was one chute rushing down close to a black overhanging cliff, then a moment's pause, and then another plunge in a somewhat different direction. The difficulty would be, after getting safely through the first part, to get the canoe turned quickly enough to prevent her from being swept broadside into the lower rapid. These peculiarities the parson carefully studied, and then came to the canoe where the pedagogue sat patiently waiting. "Well, what do you think of it?" said he. "Oh, I think we may try it," was the answer. A pleasant light came into the pedagogue's face, a smile of gratification, as if a fat boy was waiting to be caned. We made everything snug in the canoe, settled ourselves firmly on our knees, and swung out into the stream. At last the middle is reached and the bow is brought round. Silently, and yet with a joyous quiver of expectation, the canoe moves on. Faster and faster she glides. There is no turning back now, for smooth as the black water is, it is going like a mill-race. There is just a moment when the thought comes, "What fools we are!" and then like an arrow from the bow we fly past the granite wall and find ourselves dancing among the eddies and bubbles below. And now the pedagogue strikes in his paddle like lightning, and the parson bears hard on his to bring the light craft round for the next dash. Quick she answers to the summons, and like a bird goes speeding on until at last we find ourselves breathless but rejoicing in the quiet water beyond. Tobogganing is fine sport, but, when compared with

that wild rush among surging waters and past the sullen rocks and swaying pines, it is

“As moonlight unto sunlight, and as water unto wine.”

On Thursday, at noon, we reached the settlement of Louis Content. Here, in a sort of valley between high rocks, was a cluster of Indian huts, occupied in the winter, but deserted now by their roving owners. One sight there was of peculiar interest. It was a little square enclosed by a picket fence, inside which was a large wooden cross and some twenty smaller ones. This was the Indian burying-ground, and each little cross marked a grave. We Protestants are somewhat averse to the use of the crucifix, but I must confess that a feeling of reverence came over me at seeing, in these wilds, the symbol of our faith, and once more I thought of the black-robed fathers that over two centuries ago had passed this very spot.

Towards the mouth of the river we were somewhat puzzled by the multiplicity of channels; but when, far down one of these great stretches of water, we saw a boom of logs we knew that we were in the right passage. Soon we came to a gang of lumbermen, and from them we learned that we were within a mile of Georgian Bay. One little portage had to be made and we were on our way to the open lake, when a lamentable accident occurred. There was a boom of logs chained together and stretching clear across the river. We had our choice of either unloading and carrying along the shore, or getting the canoe over with the load on. We determined on the latter course. The parson stepped out on a log on one side of the canoe; the pedagogue did the same on the other. It was rather precarious footing for both, but the pedagogue had the shakier log of the two. We steadied ourselves for a lift, when a gust of wind caught the canoe and sent her with a bang against the quaking pedagogue. Immediately there was a vacancy, reminding one irresistibly of the item in the advertising column, “Wanted, a Schoolmaster,” as the waters of the French River closed over that manly form. I could do nothing. I had the canoe in charge. And, anyway, I was not anxious to create

any further gap in the rapidly diminishing ranks of our party. So I waited patiently and sadly until at last a sunburned face rose to the surface, and a pair of brown hands clutched desperately at the boom. The Parson was, as usual, dry enough, but oh! what a dripping pedagogue that was climbing up into the glad sunlight. "Did you feel afraid when you went down?" I enquired. "Yes," he replied, "I did. I thought those big boots would have sunk me. But they didn't." No, they did not, and when I reflect on the vast dimensions of those very boots, and consider that at the present moment I am not within easy reach of either the stout arm or ready tongue of my companion, I cannot help remarking how exceedingly light his capital extremity must have been to have overcome the weight of those pedal enormities.

Towards evening we beheld the expanse of the Georgian Bay, limitless to the eye, and dotted with many islands. We had still over a hundred miles of canoeing before us, but as this was over a course often traversed by tourists no description need be given. I shall not stay to tell of the three days' storm, when our tent was first inundated and then blown to the ground; nor of our visit to Byng Inlet, where the brain of the pedagogue was nearly turned by the combined influence of a huckleberry pie and several young ladies who were out on a holiday trip; nor of our stay with the jolly fishermen at Pearl Island; nor of the camp near Moose Point, where the parson slept the livelong night on a nest of red ants, and wondered what on earth was wrong; nor of our emotion when at last we came in sight of the roofs of Penetanguishene, and paddled into the ample harbor of Midland City. Suffice it to say, in conclusion, that while some may seek pleasure in the monotony of sea-side life, while others may hope for it in the excitement of sight-seeing, theatre-going, and social entertainment, I for one am prepared to say, and I seem to hear the combined and sonorous amens of the Poet and the Pedagogue, that a man may find the freest, manliest, most health-giving of holidays in the company of a Birch-bark Canoe.

WOMAN'S WORK AND WOMAN'S CULTURE.*

BY D. C. M'HENRY, M.A.

THE educational progress of our times is of a most encouraging nature; and if we admit, as we may, that a superior education is now regularly provided for *men* in our country, our sense of justice and propriety would lead us to conclude that corresponding opportunities are available to *women*. This conclusion results from the assumption that woman is the intellectual peer of man, and that her just claims to the highest mental culture and its resultant blessings would never be called in question. It may therefore seem needless in me this evening to offer a plea for that form and degree of education for women which every one present will at once concede as her right, and which few in our land would have the hardihood to deny her. Some there are, however, and among them those holding the keys of high seats of learning, who are still reluctant to give full effect to liberal schemes for the higher education of women. So that until this opposition disappears, such pleas as the one I shall offer may not be considered unnecessary.

As a contribution towards bringing about a true conception of what liberal culture can accomplish in women, and a recognition of her claim to the benefits of this higher culture, I shall offer a few thoughts on the following topics:—I. Woman: her Natural Sphere and Natural Abilities. II. Woman: her Actual Sphere and Practical Disabilities. III. Woman's Culture as a Preparation for her Work.

I. WOMAN: HER NATURAL SPHERE AND NATURAL ABILITIES.

If we can fix on what Nature really intends as woman's true sphere, we need go no further in our search; for Nature, correctly interpreted, is an infallible guide. The various

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theories entertained on this point may be conveniently reduced to two—(1) that woman was created for the service she can render to *man*; (2) that she was created to some end proper to *herself*. The former, as explaining the purport of woman's life, may be subdivided into the physical theory, the domestic theory, and the social theory.

The Physical Theory, common to all savages, whether savage tribes of heathendom or the savage individual of Christendom, may be dismissed with the remark that to consider the moral and intellectual nature of woman as a superfluity, and to treat her as a mere animal link in the chain of life, is a monstrous doctrine, a gross impiety against our human nature, and suited only to the ages of barbarism.

The Domestic Theory is almost universally accepted by the civilized world, and is notably favored in England, where an ideal home is a synonyme for all that is good and desirable. It finds expression in the remark, "Woman's sphere is the home." Let her but pass the limit of domestic functions and relations, and she is regarded as "out of her sphere," in a fair way to become unwomanly and masculine.

Very beautiful, very proper, perhaps, but, like many beautiful things and theories, often unreal, impracticable, and misleading. That the home is woman's proper kingdom; that all pertaining to its order, comfort and grace, naturally falls to her charge, and cannot be transferred to man; that woman's life, without such a domestic side, is incomplete,—all this is very true. We all admit that, while a man may buy or build for himself a *house*, it takes a woman, a true woman, to make it a *home*; that the more womanly she becomes the more will her true and charming personality appear in that home, transformed from what man, alone, could make it—a place of eating and sleeping—into the abode and embodiment of all that constitutes a happy home. We all know, moreover, the innate desire of woman for home-making, as natural as nest-building in the bird; nor would we attempt to eliminate the one personal

element essential to its homelikeness, around which cluster the aggregate of home comforts great or small—the one who has

“An ear that waits to catch
A hand upon the latch,
A step that hastens its sweet rest to win ;
A world of care without,
A world of strife shut out,
A world of love shut in.”

In this stern, practical world of ours, however, amid the vicissitudes of a busy age, the exercise of this instinct in woman is frequently interfered with.

We have traced to its main source the “sunshine of domestic life” as it is found in woman. Let us proceed to a closer analysis of this sunshine. Does it consist in the *presence* of one who, by some means or other, becomes “lady of the house,” even though the embodiment of a dozen servants—housemaid, housekeeper and cook—all rolled into one such mistress? Let us not forget that she who presides in our model home must possess habits of reason as well as domestic order; a refined love of the beautiful, and a dignified kind of loving care, ever present, but never intrusive; always calm, bright and glad-some. What is the source, the secret, of these higher essential qualities? Are they produced by the domestic theory, *per se*? It furnishes a good housekeeper, but this does not meet the case. The idea that in the humbler ranks of society the cooking of dinners and the mending of clothes, and in the wealthier classes the art of ordering a dinner, and the studying of fashions, the receiving of company, and shining in society, the usual round of so called accomplishments—that these constitute the true sphere of woman, or indicate superior excellence, is an opinion stupidly false, but painfully prevalent. This theory, in fact, cannot guarantee those qualities of mind and heart that produce our “domestic sunshine.”

There can be no true home without the presence of woman, but the guaranteed presence of woman cannot in itself make it a home. Our ideal home is presided over by a woman pos-

sessing not only the highest qualities of a pure and loving heart, but also the inestimable charms of a highly cultivated mind. This brings us to

The Social Theory, which exhibits woman in her social capacity, presents to us women who know how to make home a centre of intellectual and kindly intercourse—the *artiste*, the woman of letters, the philanthropist. This many-sided theory at once suggests illustrious representative examples. Mrs. Somerville and Rosa Bonheur have shown what women can achieve in science and art; George Eliot, conspicuous among novelists; Mrs. Browning and others, in the domain of poetry; Mrs. Coutts and Florence Nightingale, in benevolence and humanity; our Pattis, our Nilssons, and our Princess Louise, all illustrate the possibilities of talent and culture in woman. The most elaborate, and I think the most extravagant, theory is that of Comte. Discarding the physical and domestic ideas, he carries to excess the social; places woman where she is excluded from art, science, and even the work of education, and makes her the object of a humiliating worship.

Now, I am sure you will admit that no *one* of these theories offers a sphere *generally* applicable to woman. Neither of them, exclusively, opens a field suitable for the proper development and exercise of her natural abilities. Could we select the real, the good that is in them, we might satisfy the demands of our matter-of-fact age by a union in woman of these selected excellences. In other words, supposing every woman inherently to possess these desirable qualities, and that to every such woman our ideal home were really assignable, we might, perhaps, define *the* sphere of woman, and confine our attention to the means necessary for the education of these latent powers.

In our present social condition, however, we must face the fact that there are many women, naturally gifted, who have to depend on their own exertions; that while man in self-complacency asks, "What can she do for *me*?" from many a woman we hear the honest, thoughtful inquiry, "What can I do for *myself*?"

Let those who lightly treat such questions as the higher education of women, the efforts of women to enter industrial pursuits and professional life, bear in mind that these questions are no mere contention for woman's rights in the abstract. Voices are heard which we cannot disregard; and, if the hour of earnest thought is the precursor of the hour of action, the hour of action is near at hand.

I am addressing an audience which, I know, places a high value on all true accomplishments; but I am sure you value just as highly the more substantial parts of your course. With you it is no secret that "life is real, life is earnest," and that to prepare for meeting its stern realities is a mark of highest wisdom. You know full well that a *true* life must be an *active* life; that a worthy career must be a useful one. So that no fine theories, as to your place in life, will ever prevent you from securing such a liberal and general culture as will fit you for any place you may be called to occupy. That is, you know very well that woman has no *one* sphere in life fixed by nature; but that a wise Providence has ordered that, endowed with powers of varied application, she prepare, in ways both general and special, for entering upon any one of the many useful occupations of life.

II. WOMAN: HER ACTUAL SPHERE AND PRACTICAL DISABILITIES.

Or, which may be preferable, her actual condition in the many spheres of daily life, and the hindrances to her highest success in special spheres of action.

For obvious reasons we do not attempt to confine man within any very limited sphere, and, as I have stated, we shall find the task practically as difficult in regard to woman. To construct any theory and rigorously adhere to it, to form a mould of certain shape and arbitrarily try to fit woman into it, would be assuming that she is formed of some plastic material that can be manipulated at will to suit our cherished theory; while man, less pliable, formed of more stubborn material, cannot thus be forced into any position our fancy may suggest.

An appeal to facts will prove that any such assumption is unwarrantable. We find, for example, that the majority of women are provided for by parents or husbands, passing their lifetime in domestic routine, with no special concern as to the necessity for independent effort. It teaches us, also, that there is a very respectable minority who, otherwise unprovided for, are engaged in some honest calling to gain a livelihood or secure a competency. It shows, moreover, a third class, who, not of necessity but from choice, from their love of knowledge—an ambition, it may be, to gain a distinguished position in literature or science, or in some professional career—are claiming the right of participating in all the advantages of a higher education.

These three classes are distinct, and cover the entire ground, yet there are certain points on which they unite in common. For example, they all agree in this, that real success in any sphere is not usually the result of *chance*, but the outcome of careful *culture*, that is, making the most of what God has given, by cultivating natural endowments, whether to be employed in the quiet homes of our middle classes, in the sumptuous homes of the wealthy, in any of the positions now open to women in mercantile, industrial and manufacturing lines of life, or in the more intellectual sphere of literature and education.

The rule holds good: those accomplish most who are most accomplished—in the kitchen, in the drawing-room, behind the counter, in the workshop, in the studio, in the hospital, in the sanctum, in the teacher's chair in the physician's office, or on the throne of a nation.

If, therefore, woman is called to occupy positions demanding special culture, if she appear at her best, why, may we ask, is she in any way debarred from qualifying for these spheres of usefulness? She surely has enough to bear from other unfair discriminations. Women, for instance, display a long list of property disabilities to be relieved, social wrongs to be vindicated, and political grievances to be redressed—involving the solution of some of the deepest problems in social and political

science. I have only time to mention, in a general way, the leading positions that are attainable through what is termed the higher education of women, and to point out the principal obstacles in the way of their attainment.

These *positions*, in a word, are found in educational and literary pursuits; in medicine and other learned professions. The *obstacles* are, a prevailing prejudice as to the natural fitness of woman for any professional career whatever, and, growing out of this, a reluctance on the part of some seats of learning to re-arrange their machinery and open their doors to women. It is true, however, that during the past few years many of the old barriers have been gradually removed, and to-day there is little to which objection can be taken.

III. WOMAN'S CULTURE AS A PREPARATION FOR HER WORK.

Perhaps we cannot do better at this point than to trace the progress of the development and improvement in the line of education by a sketch of the rise and progress of schools for the higher education of women.

At the outset, before showing the bearing of history on this question, I take this position:—If it can be shown that a university education, or any similar form of higher culture, will satisfy the just claims of women, and result in their elevation as it promotes man's elevation, this privilege should be cheerfully accorded to them. The reasons that lead me to take this position are: (1) The enlargement of woman's sphere has a pressing cause, since there is an increasing number of women who have to support themselves. (2) If one class of the community, as men or women, be placed at a disadvantage, the other suffers proportionately. (3) The assumed intellectual disparity between men and women is due more to controllable circumstances than to any innate difference. (4) Even if it could be shown that the practical advantages arising from a higher education were the exclusive *right* of men, it cannot be denied that women, in common with men, should share in those personal enjoyments that arise from a highly cultivated intellect.

But how can it be shown that the educational privilege desired would meet the case? For the time assuming the *onus probandi*, allow me to suggest that the evidence will appear on referring to the history of the movement, and noticing what has been already accomplished by women of culture.

[Here followed a detailed account of the progress of higher education for women in the leading countries of Europe. Reserving this sketch for a supplementary article, we give a part of that relating to the United States and Canada.]

The doctrine of equality in education for both sexes was first advocated on this continent in Boston sixty years ago, and resulted in the establishing of a high school for girls. As in case of the Russian and Dublin medicals, the *men* were alarmed by the great success of the movement, the school was closed, and the girls were sent to the grammar school with the boys.

In 1833, Oberlin College was founded, open to both sexes, and has graduated over 600 women. In 1837 Mount Holyoke Seminary for girls was opened. Vassar, in 1865. Michigan University opened its doors to women in 1870; Boston, in 1871; Cornell, in 1875. And so the movement has grown, until we are almost startled with the results.

In Medicine, the first college for women was opened in Boston in 1848. In Philadelphia one was started in 1850; one in New York in 1863. There are now over 500 lady doctors in the United States—several being college professors.

Law has had its share—the first lady lawyer having appeared in Chicago. Many of these do not plead in court, but are engaged in office-work; and several, who are married, practise with their husbands.

At present there are in the United States over 100 arts colleges open to women; 236 colleges for the higher education of women, from which, in 1884, no fewer than 844 were graduated. Vassar has 237 students in the regular course; Smith College, 296; Wellesley, 515. In Boston University there are 154 ladies; in Michigan University, 177; in Harvard (Annex), 50; in Cornell, 49.

One of the most encouraging facts in connection with this question is the success achieved, in work of a high order, by certain of these lady graduates.

Turning to Canada, we find that it is just fifty years since the higher education of women first received practical attention. In 1836 Upper Canada Academy (now Victoria) was opened for the superior education of both sexes. In 1857 Alexandra College, Belleville, was opened. The Wesleyan Female College, Hamilton, was opened in 1861. In 1869 there appeared Hel-muth Ladies' College, London, the Church of England College, and the Presbyterian College, Ottawa. The next year we find the Bishop Strachan School, Toronto, added to the number. In 1874 there were opened Brantford Ladies' College and Ontario College, Whitby. Besides these we have Alma College, Woodstock Literary Institute, and other higher seminaries for women.

What these schools have accomplished I shall not attempt to detail. Their record is a noble one, and hundreds of cultured young women have gone forth from their halls to bless the world.

If we wish to learn the past work and present attitude of our universities on this question we shall need to retrace our steps to the date first named above (1836). Victoria claims the honor of first establishing a course of higher learning accessible to women. She has the honor, I believe, of admitting, in 1878, the first lady matriculant in Arts, as well as of graduating the first lady in Medicine and the first in Science. She this year sends forth her first lady graduate in Arts, and others are soon to follow. In granting to women equal privileges with men, Victoria was followed by Queen's and Dalhousie. At McGill, through the gift of \$100,000 by the Hon. Mr. Smith, a college for women has been established as an adjunct of the university. Herein separate classes are conducted in the work of the first three years in Arts, and next year the full course is to be provided for. Women reading honors may attend lectures with men. Degrees are granted to women on completing the course.

At Toronto University great progress has been made towards securing for women all the privileges accorded to men. A

number of women, taking advantage of the fact that there is really no statute expressly debarring them from lectures, have entered, without saying "by your leave," and are now found in all stages of the course. The lady who graduated this year was treated to an ovation when she appeared for laureation. This may be regarded as an indication that ere long the attendance of women will not be on sufferance merely, but by statutory right and official welcome.

Trinity last year offered to admit women to arts examinations, but not to degrees. This year this prohibition is removed, and she occupies a position similar to that of Toronto University.

Doubtless the courageous attitude of those women that have entered Toronto University will bring the authorities fully to their senses, and the last barrier will soon be removed.

And here this sketch must close. What has it revealed? In the first place, the conclusion forces itself upon us that throughout the civilized world there is a growing conviction of the value of higher education for women; and that this conviction is moving the nations to provide means for the attainment of this object. Secondly, that while initial attempts were feeble and infrequent, the gentler half of our intelligent communities are strongly uniting in their appeals, and "listening senates" are graciously devising liberal things. Thirdly, what at one time were looked upon as unanswerable objections are now seldom urged. The advocates of amiable weakness—or, if you like, imbecile elegance—are good-naturedly handed over to Oscar Wilde, as disciples of this apostle of effeminacy. Fourthly, that for women, as well as for men, life is an earnest business; and that no young lady will develop into a true woman on a diet of fashionable accomplishments. It is unquestionable, also, that educated women have succeeded in all the various professions.

A certain mathematician, after reading "Paradise Lost," wrote on the last page, "Very pretty, but it does not *prove* anything." Without attempting a formal argument, I am in-

clined to believe that this sketch does prove something to you. No one who has intelligently studied this question can easily resist the conviction that the struggle is about over. The fact that success has crowned the efforts of thousands of women in the higher walks of professional life—in all positions demanding superior education—is of itself enough to place their claim fairly beyond dispute.

As a result, women are no longer debarred from that personal enjoyment attained only by persons of culture. Society at large is reaping many advantages from the presence and influence of educated women. Much of the special, abnormal development fostered by methods once prevalent in girls' schools is superseded by that which is more thorough, more healthful, more liberal. In a word, a very mischievous educational fallacy has been corrected by the adoption of common-sense methods in the education of girls and women.

To reach the present vantage ground not a few obstacles had to be overcome, some taking such an intangible form as made it hard to grapple with them. We live in an age which in its rapid progress has let slip many traditions that may now be picked up far back in the path; and much of the traditional nonsense about girls' education deserved to be thrown to the winds.

Among the errors that had to be opposed was, that by admitting women to advanced classes the standard would have to be lowered—assuming a universal incapacity in women for vigorous mental exercise. Who has heard of any university lowering its standard because of the presence of women?

[Here followed an account of the brilliant successes achieved in scholarship by women.]

Another danger has been greatly exaggerated, that of overwork. If, as I believe, the amount of our healthy mental activity is the measure of our intellectual enjoyment and strength, students are not injured from study in itself. Well-regulated study will no more weaken the mind than proper exercise will weaken the body. What the French term *la*

petite santé, so common in girls, arises mainly from inherited weakness and neglect of nature's hints and imperative demands. The foster-parent of much evil is the idea, prevalent in certain circles, that there is something peculiarly lady-like in a rather delicate state of health—in the pale, languid creature of the drawing-room, with her proportionate mental feebleness. I would not undervalue true refinement, and would say, with Cousin, "Adore *grace*, but be careful not to detach it from *strength*; for, without strength, grace quickly withers like a flower separated from its supporting stem."

Leaving further details, allow me to summarize. I have tried to show that while woman has naturally a domestic sphere, she has also many special callings demanding special preparation; that discriminations against women, on the ground of natural ability, are both impolitic and unjust; that since woman is called to occupy many positions requiring high educational endowments, and as she has proved her ability thus to qualify herself, and afterwards succeed in these positions, she is fully entitled to all the privileges of a superior education; that old-time objections are traceable to misconception and traditional prejudice; and that the claims here set forth are now practically acknowledged by the leading countries of Europe and America.

[The next part of the address consisted of practical suggestions, of which we give a summary.]

Ladies' colleges should aid in raising the average standard of our female teachers. Women, like men, should be paid in proportion to the intrinsic value of the work done. The good work done by our ladies' colleges would be even more satisfactory if a more rigid entrance test were exacted, and if none but experienced and trained teachers were employed. By a course of lectures on industrial science the young ladies should be led to take a general outlook over the many vocations open to women in commercial, manufacturing, artistic, and philanthropic pursuits. Domestic economy should receive due attention; and lectures on cognate topics might be added, such as "Nourishing

foods—how to care for and how to cook ;” “Processes of the digestive organs, and causes leading to indigestion ;” “Heating, lighting and ventilation ;” “Care of the sick,” etc. Ladies’ colleges should be brought into closer relation to our general school system.

My suggestions, in a word, amount to this : Do what you can in the work of elevating the teaching profession. This will open better positions to your graduates, provide you with better teachers, and benefit the country at large. Do what you can to fit for entering professions those of your students whose taste, talents and circumstances warrant such a course. Do what you can to prepare your students for earning an honest living, if necessary, in the various vocations of life. Do what you can to increase their respect for home-life and their practical fitness for some day presiding in a happy home.

To the young ladies I would say—following up these suggestions—*look ahead* : a homely phrase, but one that expresses the duty you owe to yourselves, to your friends, to your country—the duty of honestly considering what you are aiming at. Rest not contented with less than a thorough preparation for what you may be, for what you probably will be, for what you *ought* to be, in your future life. Do not be satisfied with living at random. Let your aim be marked by deliberate intention. Make your culture broad, and deep, and elevating ; but fail not to make it *practical*. This you can do with exquisite good sense, and without compromising the most delicate refinement. You remember Wordsworth’s ideal of a perfect woman :

“I saw her upon nearer view,
 A spirit, yet a woman too !
 Her household motions light and free,
 And steps of virgin liberty ;
 A countenance in which did meet
 Sweet records, promises as sweet :
 A creature not too bright or good
 For human nature’s daily food,
 For transient sorrows, simple wiles,
 Praise, blame, love, kisses, tears and smiles.

“And now I see with eyes serene
 The very pulse of the machine;
 A being breathing thoughtful breath,
 A traveller, 'twixt life and death;
 The reason firm, the temperate will,
 Endurance, foresight, strength and skill;
 A perfect woman, nobly planned,
 To warn, to comfort and command;
 And yet a spirit still, and bright
 With something of an angel light.”

The poet's ideal will be more generally realized as soon as woman's *work*, in its many forms, is more fully defined and recognized; and when a *culture*, adapted to her many-sided lifework, is placed within her reach.

The voice of reason, the voice of humanity, the voice of God, unite in demanding for woman opportunity to do her share in uplifting a fallen world, and opportunity fully to fit herself for her God-given work.

This three-fold voice will be heard; this demand will be granted. A failure here means disaster to man, to woman, to humanity; for

“The woman's cause is man's; they rise or sink
 Together, dwarf'd or Godlike, bond or free.”

THE SECRET OF SUGAR.

ALL sugars, as well as starch and gum, belong chemically to the class of carbo-hydrates, that is, they are a combination of carbon (C) with hydrogen (H) and oxygen (O) already combined in the proportion in which these two form water (H₂O). There are three groups of these: the true crystalline sugars or *sucroses* (C₁₂H₂₂O₁₁) including cane sugar, milk sugar, sugar of malt, etc.; the *glucoses* (C₆H₁₂O₅) or inverted sugars, which contain one more atom of water, including grape sugar or dextrose, fruit sugar, lævulose, etc.; and the *amyloses* (C₆H₁₀O₅), which contain one less atom of water, and are found in irregular granules instead of crystals, including starch,

dextrine (the "sticking stuff" used for postage stamps), the gums, and the cellulose, or vegetable fibre, of which cotton is the most noteworthy example, being almost pure cellulose. Thus a lump of charcoal (C) and a glass of water (H_2O) contain all the elements of a lump of sugar, a pint of syrup, a pound of starch, or a spool of thread. By chemical treatment, either the sugar group or the starch group can be turned into the glucoses, and by fermentation, into alcohol (C_2H_5OH). Thus, a chemist will make sweetness out of your pocket-handkerchief, a manufacturer will transform the starch of tons of corn into glucose, and a brewer or distiller will produce from barley, malt, or corn and rye, gallons of beer or whiskey. Stranger still, from these same carbo-hydrates powerful explosives can be made. A mixture of sugar with chlorate of potash makes a "white gun-powder" which a drop of acid will touch off; and by soaking cotton (cellulose) with nitre and sulphuric acids, gun-cotton is produced, which may be spun and woven into unsuspecting thread, or cloth, or paper, that will explode at a flash, or solidified into the useful but highly inflammable celluloid. Dissolved in alcohol and ether, gun-cotton becomes the collodion which, on drying, produces the film so useful in surgery as an artificial skin. At a temperature of 320° F. true sugar becomes the transparent substance known as barley sugar; at 400° F. it loses part of its water and becomes caramel or brown sugar, the coloring matter of molasses, of brown candies, and of some liquors.

Within each of the three carbo-hydrate groups there are numerous substances which are, as the chemists phrase it, *isomeric* (of equal parts), that is, containing exactly the same kind and number of atoms, but *allotropic*, that is, with atoms arranged *in different ways*. In "the spelling game" you can arrange the same letters A, E, M, N into the quite different words Mane, Mean, Name, Amen. Nature has the same trick. She puts her C's (carbon) together to make coal, graphite (of lead-pencils), or diamond. Thus out of six C's, ten H's, and five O's, she makes starch, or gum, or cellulose; out of $C_{12}H_{22}O_{11}$ she

makes a number of different sugars ; out of $C_6H_{12}O_6$ she makes dextro-glucose or dextrose, and lævo-glucose, or lævulose, and still other glucoses. These have different qualities, but are chiefly to be distinguished by the curious effect they have in turning aside a ray of light which has first been "polarized," or made to vibrate on one plane only. Dextrose, indeed, is so called because it turns the ray to the right (*dexter*), and lævulose because, though exactly the same atoms, it turns the ray to the left (*levus*) or inverse direction. Cane sugar, pure, dissolved in its weight of water at a temperature of 59° , rotates the ray 73.80 to the right ; whereas trehalose, a true sugar made from Turkish manna, rotates it under the same conditions 220° to the right. If the sugar is less pure, or the solution stronger, it has a different effect on the ray, and this fact is the basis of the commercial test of sugar by the scientific instrument called the polariscope, in which a ray of light, polarized as it is admitted into the instrument, passes through a solution of sugar carefully weighed and dissolved in a definite amount of water and placed in a long tube closed with glass at both ends. The deflection of the ray is counteracted by interposing a wedge of quartz, forming a part of the instrument, and, with the help of an eye-piece at the other end of the tube, the degree of deviation is read off on a little scale above, marked to show the actual percentage of sugar. The key to this useful and wonderful provision of Nature is probably the simple fact that the different combinations of atoms give different reflecting or refracting surfaces to the different crystals or granules.

The man who, by the patient plodding of scientific investigation, or by the inspiration of genius, which is its equivalent, will some day read the secret of an atom of carbon, in its protean combinations, with its intimates, oxygen and hydrogen, will achieve one of the great triumphs of mankind. Out of the corn which gives us the daily bread for which we daily pray comes also the spirit which crazes men ; out of the wholesome peach the deadly acid one drop of which will kill. The same simple atoms are in each, and our rudest manufacturing pro-

cesses can give them the change of form which is the difference between life and death; but science has not yet reached below the surface of the mystery, and to the wisest eye the transformation is still a miracle. Science long ago reached beyond the telescope and microscope, which disclose their secrets to the eye, and turns now to the spectroscope and polariscope, which reveal to the scientific imagination those infinitesimal secrets evident only in the effects of atoms, unknown and unseen, on the delicate and tremulous beam of light. The beam of the polariscope is not unlikely to become the divining-rod of the Columbus, yet to come, of organic chemistry, who will prove one of the great benefactors of mankind. So far, man, for the most part, has had to be content with undoing what Nature has done, as in breaking up starch into glucose or alcohol. Some "organic" substances, such as indigo and the aniline dyes, have, however, been made by man. When, if ever, he succeeds, directly or indirectly, in converting the carbon about us, the hydrogen and oxygen of water, the free nitrogen of the air, into the organic products we now get in roundabout fashion, only in Nature's laboratory, the plants, the whole problem of food supply will be solved.—*R. R. Bowker, in Harper's Weekly.*

THE EVOLUTION OF HELIOLOGY.

THE world was learning much, and thinking more, and stirring with fresh wonder. And there came to it a Teacher well assured. His sight was swift and keen, but its range was curiously limited by a peculiar form of short-sight. He could discern nothing beyond the atmosphere of Earth, and thus had never seen the Sun. So he reasoned with a sun-conscious organism, and sought to prove to it that the origin of all its forms of expression was earthy.

"Trace them up," he said, "and you everywhere find that form, color, motion, growth, even thought, are only transformed elementary force evolved by the earth. As these develop, as

activity increases, as faculties multiply, and as you become conscious of them and at least able to reflect upon and reason about them, you suppose—fatal error!—that they are somehow derived from a source extraneous to the soil from whence they sprang. Thus, also, with sensations of light and heat. They both originate exclusively from the organic germ itself, or from its earth-environment. The notion that light or heat-rays come from and are due to some great 'sun' in distant space, independent of earth (though earth is dependent upon and revolves round it), is pure delusion. It would be useful to write a paper on the 'evolution of sunrayism,' or perhaps of 'heliology,' and to show how the ideas of a sun as a fountain of light and heat and chemical force arose—to trace back, in short, their history and genesis. For it is plain that even were there any foundation for the myth of a sun, it must be beyond our faculties of perception, as beyond our atmosphere; and the idea of our learning its constituents or movements and action, yet more, of our consciously receiving its emanations and influence, must in the nature of things be groundless. It would be easy to show the natural process, in times of scientific ignorance, by which the heat in the earth's centre, shown in volcanic action, geysers, etc., and in deep mine-borings, the light and flames produced by friction, phosphorescence, both animal and mineral, and the diffused light of a self-luminous atmosphere, have been erected by the ever-growing superstitions of organic life in its credulous infancy into the revelations of a mighty life-imparting, light-giving sphere, the cause and origin of all activity on earth, and of all the rich and complex phenomena of our existence."

Here the group was joined by an egg-enclosed Embryo which observed:—

"I have just been lecturing in the same sense to my foolish brother-embryos, who persist in sticking to similarly obsolete notions about being 'hatched.' They, too, apparently inherit a sort of glorified ghost-theory, by which they flatter themselves that they originated not primarily from the speck out of which

it can be proved that they grew, but from some mysterious source outside the very egg itself, forming round them what they suppose to be a mere shell, some day to be cracked and 'transcended,' but which, like the atmosphere you speak of, encloses us in barriers which cannot be passed even in thought. So I explained to them that all theories which foster a craving for post shell-cracked existence are sheer fancy; for the sooner we all understand this the better. As you and I know, the very idea of such 'parentage' is due, really, to inflated dreams of our dignity and destiny, which have a morbid origin. So strong, indeed, is the tendency to carry high-flown mythological fancies into detail that some even declare that, once outside the shell, they will acquire powers not merely to run upon the earth, but to 'cleave the skies on wing.'"

The conversation was now taken up by an Orange-pip and a Wheat-grain.

"We quite agree with you," said they; and the Orange-pip continued:—"I can contribute some curious facts from the experience of my own tribe. Some of us claim a subtle faculty of conception, an inward power of perception, a receptive organ of reflection, by which the wildest stories and legends are certified and taken as representing sober fact, and revealing verifiable principle. One such imaginative pip asks us to believe that it originally dwelt in a golden globe attached to what it calls the branch of a tree, and surrounded by so-called leaves—whatever such terms may stand for—and further fancies that this globe started from the centre of a corolla of fragrant leaves, called the petals of a flower. Not content with such a tissue of idle dreams, the pip insists that within the shrine of its own heart lies, ready to be drawn forth by the action of that very extraneity called 'sun,' the promise and the potency of a plant to spring from it that shall consist of root, stem and branch, of leaf, and flower, and fruit, and thus of seed again. And it maintains that the very condition of this development is that first it shall moulder away, be broken up and die as seed in earth."

Here broke in the Wheat-grain :—

“Some of us, I can assure you, go even further in their folly. They not only fancy that they are conscious of a plant-life beyond grain, but one actually teaches the ‘law of sacrifice’ in life through death ; affirming that the supreme destiny of the wheat-grain is incorporation in a higher organism than any plant-form known. It tells us that not only are we to abandon all care for self-preservation as intact seed, to fall cheerfully into fertile soil, and there in pain and darkness waste away in order that at last, through utter dissolution, our hearts may germinate and ascend towards the light, but that corn has another ‘privilege,’ a representative ‘glory.’ It may, forsooth, be ground, and then be kneaded and exposed to fearful heat ; after which it may be received into and assimilated by a more complex organism, to help in forming tissue composed of innumerable cells like our own, but with indefinitely greater powers of combined consciousness and action. A fine prospect and a likely issue, truly !”

“Well,” said the pip, thoughtfully, “my friend, too, spoke of the golden ball being cut when he fell out, and its substance being taken into some organic region unknown to us to help in building up a finer structure.”

Here the Teacher was observed to be making notes with an air of being somewhat taken aback, and was heard to mutter :—
“This must be seen to. I must correct the mistaken inference that because there are no sun-rays to produce or stimulate these processes, therefore they don’t exist ; I must write an *Essay on the Science of Biological Ethics*, which shall show that all this really takes place, but through forces wholly derived from earth.”

A fragment of Ice and a crystal of Snow lay close together listening, and near them rested a particle of Carbon. Said the Ice to the Snow :—

“Let us take all this to heart. We used to think that if warmth came to us it was from a sun, and if we melted, though I lost my gem-like glitter, and you your exquisite design, yet

that we should find a larger life in flowing through the world in fertilizing streams; nay, that beyond all present limits we should be drawn up by the sun in wreaths of filmy vapor from the earth, returning there in life-bringing showers to aid sun-work. But clearly warmth is earth-begotten and death-dealing; we melt, and we are *not*."

"Aye," sadly echoed the Carbon; "and once I thought that, dull and uncomely as I am, I, too, might one day enter into a glorified state of radiance men call 'diamond,' and that the many colors and the sparkling light I should give forth would reflect the fabled 'sun' they speak of."

Soon many murmurs took up the burden both of protest and regret. All Nature seemed perversely to have given one hand to heaven and the other one to earth; from all sides came the voice, "Behold the sun! what witness need we that it *is*?"

But the Teacher smiled. "It is curious," he said, "how the growth of superstition follows the same laws everywhere. It is a weed hard, as all weeds are, to kill or root up finally. Ideas long cherished, however baseless, tend, both in the individual and in the race (through heredity), to project themselves into a sort of spurious objectivity. You will hear many declaring that they *see* the sun, and often watch with rapture its glowing, radiant disc behind the many-hued clouds, at what they call sunrise and sunset. And numbers maintain that the alternations of night and day, winter and summer, witness to this ultra-atmospheric luminary, instead of merely being special forms of a general law of rhythm, or action and reaction, as observed, *e.g.*, in the phenomena of sound. As well might we attribute to the influence of the tidal ebb and flow the rise and fall of our own respiration! It is time that the sun-myth were finally discarded. Intelligent and reasonable beings should recognize, even though with pain, the limit of their knowledge and their vision. It is plain common-sense that we cannot know what is beyond the region of the atmosphere, or penetrate the vacant, sunless depths. Let us all be satisfied with earth!"—*The Spectator*.

THE SCIENCE OF FLAT-FISH, OR SOLES AND TURBOT.

“ONCE upon a time,” says ‘that delicious creation of Lewis Carroll’s, the “Mock Turtle,” “I was a real turtle!” “Once upon a time,” the modern sole might, with greater truth, plaintively observe, “I was a very respectable sort of a young codfish. In those happy days my head was not unsymmetrically twisted and distracted all on one side; my mouth did not open laterally instead of vertically; my two eyes were not incongruously congregated on the right half of my distorted visage; and my whole body was not arrayed, like a Portland convict’s, in a party-colored suit, dark-brown on the right and fleshy-white on the left department of my unfortunate person. When I was young and innocent I looked externally very much like any other swimming thing, except, to be sure, that I was perfectly transparent, like a speck of jelly-fish. I had one eye on each side of my head; my face and mouth were a model of symmetry; and I swam upright like the rest of my kind, instead of all on one side after the bad habit of my own immediate family.” Such, in fact, is the true portrait of the baby sole for the first few days after it has been duly hatched out of the eggs deposited on the shallow spawning-places by the mother-fishes. After some weeks, however, a change comes o’er the spirit of the young flat-fish’s dream of freedom. In his very early life he is a wanderer and a vagabond on the face of the waters, leading what scientific men prettily describe as a pelagic existence, and much more frequently met with in the open sea than among the shallows and sand-banks which are to form the refuge of his maturer years. But soon his *Wanderjähre* are fairly over; the transparency of early youth fades out with him exactly as it fades out in the human subject; he begins to seek the recesses of the sea, settles down quietly in a comfortable hollow, and gives up his youthful Bohemian aspirations in favor of safety and respectability on a sandy bottom. This, of course, is all as it should be; in thus sacrificing freedom to the necessities of existence he only follows the universal rule

of animated nature. But, like all the rest of us when we settle down into our final groove, he shortly begins to develop a tendency toward distinct one-sidedness. Lying flat on the sand upon his left cheek and side, he quickly undergoes a strange metamorphosis from the perfect and symmetrical to the lop-sided condition. His left eye, having now nothing in particular to look at on the sands below, takes naturally to squinting as hard as it can round the corner, to observe the world above it; and so effectually does it manage to squint that it at last pulls all the socket and surrounding parts clean round the head to the right or upper surface. In short, the young sole lies on his left side till that half of his face (except the mouth) is compelled to twist itself round to the opposite cheek, thus giving him through life the appearance constantly deprecated by nurses, who meet all unilateral grimaces on the part of their charges with the awful suggestion, "Suppose you were to be struck so!" The young sole is actually struck so, and remains in that distressing condition ever afterward.

This singular early history of the individual sole evidently recapitulates for us in brief the evolutionary history of the entire group to which he belongs. It is pretty clear (to believers at least) that the prime ancestor of all the flat-fish was a sort of cod, and that his descendants only acquired their existing flatness by long persistence in the pernicious habit of lying always entirely on one side. Why the primeval flat-fish first took to this queer custom is equally easy to understand. Soles, turbot, plaice, brill and other members of the flat-fish families are all, as we well know, very excellent edible fishes. Their edibility is as highly appreciated by the sharks and dog-fish as by the enlightened public of a Christian land. Moreover, they are ill-provided with any external protection, having neither fierce jaws, like the pike and shark; efficient weapons of attack, like sword-fish and the electric eel; or stout defensive armor, like the globe-fish, the file-fish and the bony pike, whose outer covering is as ^{or} actually repellant as that of a tortoise, an armadillo or a hedgehog. The connection between these apparently dis-

similar facts is by no means an artificial one. Fish which possess one form of protection seldom require the additional aid of another: for example, all the electric fish have scaleless bodies, for the very simple reason that no unwary larger species is at all likely to make an attempt to bite them across the middle; if it did it would soon retire with a profound respect through all its future life for the latent resources of electrical science. But the defenceless ancestor of the poor flat-fishes was quite devoid of any such offensive or defensive armor, and, if he was to survive at all, he must look about (metaphorically speaking) for some other means of sharing in the survival of the fittest. He found it in the now-ingrained habit of skulking unperceived on the sandy bottom. By that plan he escaped the notice of his ever-present and watchful enemies. He followed, unconsciously, the good advice of the Roman poet—*bene latuit*. But when the father of all the soles—turbot, brill and dabs included—first took to the family trick of lying motionless on the sea bottom, two courses lay open before him. (That there were not three was probably due to the enforced absence of Mr. Gladstone.) He might either have lain flat on his under surface, like the rays and skates, in which case he would, of course, have flattened out symmetrically sidewise, with both his eyes in their normal position, or he might have lain on the right or left side exclusively, in which case one side would soon practically come to be regarded as the top and the other side as the bottom surface. For some now almost incomprehensible reason the father of all soles chose the latter and more apparently uncomfortable of these two possible alternatives. Imagine yourself to lie, as a baby, on your left cheek until your left eye gradually twists round to a new position close beside its right neighbor, while your mouth still continues to open in the middle of your face as before, and you will have some faint comparative picture of the personal evolution of an infant sole. Only you must, of course, remember that this curious result of hereditary squinting, transmitted in unbroken order through so many generations, is greatly facilitated by the cartilaginous nature of the skull in young flat-fish.

EDITORIAL.

CURVES OF COMPOSITION.

THE thirty-fifth annual convention of the American Association for the Advancement of Science met this year in the city of Buffalo. Among other interesting and valuable papers was one read by Professor T. C. Mendenhall, entitled "The Characteristic Curve of Composition," in which he gave the curious results of a minute examination of the vocabularies of authors. He found the curve in this way: Taking a passage of 10,000 words from some popular writer, he counted all the words of one syllable, the words of two syllables, those of three, and so on, until all the words had been counted. Then he drew a base line, and, at regular intervals, drawing lines at right angles to this, of lengths corresponding respectively to the number of words of one, two, three and four syllables taken in order, he was able to join the tops of these lines, and so obtain a waving line, which he calls "the characteristic curve of composition." This method of analysis has been applied by Professor Mendenhall to a great many authors, and he claims that an author's curve is reproduced with marvellous exactness. The curves differ so much that Thackeray's curve can be easily distinguished from Dickens' and Browning's in a bushel of curves. The President of the Association remarked that this should settle the Shakespeare-Bacon theory, and crown or kill Professor Donnelly's "cipher" theory. The possible applications of this method of investigation are almost numberless. Mathematicians delight in curves. A curve of sentence-length, which would represent the preponderance or paucity of sentences of any length as between twenty and thirty words, thirty and forty, forty and fifty, etc., might easily be obtained. Another obtained from the number of commas, colons, and periods in a given length of passage, when punctuated according to a system applied to all authors, submitted to comparison,

might be called the curve of punctuation; and the number of rhetorical pauses of certain lengths, when the passages under examination were read by the same elocutionist, would yield the curve of mental rhythm. Every author's mental action has a characteristic rhythm, which, whether slow or rapid, even or broken, would be revealed by this curve, and would furnish means for the most subtle comparison. How vastly the curves of mental rhythm, of sentence-length and of punctuation of Ruskin, Carlyle and Victor Hugo would differ! A phonograph turned by clock-work would make mathematical exactness possible in such researches. Professor Mendenhall has certainly opened a rich mine for future working.

COMPENSATIONS.

IF a gentleman camping for a few weeks or months in some lonely spot on the shore of a Muskoka lake supplements the accommodations of his tent by cutting out a summer house, with a few simple rustic seats, in the neighboring cedars, or adds to the wild beauty of his summer home pretty paths or quaint clearings here and there, near the sparkling shore or in the darker shadows of the woods, giving unexpected glimpses of the blue waters or the distant hills, his memory of the beauty of the scene and of his pleasant experiences will be enhanced almost immeasurably. He has expended there some of his thought, labor, love. He has sown himself, and consequently reaps himself. It adds value to any place to act worthily in it. Men are almost always ready to speak ill of the places where they have behaved ill. The Scotchman who came to America, gained great wealth, and, remembering his native town, blessed its charities according to his great ability, was made a richer man by his act. Henceforth that is twice his native town, and the honor the townsmen have lately bestowed upon him is but a small part of his blessing. It is a trite saying that "this is a good world to those who act well in it." As we bestow upon it our thought and labor we increase our possession of

it. We conquer by bestowing. The selfish man is always an alien and possessionless. Those lands are twice ours where we have "cast our bread upon the waters." This is the perpetual heirloom of a noble life, and for the noblest "all things are yours." The number of men who realize this fact seems to be increasing. Great bequests to public beneficence are becoming more common. The dying give wiser commandment concerning their possessions. Relatives are disappointed and uncursed, while the stranger is blest. The living sow early to see the harvest ere they die. He who gives his sympathy and anxious thought to another's well-being has bestowed his labor on a soil which has an immortality for a harvest time. His work abides, and bestowment amounts to possession. The heart-world is given to him who dies for it. The man who trims a hedge into symmetry or helps to mould a life into nobleness leaves part of himself as a spiritual presence to watch over his own. True is Longfellow's saying, that "all houses wherein men have lived and died are haunted."

"We have no title deeds to house or lands;
 Owners and occupants of earlier dates
 From graves forgotten stretch their dusty hands
 And hold in mortmain still their old estates."

London is Peabody's, Ireland is Gladstone's, the world is Christ's. The science of this realm always asks, "How much is given?"

THE MIGHT OF BRITAIN.

THE following figures, extracted from an interesting volume, "The Progress of the World," by Michael G. Mulhall, and quoted by the Lord Bishop of Carlisle in a recent address, form a strong basis for Anglo-Saxon pride and Christian hope:

EXTENT.

The British Empire contains one-fifth of the whole land, and the population includes one-fifth of the inhabitants, of the

world. If the whole Empire were collected in one circle the radius would be 1,200 miles, and an express train travelling at the rate of forty miles an hour, night and day, would need a week to complete the circuit of Greater Britain.

In the colonies which had ancient populations, and are British by conquest, such as India, West Indies, Guiana and others, there are 1,050,000 square miles and 196,151,000 population. In those which have been chiefly colonized by those of Anglo-Saxon blood, there are 6,828,000 square miles and 8,114,000 population.

INCREASE OF POPULATION.

Upon this largely depends the commanding position of the Anglo-Saxon in the world. It is found that the population of England increases more rapidly than that of any other European country. The annual increase per thousand, on an average of more than twenty years, is as follows :

England	13	Italy	7
Prussia	11	Russia	4
Austria	8	France	2
Spain	7		

Not only is England's rate of increase greater than any other, but her birth rate is increasing, while many of the other European countries have a decreasing rate. The millions of emigrants poured forth from this great bee-hive, Great Britain and Ireland, equal those swarmed by all the rest of Europe, the figures being as follows for the last sixty years :

British.....	About 8 millions.
Germans.....	" 4 "
Other European nations	" 4 "

LANGUAGE.

Closely allied to these facts are those concerning the spread of the language. The English language is spoken by 90,000,000 of people, in round numbers. It is spoken by one quarter of

those who use European languages, and the rate of its progress is three times that of any other. And this rate will increase. As the language acquires a more commanding position in the world, the pressure, on account of commercial and other necessities, put upon other nations to learn it increases immensely; and this consideration, coupled with the fact that everywhere in the colonies the languages of the native races are giving way to the English, leads to the conviction that a century hence English will be the cosmopolitan tongue.

WEALTH.

England is the richest country in the world. As to average capital and income per inhabitant, England stands first among the European nations, while the United States leads the rest of the world.

	<i>Capital.</i>	<i>Income.</i>
Great Britain and Ireland.....	£260	£33
France	202	25
Germany	108	17

During the last fifty years every other European nation has increased the rate of her expenditure per head of population; England has diminished hers. Germany's has increased five-fold, France three-fold. England has reduced her national debt by fifty millions in the same period, while, with the exception of the Low Countries, all the continental states have increased theirs.

In commerce England and her colonies enjoy one-third of the whole commerce of the world. British steamers count for rather more than half of the steam tonnage, and British sailing vessels for more than a third of the sailing. No less than 53 per cent. of the world's carrying trade is done on British bottoms.

In productions England stands as follows: Europe manufactures annually £200,000,000 of cotton; England's shares of this is one-half the whole amount. In woollens the United Kingdom manufactures one-third. In both the manufacture of iron

and of Bessemer steel England's output is one-half that of the world, and her production of coal, 130,000,000 tons annually, is nearly equal to that of the rest of the world.

Another set of tables, given by G. G. Hubbard, calls attention to the fact that eighty per cent. of the colonial territory held by Europe belongs to Britain, and that over eighty per cent. of the commerce is with Great Britain. Nothing has so much awakened the jealousy of other nations as her power of making her colonies not only self-supporting, but to contribute largely to the trade of the motherland. Hoping for commercial gains, Germany and France have founded colonies. The latter's Algerian colony, the most prosperous of all, is a drain both upon her population and treasury. Germany's African colonies have made doubtful progress. Italy, Spain, Portugal and Denmark have colonies of which the cost of maintenance exceeds the revenue. Russia, Belgium and Austria do not colonize, but in contrast to all these the territory comprised in Great Britain's colonies is sixty times her own, and the commerce of the colonies with the mother country amounts to \$4,658,950,000, which is twenty-six per cent. of her own commerce.

COLLEGE CONFEDERATION.

AT last the die is cast. Whether for good or ill, the decision of the General Conference of the Methodist Church is to have a great effect upon the whole future of the educational system of the Church and of the Dominion. The scheme upon which the University of Manitoba is being formed is a confederation, and if the confederation of the colleges of Ontario is found to work well, the future universities which shall yet grow up on the fat soils of Assiniboia, Alberta and Saskatchewan will probably be modelled upon the same plan, and we shall have a string of great provincial universities in which all the religious denominations will be represented, and the various schools of thought influential in the country meet in intense and bene-

ficial conflict, and which will be kept alive by inter-provincial competition. The plan is one which is peculiarly adapted to the scanty resources of young Provinces when they awake to the need of crowning their educational system with a university. There was a day in Ontario when this scheme would have received a much heartier greeting than it did in this juncture, when it has triumphed in the face of vested interests, churchly pride, and that sentiment which leads *alumni* to desire no change in the identity of their *alma mater*. In more favorable circumstances it will triumph again. It is the natural outgrowth of our provincial system of schools, so much so that we see no force in the objection of those who say that this scheme is a union of Church and State, and therefore to be deprecated. All the denominational colleges are already dovetailed into the provincial system of high schools and collegiate institutes; and if connection with the State system on the underside is safe, why may it not be equally safe on the upper side? All that is necessary is as strict a definition of privileges and powers in the latter case as exists in the former. The religious public in the country will stand in much the same relation to the university as it does now to the public schools, especially when all the denominations are represented in the confederation, and consequently in the governing body of the university. For these reasons we think that the day the great debate ended inaugurated a new era in the history of Canadian culture and educational development.

In the discussion of this question we have felt the force of the strongest arguments on either side. The ideal scheme has many grand features. As we are about to realize it there are many dangers. There will be intense competition between the lecture rooms of University College and those of Victoria. Nothing can hold the students to any college except first-class work. Dead wood and mediocrity will be weeded out, but will the competition be healthy? Is not the bane of our public school system the perpetual "grind" in view of examinations? In the lofty region of the university professoriate, thank heaven,

this may be escaped. And it will rest upon the members of the professoriate to save our new university from the stigma of machine education, and to demand the highest style of work from those who attend their lectures and work in their laboratories. This, however, may be rendered impossible by the pressure of numbers and the slavery of excessive university machinery, crushing the individuality and checking the enthusiasm of professors.

We are inclined to think that Victoria, as an arts college, is doomed; that questions of economy and utility will, even if Dr. Potts' work be crowned with remarkable success, gradually force the college authorities to take the position of a theological school unless unforeseen events supply stimuli sufficient to awake all Victoria's energies and prevent such a consummation. A very few years will decide, and if the hopes of the zealous defenders of the scheme be not realized we shall see Albert College take the place of Victoria, and Belleville succeed to the blessings of Cobourg. Queen's will have its rival in the East, and Methodism, doubly equipped, with splendid theological school in Toronto and an independent university at Belleville, will have a double hold upon the educational work of the country. We are quite willing that the experiment should be tried, costly though it must be.

Victoria's only hope now is strength, and her strength can only grow out of the loyalty and hearty support of her *alumni* and Methodism. To go into confederation a weakling means disaster. With her mathematics, science and metaphysics gone, to be anything less than peerless in what is left to her means the quenching of her very life, and she will bring no more into confederation than a name and a crowd of students over whom she will have very little control excepting those pursuing theological studies. If she has a fine residence she may have the privilege of putting some of the Methodist students taking the arts course to bed, and of filling their stomachs every morning with oatmeal porridge, mixed, perhaps, with a little theology during the terms of four years. But what is-

the privilege worth? Strong reasons must be given to students to give themselves to Victoria instead of enrolling themselves at University College. Only first-class equipment and professorial success and enthusiasm can give these reasons. The lengthened agitation has resulted in this decision. Now we plead for a fair trial. After confederation the chances of a Methodist student will be as good as they can be now either at Cobourg or Toronto. Toronto is ours, Victoria is ours. Let us make our college such a one that we shall be proud of her, because of the influence she may exert upon our common university.

Many are the dangers which will beset student life in the city. No longer will the quiet charm of a truly academic town be ours. The restless atmosphere of a business city will brighten or blast the intellectual prospects and work of many a student. The same social influences cannot grow up upon a different kind of soil. And while to some students of Victoria the change may be hurtful, to one class it must yield great advantages, and that is, the theological men. In these days, when the rush of population is toward our cities, when there a heathen population is growing up under the shadows of our churches, and there the great social problems of the day are illustrated, it is a misfortune for a great Church to educate her ministry away from the great centres of population, and send them out from her college halls with no practical idea of the Gospel work to be done in cities before our civilization is safe. If the opportunities which Toronto affords are made proper use of by the authorities of Victoria the theological students will not be scattered among the down-town churches as pulpit-supplies or workers in the Sunday-schools, but will be deployed off into the rougher portions of the city to do genuine Jerry McCauley work and be saved themselves from kid-glove Christianity. No other training can so well fit them to take charge of city pulpits and to engage in missionary work at home or abroad, or to feel sympathy therewith. Further, the contact with men holding to different creeds must exert a broadening influence upon them, and tend to

produce a true Christian liberalism among the young thinkers of Canada.

For the sake of Canada and the Methodist Church we hope that some day the splendid possibilities of this scheme may be realized, and the fears of many be supplanted by the sight of better things.

SCHOOL ARCHITECTURE AND HYGIENE.

THE Educational Department of Ontario has issued a work on the above important subject, in which not teachers alone, but parents and all public-spirited men should be interested. Dr. George Hodgins, from whose pen the work proceeds, has done noble service to the public cause in a pamphlet of 135 pages, interestingly written, of admirable arrangement, profusely illustrated with fine engravings, and calculated to attract and enlighten those who have only a slight interest in the subject. Taking the ground that the great evils arising from a lack of attention to this subject are "preventible," he proceeds "to deal with the subjects named in the table of contents—more with a view to furnish trustees and others connected with our schools with the latest and most practical information in regard to school accommodation and school-house instruction than with the design of theorizing on the subject." Using the general official regulations in regard to school accommodation in Ontario as a text, our author never loses sight of practical ends in the discussion of his themes. The chapters dealing with the subjects "The School Well," "The Construction of Latrines," "Heating and Ventilation," and "Plans for School-houses," are especially to be noted. To further enforce need of attention to this too often slighted subject, we publish part of a paper read by P. Palmer Burrows, M.D., Health Officer of Lindsay, before the School Teachers' Convention. After referring to his efforts, failures and successes in awaking public and official attention, he says:—

To-day a better state of things is inaugurated. The schoo

boards are aroused, and with new blood change is sure to follow. I need only refer to the late improvements in your class-rooms as but the promise that more will be done. I am very desirous that in this change for the better you Lindsay teachers shall not stand alone, but that every school throughout this district will receive much-needed attention, and that as you labor in your class-rooms you will not be in sheds or stalls merely, but in comfortable rooms, well heated, properly ventilated, airy, light and wholesome, with pictures, mottoes, perhaps plants and flowers—not bare windows, but blinds, and perhaps lambrequins; the little girls will come to school with their neat white pinafores, and the boys neat and clean; the fences will be in repair, whitewashed or painted; the grounds well kept,—all reminding you of the comforts of home, and a home indeed to our little ones. This is my desire, and although changes come slowly, I am convinced this utopia will be reached. The day of obstruction and delay has already passed. Galileo, after his sad recantation, was heard to say, "It does move;" and we, although at times dispirited and disappointed, will know as others learn that it does move.

In the meantime it becomes you, as it does me, to fully realize the importance of healthy, cheerful surroundings to our developing men and women; and to strenuously advocate their interests you must exercise patience. But I tell you truly, personally I have neither patience nor respect for those who neglect their official responsibilities, and who by that neglect continue to imprison our teachers and scholars in unwholesome rooms, and, while they themselves occupy comfortable homes, neglect the cleanliness, the health and comfort of our children. It sometimes appears to me a myth that we have an inspector of schools, a visiting committee of the school board, or, indeed, that we have any such board at all. It does not seem possible that with the acknowledged advance in sanitary teaching our schools have still the cobwebs of neglect upon them. It at times appears to me almost a pity that the English ivy does not thrive in our climate, when by its growth our schools could at least be made

interesting relics; certainly some in this town and county are almost ready for such adornment. But, I take it, our local officials are not altogether at fault. It appears to me that the curriculum is too extensive; too many subjects are taught in our common schools; too much is offered at too little personal sacrifice or expense, at least by way of first cost, although in a less direct manner we are paying too much for the real practical benefit we receive. If free instruction was reduced to purely practical subjects to qualify for the ordinary duties of life, parents, teachers and trustees would feel more encouraged to make our schools comfortable, and children would show increased zeal in the acquisition of knowledge which they felt would indeed be useful; teachers would have time to study the individual character of their pupils, or, in mathematical language, the mental coefficient of their pupils and scholars to digest the more wholesome food presented.

The scientist, philosopher, clergyman and physician have their opportunities of doing good and of imparting instruction, but none of these have the plastic material hour after hour before them to mould and fashion. A parent's chances are not equal to yours in practical effect. A new life opens before the child as it enters the school-room: every surrounding is novel to its senses, everything is strange; and the little timorous thing, possessed of new ideas, becomes for the first time aware of that spirit of emulation which, fanned or quenched, determines its course in after years. Desirous of your good will, with faith in your strength and goodness of heart, it leans on you for support. How often does it need your approving smile? Its tender brain tires as its soft limbs tire, and its whole nature seeks repose. The weary eyes look to you for sympathy, and your kind word is as soothing balm; it cools the fevered pulse and stimulates to further toil. Your token of encouragement implants the flag-staff within its breast, and "Excelsior" becomes the conscious talisman. Is it not worth a life's labor, the knowledge that you have lifted a fellow-mortal, small though he be, to a higher plane? and when the memory of its sparkling eyes and face,

beaming with the sunshine of hope, follows you in after years, are you not amply repaid? Day by day, week by week, the little one struggles on to become master of the situation, to stand where other like toilers have stood—no more the wavering, timid novitiate, but fully developed into the self-conscious scholar, the pride of its class, and fully prepared to brave the greater obstacles of advanced classes or the vicissitudes of life. Have you not your reward? Do you not feel that in your hands is placed an important trust? and do you not realize that you have more than a mere machine to feed? Out of your classes must come the future generation that go to make a community. Your example, your precept, your teaching, prepare for the noble walks of life, for in our free country all prizes are in open competition; and failing in your duty, your whole duty, the promise of an honorable career is blasted, good nature killed, ambition lost, virtue destroyed, and the pure mortal given to your care loses the talisman once its standard of hope, and becomes with man or womanhood intellectually dwarfed, a failure, a mere hewer of wood or carrier of water to its more fortunate rivals. The impress of your teaching will remain years after your class-roll may have been destroyed, the stamp be indelibly impressed, and the individual a grand success or miserable failure, as you may have directed. Remember always that although the paternal roof may first be gladdened by the smile of innocence, the school is in reality the birthplace of the man. A modern authority has rightly placed "the school as chief factor of modern knowledge." I have great respect for your profession. I look on you as largely making our future country; your position is, to my mind, one of unrivalled importance. Holding as I do a high estimate of your duties, I look on the inculcating of pure morality as of inestimable value. You are responsible for the moral as well as the intellectual training of your pupils, and really represent the parents of those children under your charge. You should therefore encourage in your boys *manliness* and *honesty* both of thought and action, and in your girls *womanliness*, *modesty*

and *correctness* of deportment, and *truthfulness* as a cardinal virtue by all. You should most carefully instil these principles. You should impress upon your classes that by such and such alone they can attain assured advantage; that while it may happen that those utterly devoid of these virtues may succeed, still that sterling worth must meet its reward, and that success is to them doubly sweet in that it carries with it the inward consciousness of merit. Truthfulness in a child is the eleventh commandment of conduct. Like that which tells us to "love our neighbor as ourselves," it embraces all others. The possessor of it can be depended upon in every emergency. The child that will not lie will not steal, will not swear, will not skip school, and will not of a certainty deface the school walls with scribblings which its very soul would abhor to utter. *Self-reliance* and *self-respect* should be taught as well. The sooner the child feels that within itself there is the power to win, the burden is lightened to its strength, and the consciousness of gain will encourage to final reward. The fully developed man or woman is not more anxious to succeed than is the little child. It becomes you to portion the task to its ability and in so doing fan the flickering spark into a living flame. The minute seed will then germinate, and with every faculty fully awakened, like the plant rootlets reaching out hungering for food, the plastic clay has become a thinking, self-reliant, self-conscious being.

Thus far I have truly moralized. You have expected, perhaps, something more in my professional line, in which I am bound to state there is much to be said, evils to be remedied, sanitary matters to be considered, a free discussion of which is highly desirable. Ventilation, efficient drainage, the proper heating and lighting of our class-rooms, improved school construction, the importance of a true understanding of the injurious effects of depressing agencies on the growing child, the life of pain and misery entailed by neglect of hygienic laws, the predisposition to disease engendered by unhealthy surroundings, and the unwholesome cramming of useless instruction, are all

subjects of vital importance, and might well be dilated upon. I will not, however, take up your time, but merely tell you that these matters will receive my studious attention; and you may feel satisfied that as long as I occupy my present position as Medical Health Officer, which connects me in great degree with this work, I shall by all means in my power advocate such principles as shall be with the teachings of the time, and as far as my humble talents go do my best in your interests and the true benefit of those entrusted to your care, and shall be glad indeed at any time to receive suggestions from the teachers for my guidance.

To show you that such questions are becoming live issues, I have only to mention that at a very recent meeting of the American Public Health Association twenty papers were presented "on the sanitary condition of our public schools" and "the necessities of school-houses and school life." President Cleveland, in his letter of regret, recommended attention "to the proper construction of school buildings for the children of our citizens," and the retiring President of the Association said "the passage from infancy to childhood and from childhood to adolescence is a thousand times more dangerous than the approach to our harbors." For my own part, I am impressed with the importance of a better supervision than exists at present. I think there should be a provincial sanitary inspector appointed, whose duty it would be to examine into existing grievances that interfere with the robust mental and physical growth of our scholars; to visit all sections and schools in which there may be neglect or complaint; see that district inspectors and trustee boards are fully alive to hygienic and sanitary requirements, and that they are practically carried out; that nothing should be wanting from lack of intelligence or remissness of duty to interfere with or in any degree retard true symmetrical development. Accepting the scientific fact that one-half of the usual sickness and deaths can be prevented by proper sanitary observance, we at once realize the importance of authoritative supervision. Dr. Oldright, at the Woodstock Sanitary Conven-

tion, held early in April, pointed out "that the mortality of female teachers from consumption is very much greater than among other classes, arising from impure air. *He could not understand why trustees did not endeavor to bring about a better state of affairs.*"

On referring to the Ontario Registrar-General's report just issued we find the death rate of the three professions—divinity, law and medicine—given at 58 years, teachers below 50 (males 50, females 38); and this is remarked as a slight gain, "owing in a great degree to the improvement of school-houses, both as regards their ventilation and sanitary condition." Still this difference of 58 and 50 is so marked as to offer food for serious thought. With the more strict observance of the laws of health the teachers' average should equal the other professions. There is nothing *per se* in the occupation of teaching that should keep it equal with such callings as are recognized as extra hazardous. That you may be satisfied on this point, I refer you to the report of the British Registrar-General, in which clergymen are given first place; schoolmasters rank only fourth or fifth on the list, and the physician far below either. This report is instructive, further, in showing that a million men born in that country during the ten years between 1870 and 1880 covered by the report would live 1,439,139 years, and a million women 1,338,445 years, more than if they had been born during previous decades, making a total of 2,777,584 additional years of life. "The addition of two million years of life has been given in return for the money spent on sanitary improvements." This will, I think, convince you, as it should the public generally, that there is still room for great improvement in this country, especially in regard to those of your profession, and as well "that there are actual years of life given in return for the money invested so grudgingly granted for sanitary improvement." These figures, I think, convincingly support my contention that a provincial sanitary inspector, having special supervision of our schools, is a necessity in your interest and that of your scholars as well, the same evil influences

equally affecting both ; and I trust, indeed, that the suggestion will receive your consideration and approval, and that other like conventions will follow in asking such appointment.

PEACEMAKERS.—Prof. J. L. Tuck, of New York, on the 24th August exhibited on the Hudson a new torpedo boat, which, made of iron and steel, is 30 feet long, $8\frac{1}{2}$ beam and 6 feet deep, and weighs twenty tons. The trial trip was very successful. She dove forty feet under water and made a submarine trip toward Yonkers at the rate of twelve miles an hour. It is claimed that she can remain under water for several hours, a supply of fresh air being carried compressed in iron pipes. The purpose for which she is intended is to dive under a ship, liberate against the bottom two torpedoes with floats attached to make them cling where placed, and then, after retiring to a certain distance, to fire them by means of electricity. Her inventor has suggestively named her the *Peacemaker*. Perhaps one of the most powerful influences at work to bring about universal peace is the invention and manufacture of such weapons of war and explosives capable of such terrible execution that no armament or defences can withstand them. No vessel that we can build can ride safely over torpedoes, and no forts can withstand modern cannon, and war has almost come to mean annihilation to one, or bankruptcy in money and men to both of the combatants. When the “nations learn war no more” it will be largely due to the fact that they have learned it so well. “Blessed at last are the peacemakers.”

INVESTIGATIONS by Dr. R. Von Helmholtz, described before the Berlin Royal Society, confirm the statements that the formation of cloud in saturated air is induced solely by particles of dust, and that the finer and sparser are the dust particles the more slowly is the cloud formed. The results of these investigations also support Prof. Tyndall's explanation that the blue color of the sky is due to floating particles.

CORRESPONDENCE.

SOME METEORS, AND OTHER THINGS.

BY REV. J. W. BELL, B.D., CARBERRY, MAN.

ON a calm summer evening in the year 1881, I think, a little after five o'clock, the sun shining clearly, happening to look out of the west window of the parsonage I saw a bright meteor approaching from the south-west in apparently a horizontal line about, say, one thousand feet from the earth. It was coming so slowly I called my wife and her sister, who were in time to see it pass; we then ran to the door in the east and saw it again, travelling at about the same height from the ground. After some seconds it exploded. The meteor was not only white but showed distinctly the appearance of blazing as it went with a clear white light. I am not sure but there was a whitish streak after it, but of that I cannot speak definitely now. Query: What could have been its material to cause it to move so slowly, so horizontally, and to blaze?

Last summer (1885) a gentleman in the town of Carberry, Man., was just passing out of the door in the west side of his house one evening about dusk when his attention was attracted by a brilliant meteor falling apparently straight down in the west. While still some distance from the earth it rebounded a considerable distance, then, descending nearer the earth, rebounded again, dropping nearly down, when a third time it rebounded, afterwards falling to the earth. At the first rebound the gentleman called his wife, who ran to the door in time to see it on its second rebound. I have every reason to believe the account given me to be correct. I would like to know whether a similar circumstance is on record. I have never heard of such a thing before. Again the query starts, What was the nature of the material composing the meteor, which was light enough to rebound in the air?

We often hear of the strange freaks of lightning, but I think

it is not often one flash goes in for as much fun as the following:—While living in Nelson during the summer of 1881 a heavy thunderstorm passed over the village. A flash suddenly dropped on the house of Mr. T. Nelson, ripping off a quantity of shingles and scattering them in the yard. It went down in the house, bulging out one wall and knocking off the plaster inside and out, but not doing the slightest damage to any one, though there were a number of persons in the house. It then jumped some thirty feet to a blacksmith-shop, pulled one board off the roof and went down inside. The blacksmith was working at the forge at the time turning a horse-shoe. The fluid dropped down on the anvil, ran along it, went down on the ground—there was no floor—ran along past the hind feet of a large heavy horse which was being shod and touched the horse's front foot. The horse immediately turned on his back and stuck his feet up in the air, but presently got up none the worse for his little roll. A large, tall man, six feet three inches high, was sitting on a window sill in the shop. The window was of one sash, four panes 7 x 9 inches, making an opening in the wall 17 x 21 inches. The lightning shot this man like a bolt out through this window into the mud. But whether he went out head first, feet first, or back first, he never could tell. The flash then crossed the street to Mr. J. T. Blowey's furniture store, where Mr. B. and an assistant were working together fixing the ceiling. The young man was knocked down and paralyzed in the right side, Mr. B. feeling no ill effects. It took some time to restore the young man. I did it, however, by getting a long heavy iron chain, throwing one end in the water out on the ground, taking the other in my hand and rubbing him with my other hand. In half an hour he could walk about as if nothing had happened. A team of horses were feeding in front of my place, full three hundred yards away from the scene of the stroke. One of these was so stunned that it reeled like a drunken man, and circling round nearly fell. In fact, the whole village was to a greater or less extent electrified.

There seems to be a certain feeling that the thunderstorms

are more terrific in the North-West than elsewhere in Canada. While I do not know that this is true, and am inclined to doubt it seriously after nine years' experience, I certainly have seen some marvellous displays of electrical phenomena in thunderstorms at night. One of the phenomena which I had not noticed elsewhere is the peculiar way the lightning has of appearing as a chain and then, breaking up into a number of chains, running in all directions from horizontal both ways to perpendicular upwards but not downwards. I have seen a whole quarter of the sky covered with a sort of electric spider legs. Such flashes as these do no damage. But when we see a spot of cloud open, and appear to spill out, for what seems some seconds, a crooked stream of electric fluid right down on the earth, we always expect to hear of damage done, and generally are not disappointed. No words could paint the magnificence of some of those storms. Two or three are vividly fixed in my memory during which I sat out doors and revelled in the glory till its too near approach warned me to seek the shelter of the house. But I fear I have trespassed already on your space and your readers' patience, and asking pardon therefor I beg leave to close.

THE NEW AND COMING FRANCE.

WE are informed by many of the leading Canadian papers that there is a wonderful exodus northward of the French. We are told of a new nation of Gauls actually springing into existence along the shores of Lake Temiscamingue, and in the country surrounding. The Oblate Fathers up the Gati-neau, the Bishops of Quebec, the Jesuit doctors of Roman theology, the Archbishops of St. Sulpice, the Cardinals, and the Pope himself, are all engaged in the new venture—of making a *Nouvelle France*. With such machinery and enginery there will be a lot of mental force exerted, a lot of political pap *exuderated*, considerable Frankish furor and fume stirred up, with considerable sacrifice and suffering penitentially borne.

But will success follow ?

There are large rivers, well-timbered limits, many rich acres, fish-teeming lakes, and an unlimited supply of *farm stuff*—the old Laurentians.

But will success come ?

Steamboats are beginning already to ply on the water-stretches so eagerly coveted and sought after. Railroads are now in course of construction thitherward and will soon appear on the scene of action. Government roads are opening up and doubtless will continue through the valleys, over the mountains and across the rivers.

But will success follow ?

The French are a hardy, brave and energetic people. Full of patriotic feeling, bright with hope, obedient to their spiritual guardians, economic in their habits, and easily fed and housed, these people are prepared to stand a severe struggle and to fight with the elements cheerfully and courageously.

But will success follow ?

No. It cannot. It has never yet done so in Canada, and it never shall follow these people.

Why ? Because their social fabric is rotten and out of harmony with their best interests. Why ? Because from a civil point of view they ostracise themselves from their more independent and manly neighbor. Why ? Because they are out of joint with Canadians as such. They can bear the thought of being Canadians only on one ground.

Reverse the Plains of Abraham and following events. Were Canada France, and were Canadians Frenchmen, and were there no majority or partial English rule, then they would be Canadians with a vengeance.

How comes all this ?

Comes how ? Why, they are ruled by their servants. Those sent to minister unto them rule, order, command, control, and enslave their poor souls—their minds, *i.e.*, themselves. Their “fathers” do their thinking—and of course this of a theological kind. But this is in plain French—the coming French—a

clerical thinking, which means in plain English a churchological kind of thought. Boiled down to a strong essence, this means simply one thing: The thinking being of a churchological kind, the labor is of the same nature. Thus it follows that the mental life fails to develop. How can it develop when it won't think? It won't in the first place because it is not allowed, and then it won't because it can't. Verily, when the thinker of a man's head thinketh not, it is bad. But when a whole locality of thinkers fail to think, it is worse; and when a nation—even a Northern Nouvelle France—quits all manly, independent and liberal-minded thinking, it is worst. The French are a noble-spirited people, but they are mentally ruled and spiritually enslaved. *Ergo? Ergo* success cannot follow the present undertaking.

How can they succeed? Educate themselves. Think for themselves. Be their own spirit guardians, under one Master, even Christ—the only “*Absolvo te*” potentiality for humanity. Let them become Canadians rather than remain Frenchmen, for in remaining Frenchmen *they are Italians* although they know it not. And even as Italians they (would become) *are* traitors to Italy, being true to the Holy Pope—*enemy of all nations.*

Z.

BOOK NOTICES.

“PROFIT SHARING BETWEEN CAPITAL AND LABOR.” Six essays by Sedley Taylor, M.D., late Fellow of Trinity College, Cambridge, England. Price 15 cents, by mail. J. Fitzgerald, Publisher, 108 Chambers St., New York. “The question of the division of the profits of industrial enterprises commands attention everywhere, as probably affording the true solution of the problems involved in the relations between Labor and Capital. The work before us, written by a very well-informed student of political economy, gives a very full account of the methods of dividing the profits between employer and workman in several departments of industry—manufacture, agri-

culture and commerce. This valuable book will be read with profit by every one, and its exceedingly low price places it within the reach of all. Sent post free by the publisher on receipt of price."

"I. THE MYSTERY OF MATTER. II. THE PHILOSOPHY OF IGNORANCE." By J. Allanson Picton. J. Fitzgerald, Publisher, 393 Pearl St., New York. Post free, 15 cents. "There exists in our time no such schism between Religion and Intellect as that which characterized the eighteenth century. On the contrary, side by side with a growing independence of traditional creeds, there is a more marked tendency than the world has ever known before, to associate the emotions of religion with the discoveries of science. To those whose only notion of alliance between religion and science consists in the futile compromises of the current schemes of "reconciliation," this may appear a bold assertion. But those to whom the most obvious emotion of religion is reverential awe, and its chief fruits self-subordination, uncompromising truth and charity, will gladly allow that science, as represented by its most distinguished masters, is increasingly affected by the inspirations of the spiritual life. This view of the relations between science and religion is admirably illustrated in the two very remarkable essays named above."

"METHODISM AND THE MISSIONARY PROBLEM." By Rev. C. S. Eby, D.D. "In this pamphlet we have one of the most notable utterances of the year. Wide in outlook, eloquent in diction, bristling with points, all tremulous with earnestness, this treatise which was first delivered as a lecture before the Theological Union of Victoria College, and repeated at many of the annual conferences of the Methodist Church, cannot fail to do much in awaking an interest in that work in which Dr. Eby has borne so worthy a part. The breadth of view, the freedom from a narrow sectarianism and the passionate clinging to essentials which characterize this lecture, seem to have been gained amid the clash of old and new world elements

upon the soil of Japan. In the heat of the battle men do not think of uniform, nor the 'make' of the rifle. These are important, but effectiveness is supreme. The former editor of the *Chrysanthemum* has learned his lesson well. He presents a strong plea for broader culture of the ministry, for freedom from all worship of machinery, for sturdier common sense in religion and ecclesiastical effort, and for a sterner sense of the ethical demands of Christian doctrine in regard to this great problem. We wish Dr. Eby many years in which to speak such ringing, earnest words, and to inspire men, whether in Japan or his native land, by giving them views—outlooks and inlooks—which are ahead of the times, and by revealing to dull eyes the significance of present circumstances, and the fact that new occasions teach new 'duties.' We are glad to be able to promise our readers an article from Dr. Eby's pen, to appear in our next number, dealing with the subject of the possible ethical development referred to in this lecture."

"THE INDICTMENT OF THE LIQUOR TRAFFIC." By Rev. Daniel Dorchester, D.D. "A JURIST'S PLEA FOR THE SUPPRESSION OF THE LIQUOR TRAFFIC." By Hon. D. L. Rhone. "We have received from Dr. Dorchester these two pamphlets published by the National League (non-partizan and non-sectarian) for the suppression of the liquor traffic. The headquarters of this league are in Boston, and Dr. Dorchester is its President and Mrs. Ellen J. Foster, General Secretary. The existence of this league is a protest against the Third Party movement, and its object is to unite the temperance forces of the country upon a broad basis and give direction to the reform. One of these pamphlets is written by a Republican and the other by a Democrat. They are both in legal form, and are irresistible presentations of the subject. The former document is a perfect storehouse of well-arranged facts, and alone would furnish a good equipment for a temperance campaign, while the latter is a fine specimen of forensic eloquence by one of the foremost lights of the American bar. On every side the impression

grows that we are about to enter upon a terrible conflict. In Canada the battle thickens. The whole country has been startled by the sudden and firm stand taken by the *Toronto Mail* on this question. Without doubt the victory of the future is in the hands of the party which will be the first to place itself fairly and squarely in favor of prohibition. The tide is rising, the traffic must take its stand among the doomed things of the world. We need only competent leadership to give shape and effectiveness to the national sentiment in favor of the total abolition of this waster of our most precious race-elements.

NOTES.

A GRADUAL increase in the average size of the skull among the natives of India is said to be taking place as a result of civilization. It will take more brains to govern more brains. Wanted: Statesmen.

A CHEAP METHOD OF MANUFACTURING HYDROGEN.—A method has been discovered by Hembert and Henry for manufacturing hydrogen at a very low cost. A mixture of equal volumes of hydrogen and carbonous oxide is produced by projecting superheated steam, in fine jets, on incandescent coke. In another retort the gases are passed over a large heated surface, and by the injection of steam raised nearly to the point of dissociation carbonic acid and hydrogen are formed. The cost of production is estimated at about eight cents per thousand feet, and one ton of coke will yield 3,200 cubic meters of hydrogen.

MR. RUSKIN ON BEGGING.—A few weeks ago Mr. Ruskin received a circular letter asking for a subscription towards paying off the debt owed by a chapel in London; to which he returned the following characteristic reply: "Sir,—I am scornfully amused at your appeal to me of all people in the world the precisely least likely to give you a farthing! My first word to all men and boys who care to hear me is, 'Don't get into debt.

Starve and go to heaven—but don't borrow. Try first begging—I don't mind if its really needful—stealing! But don't buy things you can't pay for!!' And of all manner of debtors pious people building churches they can't pay for are the most detestable nonsense to me. Can't you preach and pray behind the hedges—or in a sandpit—or a coalhole—first? And of all manner of churches thus idiotically built, iron churches are the damnablest to me. And of all the sects of believers in any ruling spirit—Hindoos, Turks, Feather Idolaters, and Mumbo Jumbo, Log and Fire Worshippers—who want churches, your modern English Evangelical sect is the most absurd, and entirely objectionable and unendurable to me. All which they might very easily have found out from my books—any other sort of sect would!—before bothering me to write it to them. Ever, nevertheless, and in all this saying, your faithful servant,—JOHN RUSKIN.”

EMILIO CASTELAR.—Nature seems to have withheld from him all those defects and rained upon him all the excellences with which she has endowed all the sons of eloquence since Demosthenes. He is the beau-ideal of orators. Bossuet added the force of impassioned utterance to the religious fervors of an epoch. Danton, Mirabeau and Camille Desmoulins were the mouth-pieces of revolutionary tempest. Chatham was the orator of political vehemence and the budget. Webster, the majestic “expounder,” was the orator of lawyers. Gladstone, that Saxon Nestor whose winged words are wont to bleach the sordid politics of England in a night, is the most facile of parliamentary polemics. Free from the limitations of these Castelar adds to their various gifts a cosmic range of conception, a brilliance of expression wholly his own. He is the orator of the universal. Edmund Burke, the Bacon of political generalizers, talked to sleeping senators and empty benches. Castelar, with a passion for general truth more varied, because it is the passion of the poet, holds his audiences bound as with a spell. The resources of learning which feed the flame of his tongue

appear inexhaustible. The data of science and history are at his instant command, employed not as by other orators for rhetorical adornment, but woven in the woof of his thought. So prolonged, so accurate, so minute has been his examination of the past that every age appears to have exhaled to him its secret. As one hears him speak the winds of the centuries seem blowing across his fervid spirit as over an Æolian harp, issuing in solemn music from his lips. Describing his own consciousness in the presence of the Parliament, he has said, "I no longer see the walls of the chamber: I behold only distant peoples and ages which I have never seen." From Rome, Egypt, Assyria, Palmyra or Carthage he plucks his arguments and symbols, as if antique empires were but things of yesterday. His prodigious learning is no less at home with the present. The politics and policies, the histories and secret diplomacies, the arts, the literatures, the systems of economy of the European States, his familiar studies of the closet, fused in the glowing alembic of his brain, are poured out at will in the amazing flights of his oratory.—*W. J. Armstrong in Century.*

COLERIDGEANA.

SCHILLER is a thousand times more *heartly* than Goethe.

PAINTING is the intermediate between a thought and a thing.

THE dog alone of all brute animals has a *στοργή* (*storgē*) or affection *upwards* to man.

INTENSE study of the Bible will keep any writer from being *vulgar* in point of style.

THERE are three classes into which all the women past seventy that ever I knew were to be divided:—1, That dear old soul; 2, That old woman; 3, That old witch.

THERE are three great ends which a statesman ought to propose to himself in the government of a nation:—1, Security to possessors; 2, Facility to acquirers; and 3, Hope to all.