Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- [x] Coloured covers/ Couverture de couleur
- [ ] Covers damaged/ Couverture endommagée
- [ ] Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- [ ] Cover title missing/ Le titre de couverture manque
- [ ] Coloured maps/ Cartes géographiques en couleur
- [ ] Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- [ ] Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- [ ] Bound with other material/ Relié avec d'autres documents
- [ ] Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- [ ] Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.

- [ ] Coloured pages/ Pages de couleur
- [ ] Pages damaged/ Pages endommagées
- [ ] Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- [x] Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- [x] Pages detached/ Pages détachées
- [x] Showthrough/ Transparence
- [ ] Quality of print varies/ Qualité inégale de l'impression
- [x] Continuous pagination/ Pagination continue
- [ ] Includes index(es)/ Comprend un (des) index

Title on header taken from:/ Le titre de l'en-tête provient:

- [ ] Title page of issue/ Page de titre de la livraison
- [ ] Caption of issue/ Titre de départ de la livraison
- [ ] Masthead/ Générique (périodiques) de la livraison

- [ ] Additional comments:/ Commentaires supplémentaires:

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						✓					

NOVEMBER, 1885. VOL. III., No. 5.

Kosmos.

SCIENCE ASSOCIATION:
VICTORIA UNIVERSITY - - COBOURG, ONT.

CONTENTS.

KOSMOS (formerly *V. P. Journal*) is a monthly journal published at the beginning of each month, and is devoted to Science, Literature, Education, and the popular treatment of subjects of social, intellectual, and moral importance. It has been established and is controlled by the Science Association of Victoria University, which is composed largely of graduates, but *is not restricted to either local or sectarian interests.* Subscriptions may commence with any month. Extras to subscribers, 10 cents.

All business communications, addresses, changes, and all matters in reference to advertising, subscriptions, &c., should be addressed to

E. H. KOYL, Business Manager,
COBOURG, Ont.

Correspondence, manuscripts, and similar communications should be addressed to

THE EDITOR, KOSMOS,
Box 300, COBOURG, Ont.

$1.00 PER YEAR. ✻ **15c. PER COPY.**

KOSMOS.

VOL. III.] NOVEMBER, 1885. [NO. 5.

THE stars that glimmer in the depths of night
Are worlds as large and brilliant as the sun,
Whose blazing light doth hide their modest rays:
'Tis distance dwindles them to twinkling dots,
'Tis darkness only that reveals their light.
So with mankind—the blaze of selfishness
May fill the universe and hide all else
In floods of self-conceitedness:
But let each hide his light in generous shade,
And on his former blinded sight will shine
The light of others, faint at first and weak,
But, closer viewed, increasing bright and fair,
Most brilliant beams, far-streaming from great suns,
Illuming systems vast, and shedding light
On worlds as great as he, who, seen afar,
But faintly twinkles as twixt life and death.
In our own light we are the universe,
But in the light of heaven we are specks
Controlled by laws of universal sway,
Bound to a whole, grand, orderly, sublime.

MODERN EDUCATION.

THE Baltimore *Herald* gives the following report of Archdeacon Farrar's address on the occasion of the reopening of the Johns Hopkins University in that city:—

You must pardon me if I feel a little confused in being called upon to address such an audience as this. I was quite unprepared for it when I was told last night that my audience would embrace the rank, fashion, and beauty of Baltimore. Your nation is distinguished by many splended institutions founded by private munificence, and I only wish that the citizens of my city would oftener take pattern from you. No institution here is more likely to be of lasting future benefit than the Johns Hopkins University. If we work upon immortal minds, Daniel Webster says, we are then engraving that upon tablets which no time can efface, but which grows brighter and brighter to all eternity. Your university embraces all knowledge for its province, like Bacon, but wears no ecclesiastical badge, although the president tells us that its aim is to search for truth and maintenance of faith. Even Church history and direct theological teaching are not excluded from the public lectures. God has given us many Bibles. There are few that your university neglects. There are history, psychology, mathematics, with whose most abstruse problems you do not hesitate to grapple; languages, art, the revealer and interpreter of nature; science embracing every known subject. Your lecturers teach the laws of nature, and seek to lead the student from nature up to nature's God.

The exhaustiveness of your curriculum is nothing more than a distinct sign of the times. The exclusive education of English boys up to a very recent period comprised only the classics, and that in a pedantic way. I must say English boys used to be allowed to grow up in ignorance unfathomable, without a bottom or a shore. The system of education was one that produced either little prodigies or little dunces. It treated the plastic clay as though it were the unyielding marble and sought

to produce the same lustre from the slate as from the diamond. To a practical ignorance of English literature was added the complete ignorance of any form of science. There was even ignorance of everything that was best in the two languages to which everything else was sacrificed. I remember hearing of the schoolmaster who taught his scholars a good deal of Greek and Latin, but he admitted that he didn't know where Elis was. Seven or eight years of a boy's life in England used to be passed in *not* acquiring the inflection of a single Greek verb. Some could write Latin prose such that would make Quintilian stare and gasp, or such Greek verse that any Athenian schoolboy would have died of laughter at it. In those days not a single English grammer school had a science master; now the commonest is not without one. The condition of affairs in the colleges was at this time very much the same. Cambridge, to be sure, had its mathematics, while at Oxford, Latin and Greek were almost exclusively studied. This has all changed now, and in each college we give a due regard to every branch of learning.

I would indeed be a barbarian—or, as my friend Mr. Matthew Arnold calls it, a "Philistine"—if I had in those days been opposed to the classics as such. I did seek to destroy the autocracy of the classics, but not to abolish them. We can never afford to throw aside those languages which contain the noblest literature of the noblest nations of antiquity. I only pleaded then that Greek and Latin should not be *exclusive;* now I plead that Greek and Latin be not *excluded.* Indeed, now they are more studied than they have ever been, as distinctly scientific studies. There are two worlds—the world of man and the world of nature. Man controls nature, but nature includes man. The study of nature means not only a study of nature's laws, but also of man and his ways. We cannot, therefore, do without the accumulated experiences of the past. We are, after all, the children of the past. The past throbs in our present. It gives us our future hopes and our finest memories.

The exclusive dominance of Greek and Latin was due to their

inherent power. It was a result of the Renaissance, when the study of the classics caused a new light to burst upon the minds of men. Queen Elizabeth delighted in their study, while Lady Jane Grey, fairer or lovelier flower than whom never bloomed, was able to give up the exhilaration of the chase for the study of Plato's "Phædo." About that time, as an illustration of the power of the Renaissance, we see springing up grammar schools all over the nation. It is, then, an additional distinguishing feature of your university that among so many able professors you have such eminent professors of Greek and Latin. I think it was Mr. Cobden who said that a single copy of the London *Times* is of more value than all Thucydides. It's of no benefit to a boy to know where the River Illsis is, added Mr. Cobden, for if he were to go to Greece he would only see some Athenian female washing her clothes in it. Greek and Latin must be always worth study, if only for the beauty of the languages themselves. They are among the noblest instruments of thought ever elaborated by the human race. We cannot afford to ignore languages that come to us so fraught with lessons to mankind from the wrecks of barbarism and decay. Greek is not only the language of Homer and Hesiod, but also of the later Stoics, of the slave Epictetus, of the Christian Emperior Aurelius. It is also the language of the Holy Scriptures. If you know it you can read any ordinary Athenian paper of to-day. It is the language of both Socrates and Chrysostom. Read it and hear Demosthenes speak in the Pnyx, or St. Paul in the Areopagus. Latin is not merely the language of Ennius and Ovid, but also of St. Augustine; of freedom, for in it the Magna Charta is written: of legislation, of communication between foreigners. It is the language in which modern science was first given to the world. These two languages cover the widest range of human knowledge. Greek I may call the key to the temple not only of religion, but also to the garden of the Hesperides. Latin is the key that admits not only to the forum where burns the eloquence of Cicero, but also to the laboratories of science. Of these two languages it

may be said their fruits are the fruits of Nepenthe and their flowers the flowers of Amaranth.

A man is ignorant in these days if he knows nothing about the laws of nature around him. Our age is pre-eminently an age of science and progress. This century is unsurpassed in that respect. Our civilization has sped forward with almost indescribable rapidity. Huts have given way to cities; the virgin forest is filled with the scream of the steam engine. Fire, flood and air—all are the vassals of man. Now, there is nothing so revolutionary as a strain to keep things fixed when the law of progress is on its eternal course. The evil of everything may be traced back to that idea of selfishness—that it is our duty to preserve and not improve. There is the greatest difference among minds. Some, like my friend—for I may call him such—Dean Stanley, lean to the study of man; others delight in abstract philosophy; others again in the physical sciences. I received once a letter from the late Charles Darwin, in which he told me that when he was a school-boy he learned nothing whatever except what he had taught himself by private experiments in chemistry. The master discovered him and reprimanded him in the presence of the entire school, calling him a *poco curante*, "which," Mr. Darwin added, "as it was a word I did not understand, I thought meant something very terrible." Nothing is so unfortunate as when different minds despise each other, as they too often do. We, in these days, are able to see that the health and happiness of mankind may depend quite as much upon the researches of the etymologist as upon those of the philologist.

Look at the immense delight of scientific study. God means us to admire the beauty of all things. We are utterly unable to measure the degree of difference in happiness between the man with the seeing eye and hearing ear and him to whom sight and hearing are denied. Consider, too, the usefulness of science. Think of what we have learned by noticing the simplest facts. Nature may delight us all with its innocent enchantments, but it only reveals its meaning to the followers of

Hercules, who are the laborious seekers after truth. How many great discoveries might have been anticipated centuries ago if the powers of observation had been as rigidly trained as they were neglected! Notice also the wonderful linear advance of science. What strides have been made in the study of electricity since the Greeks named amber *electron*, because of its attractive powers! Now we know that the lightning is nothing but what any lady may brush out of her cat's back.

Let me add a few words as to the beneficence of science. Pindar said that men of science pluck of the fruits of wisdom that are valueless. How mistaken he was! The study of science begins in wonder and ends in wonder, with admiration filling up the intervening space. Science not only gratifies curiosity, but it is also a great archangel of men, devoting itself to the blessing of mankind, extending human life, relieving pain, painting with light the faces of those we love, enabling the miner to work with comparative safety, bringing eyes to the blind and hearing to the deaf, economizing labor, trampling on disease. Some people wish to know, it has been said, simply that they may know, which is idle curiosity; some that they may be known, which is vanity; some that they may sell their knowledge, which is cupidity; some that they may edify; some, but of all, that they may be edified. Education is intended neither for amusement, for fame, nor for profit, but to know God and glorify Him in heaven hereafter. Our education is desired that we may become profitable members of the Church and commonwealth, and hereafter partake of the glories of the resurrection; that, having toiled in God's work below, we may enjoy His Sabbath above. Education aims to train a man. Your late President Garfield, for whom I cannot but feel the deepest regard, was asked when a boy what he was going to be. "First of all," he replied, "I want to be a man; if I can't be that, I'm afraid that I can't be anything." Behind the scholar and the man of business stands the man! The far-reaching intellect, the eternal being, is above all. The deepest form of education is the education of righteousness. We live

by admiration, hope and love; they are parts of the traits of the spirit. Education, after all, means education of the spirit. It should result in faithfulness to the best we know; faithfulness to God; faithfulness to country; faithfulness to our fellowmen; faithfulness to ourselves!

> "Keep innocent. Be all true men,
> Let neither pleasure nor pain appal,
> Who hath this, he hath all things;
> Having nought, they who have it not."

Our education can never be perfect unless, like the ancient temples, it is lighted from the top. Only an education of religion can give us happiness and permanent success.

NERVES AS SCIENTISTS.

BY PROF. BORDEN P. BOWNE.

AMONG the conceptions with which advanced science has enriched the world are those of thought without a thinker, religion without a God, automata with duties, impersonal immortality, etc. This new wine of science has very seriously strained some old mental bottles, but its generous warmth has put new life into such veins as could receive it. There is no need, however, to dwell upon these epoch-making conceptions, as they are already familiar to most readers, and indeed furnish the mental and moral food of not a few. But there is one conception already in sight above the horizon, which seems worthy of especial consideration; in fact, it may prove to be that "all-inclusive generalization" whose coming has been so often foretold. This is the conception of nerves as scientific investigators. But this conception is so vast that we can take it in only by degrees or by a series of slow approaches.

It is now almost an axiom with advanced thinkers that all physical events go along by themselves without any interference from without. The pushing and pulling forces of matter determine all physical change, aggregation and movement. If

I wish to know why an atom is where it is, I must look to its physical surroundings and history for the explanation. This is as true for organisms as for the solar system. If I move my arm it is not due to my volition, but to the contraction of a muscle; and this in turn is due to the contractibility of muscular fibre under nervous influence. The nervous action, again, is due to an explosion in some ganglion or ganglia, whereby molecular energy is liberated, and this is due to other facts of the same kind. Nowhere do we find anything but physical consequents of physical antecedents. Hence the physical series goes along by itself. As advanced thinkers we are shut up to this view. The earlier notion that physical energy becomes thought or feeling has long been abandoned as involving complete ignorance of physical science. The notion still lingers in the writings of some rhetoricians, but has no credit with those who know. Prof. Clifford dismisses it summarily as "nonsense." There is nothing to do then, but to declare that the physical series goes along by itself, and that thoughts and volitions, if they exist, simply attend the series as a shadow attends its substance. As such they are absolutely dependent upon their physical ground, yet as such they involve no expenditure of energy. This remains always on its own side of the house, and is expended in working the nerves. The vulgar materialist supposes that the brain produces thoughts which detach themselves from the physical cause and thereafter proceed on mental principles and with a measure of independence. For him the brain has the function of producing mind, and mind when produced has the same functions of guiding and controlling life as it has in the spiritual view; but the scientific materialist knows that thoughts have no ground of existence or movement in themselves. They come and go or combine just as the nerves determine, while the nerves belong to the physical series and go along by themselves. This is the advanced view. When Prof. Huxley wrote his lecture on "The Physical Basis of Life" he thought our volitions do count for something in the course of events; but at a later period in his lecture, on the

"hypothesis that animals are automata," he advanced to the declaration that he sees no reason for thinking that any state of consciousness in general is only a collateral product of the nervous mechanism and stands outside of the dynamic circuit, dependent and powerless. There is no need to quote other authorities.

Here, if anywhere, in the presence of this grand conception, would be a fit place for the cosmic emotion of Prof. Clifford, or for the cosmic worship of Strauss. The most stolid mind can hardly avoid a feeling of awe and wonder; while the sensitive neophytes of the new religion must surely prostrate themselves in rapturous adoration. But we postpone our worship to a more convenient season in order to return to our main thought of the nerves as scientists. A mathematician, say Newton or LaPlace, sits down to mathematical study of the solar system. For his crude thought, his volition seems to have something to do with it, and his thoughts seem to flow one from another, but nothing of the kind is the case. The thoughts come and go according to the principles of nerve-mechanics, and determine nothing in any case. The nerves, too, are not conscious of the problems, and of course get neither light nor guidance from the thoughts they produce. They have a double task to perform. First, they must produce the illusion of a conscious thinker who fancies that he is proposing and studying problems and that his thoughts flow along in logical connection. Second, they must carry on the physical processes of preparing diagrams, writing equations, explanations, demonstrations, corollaries, scholia, etc., by a blind, pushing and pulling of the molecules concerned, and this they must do in such a way as to produce logical harmony and connection. Otherwise demonstrations and diagrams might get very much mixed. If we ask how this is possible, either we are referred to the "nature of things," or we are told that nervous systems have been evolved. Either suggestion is adequate and both together make the facts transparently luminous. The illusion referred to in no way aids the process, being in fact but so much extra work.

Indeed the nerves could write the book more easily without the thinker and his thoughts, as they only complicate the problem. It produces a feeling of the sublime to contemplate the nerves, as they incite to the drawing of diagrams of which they know nothing, and to the writing of equations of which they are ignorant. A simple pushing and pulling which on its effective side is purely unconscious, results in the production of a series of symbols whose mental significance is most profound, and whose logical connection is absolutely perfect. In the presence of this great mystery of the molecule, the throbbings or cosmic emotion are with difficulty repressed. In this way Newton's "Principia," and LaPlace's "Mécanique Céleste" were produced, and, greater wonder still in this way, even the works of our advanced thinker were produced; that is, without any intervention or guidance of thought whatever. Remember the writing of these works is purely a matter of physical movement, and the physical series goes along by itself. What, then, wrote the "Principia," the "Mécanique Céleste?" A couple of organisms which, for the sake of distinction, we call Newton and LaPlace. These were in marvellously complex relation of interaction with the environment, and there was also a very wonderful play of nervous discharges along lines of least resistance, together with divers differentiations of the homogeneous and manifold integrations of correspondences. The plexuses and ganglia, too, wrought bravely, and nascent motor excitations overcame the weaker, and precipitating themselves upon the muscles, wrote the two greatest scientific works the world has ever seen. Hence the propriety of our claim that the nerves, aided and abetted, of course, by the other factors of the organism, are the real scientific investigators.

In the civilized world to-day a vast deal of work is done in the interests of science. Journeys are undertaken and expeditions are fitted out for the observance of some rare phenomenon. In our laboratories countless experiments are made with the utmost ingenuity. Lectures are written, books are printed, heated controversies are carried on, all to determine or expound

some point in science. Yet this intent activity is ruled by no purpose and has no aim. The real agents in it know nothing of it. The observers of the recent eclipse found themselves at their posts, because of no purpose, but because their bodies went there on their own account. The experimenter in the laboratory, who fancies that he is adjusting his apparatus to an ideal conception, is quite mistaken. The nerves conduct the experiment and produce the illusion, being meanwhile unconscious in both. Unless we allow something more than nerves, we must admit that they are the sure and only scientists. To the unenlightened this must appear to be an extreme supposition, and doubtless many will resent it as a caricature. No one, it will be said, could ever believe that nerves left to themselves would produce the "Principia" or the "Mécanique Céleste." This is probably true, but a good many have said things which led by a short way to the conclusion. All the tendencies of pure intellect are said to be in this direction; and to deny it is to deny the "persistence of force." To suppose it otherwise is to assume something in connection with the nerves which is not nerves, but which exercises a measure of control over them; and this is a dreadfully antiquated notion—indeed, quite paleontological. Nor let anyone think that by experiment he can determine whether his volitions count for anything in the course of physical events: for consciousness—the only witness in the case—is ruled out as incompetent. Nor would it avail to protest, for that would be set down at once as "theological rancour;" and besides, thousands of theologians have perished miserably in their gainsayings of science. As for the advanced thinker, none of these things move him. He is as indifferent to logic and absurdity as his nerves. He cares only to know that a view is "in harmony with the tendencies of advanced thought," and that is ample proof and defence. If said tendencies should change, he would change also; but it is vain to hope for change on other conditions. He cannot depart from the traditions of the elders. He cannot defile the graves of the prophets of his sect. Any absurdity rather than disloyalty and

dishonor. An advanced thinker once, an advanced thinker forever. Even the noun may be abandoned if only the adjective be retained. It is greater glory to be advanced than it is to be a thinker; and if the two will not unite, by all means keep the adjective. The age of faith is over, but as full compensation we have the age of credulity. Belief in miracles vanishes to be replaced by belief in magic.—*Boston University.*

EDITORIAL.

THE growing importance of the history school at Oxford is shown by the foundation of historical societies at many of the colleges.

ERRATUM.—In Mr. Houston's article in September KOSMOS, entitled "Old English in Universities," the name of "Evart," page 119, should have been printed "Sweet." It was a typographical error, overlooked in correcting the proofs.

THE Electric Power Company of New York announce that they have established an electric railway running from Baltimore to Hampden, two and a-half miles. The road is very crooked, and the gradients are as high as three hundred and fifty-two feet to the mile. The motor draws a loaded car, carrying sixty-five passengers without difficulty, stopping and starting on the grade without slip of the wheels.—*Science.*

"EVOLUTION IN HISTORY, LANGUAGE AND SCIENCE."—Four addresses delivered at the London Crystal Palace School of Art, Science and Literature. Price 15 cents, post free. J. Fitzgerald, publisher, 393 Pearl Street, New York. "This interesting work forms a valuable addition to the series of popular scientific works known as the 'Humboldt Library.' The number of works published in that series now amounts to seventy, including many of the most celebrated writings of Huxley, Spencer, Tyndall, Darwin, and others."

THE Chautauqua University has 4,000 members of the class of 1885, who have pursued its course of study for four years and of these 200 were present at the commencement day at Chautauqua. The oration of the day was by one of the counsellors, Edward Everett Hale, and addresses were made by Senator Warner Miller and others. Greetings were sent to a class of 800 Japanese and to the South African branch. Diplomas were given to 200 who were present, and will be sent to 800 more. It is said that nearly 100,000 persons in all parts of the world are now pursuing the Chautauqua course of study. —*Independent.*

OBERLIN THEOLOGICAL SEMINARY announces the adoption of the elective system. The completion of the course required attendance on 1,050 hours of instruction, of which 515 are in required studies. There is provision for 1,087 hours in elective studies. The course offered by the professors vary from year to year, but all the courses are given in each period of three years. Nearly all of both Old and New Testaments may be read in class. A course in Chaldee, in which there are at present 12 students, one in Septuagint Greek and one in Biblical Theology of the Old Testament have been added. The complete course in History of Doctrine occupies 120 hours. Some new courses in History have been added, among them one on Modern German Theology, from Semler.—*Independent.*

PROF. GEORGE J. LAIRD, a graduate of Victoria University, and for two years science professor at Mt. Allison University, N. B., has gone to Germany to complete a course in science at Breslau University. He will likely be absent about three years, when he hopes to attain to the standing of a Doctor of Philosophy. Chemistry will be his chief subject. Our best wishes go with him for a successful career. He is the fourth Victoria graduate who has sought the halls of Breslau. Of the others, Dr. R. B. Hare has just died while actively engaged in work at the Agricultural College, Guelph; Dr. A. P. Coleman fills one of the chairs of Victoria University, Cobourg; Mr. P. T. Pilkey

died some two years ago in Germany, ere completing his course. It is needless to say that these men have all sought the same famous seat of learning, mainly through the influence of their science professor, Dr. Eugene Haanel, who also bears his degree of Ph.D. from Breslau.

LIQUEFACTION OF OXYGEN.—M. Cailletet, the French physicist, who in 1878 delighted the scientific world in liquefying several of the lighter gases, has recently communicated to the French Academy the details of a simple method which he has devised of liquefying oxygen gas. The experiment is so readily performed that it may enter into the regular course of experiments in our laboratories. Its success is based upon the intense cold produced by the evaporation of ethylene. Cailletet has found by means of the hydrogen thermometer that he can obtain a temperature of as low as 123° and 125° by this means. This liquid when boiled in the open air gives a temperature low enough to cause oxygen, if compressed, to show when the pressure is diminished a boiling appearance. By conducting the evaporation in a vacuum the temperature is reduced to such a degree that the oxygen is made liquid. To avoid the inconvenience of working in a vacuum he has suggested the use of methane, by which the liquefaction of oxygen and nitrogen also may be easily secured. The ethylene is however preferred, and in Cailletet's process it is evaporated by forcing into it a current of dry air or hydrogen at a very low temperature. Oxygen is obtained as a clear, colorless liquid, limpid as ether.

ONTARIO'S SHORE-LINE.—At the late meeting of the American Science Association held at Ann Arbor, but little of interest or of great importance was introduced. We notice in the geology and geography section a short summary of a paper by Mr. G. K. Gilbert, treating of an old shore-line of Lake Ontario which he has traced on the south. With the help of a good map the lines can be easily followed. "From Hamilton, Can., to Sodus, N. Y., it runs parallel to the modern shore. It then turns southward and deviously outlines a great bay, studded with islands,

which occupied the basin of the Oswego River and its branches from Lyons to Rome, and sent a narrow arm to Cayuga Lake. East of Lake Ontario it is once more parallel to the modern shore. The outlet was then at Rome, and the discharge flowed down the Mohawk valley. The plane of the old water surface is no longer horizontal, but inclines southward, with an average slope of about four feet to the mile, and westward more gently. At Adams centre, in Jefferson county, it is 650 feet above tide; on the north shore of Oneida Lake, 480 feet; along the Erie canal, 430 feet; near Rochester, 423 feet; at Hamilton, 350 feet. Subsequent to the epoch of this shore-line, the water surface of Lake Ontario was depressed below its present, as is shown by many of its bays, which occupy valleys wrought by post-glacial stream erosion. Mr. Gilbert's working hypothesis is, that the shore-mark associated with the Rome outlet records an epoch in which the retreating ice-sheet still occupied the St. Lawrence valley. The northern side of the basin was then relatively depressed; and when the water finally escaped past the ice at the north-east margin of the basin, its surface rapidly fell to a position below the present shore. The existing system of levels has been effected by subsequent crust movements."

A LATE number of the *Fortnightly Review* gave an interesting account of the Paris newspaper press, by Theodore Child. The names of *Le Temps*, *Le Figaro*, *Journal Des Dèbats* and *Le Petit Journal* are almost as well known as those of the *Times*, *Standard*, and *Pall Mall Gazette*. The most famous names of French journalists would include MM. Wolff, Renan, Taine, Clemenceau, Fouquier, Rochefort, Paul de Cassagnac, Jules Simon, Vacquerie, Vitu, Sarcey, and a host of others of equal reputation. Of these, each may be said to be a specialist, and by close and careful study of some one line of work has won a world-wide reputation. Newspaper work in Paris is far different from that in England or America. The ambitious Frenchman engages a small office, or it may be part of an office, for his sanctum; contracts with one of the immense publishing

establishments for the printing of his paper; rents *en bloc* the whole of his advertising space to one of the advertising agencies; and then sits down to work, bothered about only two things—the preparation of copy and the subsequent sale on the street. Paris journals have not always had the enterprise they at present display, but American capital stepped in and founded a new paper, *Le Matin*, in 1884. Its founder, Mr. W. A. Hopkins, established his own printing office, arranged for his private telegraph lines, and infused such a spirit of activity and success into it that at present it has paid all expenses and is rapidly making its way to the fore. The circulation of the papers varies greatly with the nature and cost; but the list is headed by the cheapest of all, the *Petit Journal*, whose daily circulation is almost one million, with another two hundred thousand for its Saturday supplement, containing articles from Zola, Dumas, Sardon, etc. One reason for the very large circulation can be found in the universal desire of the French for fiction, and the catering to that desire on the part of the journals.

In the following note we have a proof of the growing political and scientific importance of Christian missions. M. Pélagand, whom the French Minister of Public Instruction has sent through Syria on a "scientific trip," reports in the columns of the *Nouvelle Revue* concerning the work of Protestant missions in the Orient:—"It is difficult to form an adequate conception of the work which Protestant mission societies are accomplishing in the East, and of the large sums of money which are spent for this purpose. In Syria scarcely a village can be found where there is not a Protestant school; even in the most remote valleys of the Hermon I have found such schools. I speak not of Hasheiad or Rasaya, which are comparatively important places, but rather of such localities as Medjel-es-chan, a dismal village in the deserts of Trachonitis, where I found a school with a pretty female teacher, who also aided me in finding valuable fossils. In Beirut a German hospital works hand in hand with the American University, which, with the practical sense of the

Anglo-Saxon nations, is teaching the natives all the sciences and especially is training excellent physicians. The French colony in Beirut has been making sport of the Arabic doctors, but this only goes to show our traditional superficiality ; for all of these young medical men, after having completed their course, scatter over the country, and constitute just so many agents for the English language, English institutions, and even for English politics. All this will some day bring forth its fruits. We were astonished at the magnificent arrangements, the large collections for the study of the natural sciences, their fine chemical laboratories ; in short, over the whole outfit of the school." Hand in hand Anglo-Saxon and the Christ are conquering the world.

ENGLISH IN TORONTO UNIVERSITY.—Mr. Wm. Houston, Legislative Librarian, Toronto, is, as the readers of this magazine already know, an enthusiastic advocate of the cause of English. He believes that the study of our native language is as important as that of classics, and, to further his wishes, has drafted a course for submission to the senate of Toronto University at its next session. The objects aimed at are stated as follows in his own words :

1. To make English more prominent than it has hitherto been, partly because of its intrinsic value as a course of study, and partly to keep the Provincial University abreast of other universities in English scholarship.

2. To secure for every undergraduate in the University :

(*a*) A thoroughly practical training in English prose composition, and an intimate acquaintance with several English prose masterpieces.

(*b*) A comprehensive course of classical English poetry, including (subsequent to matriculation) works of Shakespeare, Milton, Dryden, Pope, Cowper, and Spenser.

(*c*) A complete view of the history and development of English literature, the poetical texts of the third and fourth

years being selected entirely from authors of the historical periods assigned to those years respectively.

(*d*) A fair knowledge of the history and philology of the English language, as well as of its grammar, rhetoric, and prosody.

3. To secure for those who desire a more thorough course:

(*a*) A more minute acquaintance with the works of at least two poets of the present century, in the second year, of Milton in the third, and of Shakespeare in the fourth.

(*b*) A practical study of old and dialectal English by means of Anglo-Saxon and more recent texts, including selections from Chaucer and Burns.

(*c*) The benefit of constant reference to the most approved treatises on English philology, including Anglo-Saxon, English, Scottish, and Shakespearian lexicons.

Chaucer's Canterbury Tales are the oldest texts generally studied, but in this course the student will be taken back to the perusal of Beowulf. As to the importance of the study of Anglo-Saxon and early English, we refer our readers to the article in the September KOSMOS, entitled "Old English in the Universities." Among the other writers somewhat unfamiliar to college students are observed the names of Rossetti, Mrs. Browning, Clough, and Robt. Browning. Longfellow and Irving are the only two American writers. Here we beg to offer a suggestion and submit for consideration the name of a third, James Russell Lowell, whose essays on Chaucer, Dryden, Shakespeare and other writers, would assist very much in the study of these poets' works. Lowell's style is pleasing, his ideas original and his use of metaphor and simile unsurpassed in the English language. Could anything be more perfect than his picture of Hamlet. "Like a musician distrustful of himself, he is ever tuning his instrument, first overstraining this chord a little, and then that, but unable to bring them into unison, or profit by it if he could." Goethe's comparison of the implanted pine tree shattering the vase is lifeless beside this. Of Coleridge he says, "The most decrepit vocable in the language throws

away its crutches to dance and sing at his piping." But we must be brief. Every one to his taste, however. There are not a few English students to whom Lowell's clearly written essays would be preferable to some of the misty mutterings of Sartor Resartus. Another suggestion we offer is the introdution of a standard novel each year for study and criticism. How can the student intelligently study the development of novels in his text-book without having read Ivanhoe, Vanity Fair, David Copperfield, and Daniel Deronda? We must admit that this course could not include everything, but possibly a little *light* literature of the best grade would not overweight the whole. We sincerely hope that Mr. Houston will succeed in his undertaking, and that other universities will soon offer an equally broad and attractive course of reading and study to the students of Canada.

In glancing over "The Art of Speech," by Townsend, we came across the following version of the 23rd Psalm. Below we give the translation of the same into pure, biblical, Anglo-Saxon English. Which contains the more sincere religious thought and expression? Why?

"Deity is my pastor, I shall not be indigent. He causeth me to recline on verdant lawns: he conducteth me beside the rippled liquids. He reinstalleth my spirit: he conducteth me in the avenues of rectitude, for the celebrity of his appellations. Indubitably though I perambulate in the glen of sepulchral dormitories, I shall not be perturbed by appalling catastrophes; for thou art present, thy tower and thy crook insinuate delectation. Thou possessest a reflection for me; in the midst of inimitable scrutations, thou perfumest my locks with odoriferous unguents; my chalice exuberates. Unquestionably benignity and commiseration shall continge all the diuturnity of my vitality, and I will eternalize my habitude in the metropolis of nature."

1. The Lord is my shepherd; I shall not want.
2. He maketh me to lie down in green pastures:
   He leadeth me beside the still waters.

3. He restoreth my soul:
   He *guideth* me in the paths of righteousness for his name's sake.
4. Yea, though I walk through the valley of the shadow of death,
   I will fear no evil; for thou art with me:
   Thy rod and thy staff they comfort me.
5. Thou preparest a table before me in the presence of mine enemies:
   Thou *hast anointed* my head with oil; my cup runneth over.
6. Surely goodness and mercy shall follow me all the days of my life:
   And I will dwell in the house of the Lord forever.

If the very men who are now trying to persuade Irish American voters that Ireland has been impoverished by "British Free Trade" were privately asked the cause of the greater prosperity of Ulster over other parts of Ireland they would probably give the answer made familiar by religious bigotry—that Ulster is enterprising and prosperous because it is Protestant, while the rest of Ireland is sluggish and poor because it is Catholic. But it is not worth while to attempt to disprove this stupid assertion. The true reason is plain. It is that the land tenure in Ulster has been such as to leave there a far larger proportion of the wealth produced than in other parts of Ireland, and that the mass of the people have not been so remorselessly hunted and ground. In Presbyterian Skye there exists the same general poverty, the same primitive condition of industry as in Catholic Connemara, and to talk about the want of a protective tariff or religious opinions being the cause of the backwardness of industry among a people who are steadily stripped of all they can make above a bare living, is like attributing the sinking of a ship with a hole in her bottom to the want of a figurehead or to the colour of her paint. —*Henry George.*

IN MEMORIAM.

DEATH has once more robbed us of a friend. A few weeks ago Dr. R. B. Hare, Professor of Chemistry and Geology in Guelph Agricultural College, was called away with little warning by an attack of apoplexy, leaving a young wife and two little ones to lament his sudden end. His loss will be mourned by a wide circle of friends, not only in Canada, but in Germany; for his genial, whole-souled nature attracted friendship everywhere. He was an enthusiastic student of science during his course at Victoria; and both as assistant in physics and chemistry to Dr. Haanel, from whom he gathered inspiration, and as a loyal and hard-working charter member of the Science Association, he displayed in many ways that eager and truth-seeking spirit which characterized his life. Here and at Breslau University he toiled hard and successfully at his chosen subjects, and won the respect and affection of both students and professors. Few young men have been honored by so intimate an association as he with men of world-wide fame, such as Cohn, the eminent botanist; Von Lassaulx, the mineralogist; and especially the renowned geologist, Roemer, in whose house he was a constant and welcome visitor. When, after four years of study, he graduated *magna cum laude* as doctor of philosophy in the grand Leopoldine hall of the venerable university, nothing but good wishes and regrets at his departure followed him on his journey home to Canada. Want of a suitable position induced him to become Science Master in Hamilton Collegiate Institute for a time, until a more appropriate place was offered in the chair of Geology and Agricultural Chemistry in Guelph. And now, when but in his prime, he is taken from us, leaving to his many sorrowing friends fragrant memories of his enthusiasm for all that is pure and good, of his warm-hearted, wide-reaching affection, and of his earnest and living Christianity. Rarely shall we find a man so true, so earnest, so generous, and so broad in his sympathies and aspirations as our departed brother, Dr. Hare.

VASTNESS OF THE STELLAR WORLDS.

IN an eloquent sermon preached last month in Westminster Abbey by Canon Duckworth there occur some very beautiful passages, well worth quoting. I make the following extracts, in which the speaker gives a vivid picture of the vastness of the worlds above us. When the psalmist asked himself the question, "What is man that thou art mindful of him?" (as he contrasted him with the magnificent heavens above him) he did so lost, as he was, in contemplation at the grandeur of the heavens—"the work of thy fingers, the moon and the stars, which thou hast ordained." And yet, what was his knowledge of the heavenly host at that time compared with ours? Canon Duckworth says:—

"The heaven to which the psalmist lifted his wondering eyes was for him but a spangled dome, over-arching the earth. Not one of the few thousand stars which studded it, not even the most glorious of luminaries itself—the sun— . . . did he suspect of being comparable . . . with our own planet. . . . And yet, observe, so bewildering in their vastness were the circumstances to which even his imagination rose, so radiant were the orbs which nightly glittered in the sky, so impressive was the witness borne by their splendor, their permanence and their order, that man seemed to shrink into utter insignificance in presence of them. . . .

"These heavenly bodies, on which the devout Israelite gazed, are known to us to be no more than the nearest outlying sentinels of the mighty host which the telescope unveils. Each advance of the optician's art invades a new region and brings into view new myriads of worlds. And the astronomer assures us that the little patch of sky focussed by the telescope as its field of vision contains as many stars which are invisible to the naked eye as the whole vault of heaven displays to the unaided sight.

"In a recent review of modern scientific discovery we have been told that our earth is but a fraction of one out of at least *seventy-five millions of worlds!* But, indeed, there is no bound,

and no hint of a bound, to the prodigality of creation. . . . We have no reason for supposing that the specks of light—the rays of which have taken thousands of years to reach us—are any nearer than we ourselves are to the outer limit of the universe.

"It is no hyperbole to speak of the infinitely great and the infinitely small; they are terms of truth and soberness in a boundless creation! For where existence begins no miscroscope has discovered, and where existence ends no telescope has revealed, or ever will reveal. . . .

"We cannot but speculate as to the ends which this infinitely vast creation may be serving. . . . We cannot resist the suspicion that these innumerable spheres may be teeming with every variety of intelligent life. Nay, can we well doubt that some of them must be the scene of moral and spiritual experiences at least as momentous as our own? . . . If each of these suns which sparkle in the midnight sky is ringed round by satellite planets, every one the abode of conscious life, and perhaps the theatre of some tremendous probation; and if all need the same divine oversight and nurture and love, how prodigious is this demand upon a presiding Providence! . . .

"If the magnitude of creation dismays, the minuteness of creation reassures. I know that there are creatures so small that no naked eye has ever beheld them; there are some so minute that only the intensest powers of the microscope can detect them; yet these are framed with a skill and are decked with a beauty so exquisite that no greater has been lavished on the most imposing organisms we see. . . .

"Whether those other worlds which gem the realm of space are peopled or not by undying souls over whom God watches with a love as intense as He feels for us, we cannot tell; but we accept as inspired the revelation that the human soul comes from God and goes to God—that it lives on in conscious identity, linking the present to the past and the future to the present in a chain that can never end." . . .

TORONTO, *October 8.* J. GEORGE HODGINS.

A NATIONAL SYSTEM OF EDUCATION.

WHAT Canada needs very much, and what she will have before many decades, is a truly national system of education. As there were two nations in Canada over a hundred years ago, so there are two to-day. There must come an end to this state of affairs. Canada cannot afford to pretend to any kind of national life while there are two distinct and hostile peoples forming her elemental parts. The two parties or nations are the English-speaking and progressive race, and the French-speaking or stand-still class. Furthermore, the latter are not true to the spirit and genius of a great Canadian nation unless it be a *French* nation.

By some means Canada must change her tactics. One of many plans I shall here propose, and which if followed would do much to unite Canadians, nay more, *to blend* Canadians into one homogeneous mass, having the same sentiments of patriotic sympathy for the *same* land and flowing from the *same* fountain of national life. *One language for Canada and Canadians!* One united people must be our motto. Had our earlier governments acted on the principles which guide statesmen, and forced all to learn the English language in all Canadian schools, we would not be in the disgraceful plight of to-day. Largely we are in the position of two fierce and inveterate enemies ready to fly at each other's throats. Why is it so? Simply this. We are *foreigners* to each other. We meet and try to *parlez vous*, but it will not work. Germans come to Canada and wisely learn the English as fast as they can. They see plainly they must suffer or accommodate themselves to the country in which they live. How foolish for them to say, We came from Germany, and are bound to be Germans and to build up a new Germany in this land! They have better sense. Their plan is to be true to the fatherland but patriots to their adopted home and the Empire of which Canada is an honored and honoring part.

The French, on the other hand, have been foolishly taught to

be true and patriotic to France while they *pretend* patriotism to Canada. They are to be pitied more than blamed. They see as they are and have been taught. Here is the matter in a nutshell. Majorities must rule. Every nation must be a united people. The ever-increasing majority in Canada are English-speaking. The majority are true to the Empire most naturally. The minority are averse to the Empire in feeling, and most naturally by language and education. The French, when they see their best interests, and they soon will, won't for a moment hesitate to accept the language of the nation, the spirit of the people, and the education necessary to make them members of a great commonwealth.

The plan is already foreshadowed by the above. But how shall we make it workable? Let there be a commission of representative men appointed from each of the provinces. In fact these commissioners should be the Provincial Ministers of Education. These men should, in company with a Dominion Minister of Education, meet and arrange for, and work out into a good form, a National System of Education. The foundation on which this system should be erected must be a thorough study of the English. In every school in each of the provinces English must be the subject pre-eminently obligatory. Following up this plan, provision could soon be made by the proper authorities by which all official documents in every department of public action and life must be written or printed in English *alone*. This at first would be a hardship on the French. But it could be done quietly and judiciously—but done. In the long run the French people would be delighted with the change. Of course by that time they would not be French; nothing more than Canadians whose forefathers were French; just as Irish, English, Scotch, Germans and others are becoming Canadians as fast as possible, while they are proud to claim descent from their ancestors' native land, whether from Erin, Caledonia, Albion, Germania, or in this latter case from Franconia. This should be so, *and will be accomplished.*

It is not to the point to tell us that the United States adopts

no such plan. They are an English-speaking people and do not need any such a system at present. How wonderfully quick the people called Americans are in blending all comers with themselves! They started right in early times. They recognized only one people and nation. Thus their work has been easy on that line to the present. We started with two nations. We are two to-day. We should have been one from the first. We should be one now. *We will be one in the future.* If our present rulers will not face the work and begin to put the machinery in motion, others will shortly be in their place and will show them how to legislate for a nation's best interests. Our past and present curse is easily understood. It is plain and can be expressed in few words. Canadian legislators aim at controlling legislative acts for their own extension of power and office. Protestant rulers pretend to be friends to Catholic parliamentarians. Roman Catholics pretend friendship for their Protestant compatriots. They are mutually aware of the fact that they are both lying. And largely this is the result of our present system of Separate Education, which has been a curse, is a curse, and will be a curse till the accursed thing is ended.

Let us have *only one* system of education in Canada. Let it be the same in all provinces as soon as possible. Let our children learn they are not so much French, or Irish, or Germans, or English, or Scotch, or Papists, or Protestants, as the greater fact that they are Canadians.

Let our legislators rule with a firm hand, wisely and justly—but for our people's sake and for the sake of our future let them give up cringing to and fawning upon sect and party.

It will be noticed that the plan suggested above is not out of harmony with the scheme outlined in an earlier number of KOSMOS. These reforms will all be adopted during the present generation, in spite of opposition. X.

ENERGY OF THE SUN.

MOLECULES and atoms form the material out of which the scientist constructs the universe, or rather it is into atoms and molecules that he resolves all material things. We cannot comprehend the size of these atoms; no more can we comprehend the size of the sun and those distant stars which, though revolving in immense orbits, nevertheless to us with our limited senses appear to be fixed and immovable—and these are but the outposts, the sentries of the innumerable hosts and myriads of worlds that lie beyond, as yet unrevealed to human eye. Upon the supposed yet probable existence of these molecules and atoms have been founded many of the great and leading theories of modern science.

In the universe there is no such thing as independence—true, absolute independence. Each part exerts an influence on the whole, and the whole exerts an influence on each part; the whole is governed by laws of interdependence and harmony, and as we understand the linking of the parts together and the harmony of the whole, surpassing anything attainable by us, we cannot but admit, unless biassed and prejudiced, the presence of design.

Though we are able to comprehend so little of the extent of the universe, either of the invisible molecules or the mighty system of worlds that fill the heavens, yet we are able to gain some knowledge of the general laws that govern them, whether they be systems of molecules or systems of worlds.

We have said there is no such thing as independence, and to this our own world is no exception. Let us endeavor briefly to point out what we owe to outside influence—what part one other world contributes to the general workings of this world of ours.

One would think that ninety-two millions of miles would be sufficient to break the influence of the sun, if space at all could do it; but no, we find that that is the proper and the only distance at which he could exert such beneficial influences as we shall now enumerate.

And first we observe that the sun holds the earth in its orbit in space, which is comprehended under the law of gravity, whereby every body exerts an attractive influence upon every other body. It is the same force that causes all material things to drop toward the centre of the earth; it is the force that underlies our ideas of weight.

Between us and the sun our senses tell us there is nothing, nothing but empty space. The scientist, however, in his conception goes beyond the senses, and in the invisible builds a theory, which we have not space here to question, but accept for the present on the ground of authority. He says that all space is filled with an invisible, perfectly elastic ether, rarer than any known gas and imperceptible by any of the senses. The undulations or waves of this ether constitute heat and light. The motions of this ether striking upon the molecules of our body, or of any body, set these molecules in motion somewhat in the same manner as the motion of the air striking upon the strings of an Eolian harp set them in vibration. These vibrations of the human body are transmitted to the brain and the mind translates them as *heat*. Similar vibrations of the ether, however, strike the eye, which is differently constructed from the rest of the body, and therefore the motions or vibrations transmitted will be different, and the mind translates them as *light*. Heat and light are thus both caused by the same rays. The eye and the body may be compared to two harps differently strung: the same breeze sweeps the strings of both, but the sounds resulting are quite different.

These rays of heat and light play a great part in the origin of the forces and phenomena of the world. As they come from the sun at the rate of 186,000 miles per second they first encounter the ocean of atmosphere that surrounds the earth. The heat being most intense at the equator, the air there is heated, expands, and becoming lighter ascends, when the colder and heavier air from the north and south rushes in and produces a wind. To this cause can be attributed the great prevailing winds on the earth's surface. 'Tis the sun we see that drives

our windmills and propels our boats; 'tis the sun that overpowers us with heat, but also sends the cooling and refreshing breeze; 'tis the sun that howls in the tempest and murmurs in the gentle zephyr.

But further, the rays penetrate and strike the surface of the water, causing it to evaporate, rise and condense in heavy clouds, where it is stored until some intervening mountain pierces it with its cold peak; the copious rain descends, the water rushes down the slope, sparkling among the rocks at first, but soon rushing with the mighty river's force back to its native home, turning as it goes the miller's wheel or carrying down the products of the forest.

Thus to the sun we must attribute the formation of the clouds, the welcome showers and the beauty of the rainbow, the blinding snowstorm and the destructive hail, the mighty glaciers and the mountain avalanche, the tiny brooklet and the rushing river.

Man is an æsthetic animal, having an eye for the beautiful, an appreciation of variety that blends and harmonizes, and this is especially marked in the perception of color. The wise and designing Creator has not made all the rays the same, though as they come direct from the sun bound into bundles of white light they appear to be the same. We behold the difference of the rays as they lie spread out across the sky in the beauty of the rainbow. These different rays reflected from the surfaces of substances—different rays being reflected by different surfaces—constitute what we call color. There is no color in the dark; light produces shades and tints.

The sun clothes Nature in her various hues, whether it be the glistening white of her wintry mantle, the beautiful green of the spring foliage, the golden hues of the summer grain, or the brilliant tints of the autumn leaves.

As the sun disappears below the west, we are apt to think that we are no longer debtors to him until the morrow's dawn begins anew the actions of the day, but, as we enjoy the beauty of the moonlight, we must not forget that it is the same sun's light, mellowed by reflection.

Who has not admired the weird beauty of the auroral lights, the merry dancers of the north, the arcs of light that rest upon dense banks of fog and darkness, breaking into long and slender beams that shoot upward toward the zenith, and at length appear to converge together and form a crown, ever changing in its outline and its brilliant colors—one of the grandest scenes of the earth or heavens, grander because of the want of variation in the monotony of the polar regions. With the appearance of these displays is connected the electricity of the earth. At the same time the astronomer observes dark and deeply agitated spots of darkness moving across the surface of the sun, and connects the aurora and the movements of the stores of electricity with the sun, though how or to what extent remains as yet an unsolved problem to the scientist.

The mission of the rays is not yet completed. Animals for their existence require oxygen, which exists free in the atmosphere, while the vegetable world requires carbon, and how beautifully nature supplies the required wants. The pure oxygen of the air is breathed in by the animal, seizes upon and unites with the carbon which is not required in the system, and comes forth as carbonic acid gas, which, were it allowed to accumulate, would soon smother all animal life; but the vegetable world here intervenes, seizes upon this carbonic acid gas, depriving it of its carbon, which goes to make up the woody fibre of the plant, and gives off the pure oxygen for the benefit of the animal world. What is necessary for the decomposition of this carbonic acid gas? Plants, as you know, require sunlight for their growth. Some of the solar rays are required to fall upon the leaves of the plant and thereby cause the carbon and oxygen to be disunited. Thus we see how the two kingdoms, animal and vegetable, work for each other's prosperity, and are dependent upon the sun to assist in maintaining the purity of the atmosphere. The sun is a source of life to the vegetable world, and is therefore the origin of all our wood; and we may say the same of coal, for coal is but the vegetable accumulation of bygone ages, it is nothing else than mines of

former trees and plants compressed and laid away by a wise and foreseeing Providence for the future use of man. To-day, indeed, we live in the enjoyment of the light of bygone ages.

But the animal world is ultimately dependent upon the vegetable world for nourishment, and to the sun as the source of all food we must attribute our existence as living beings. The sun is necessary for our food, and for the purity of the blood that nourishes our brain. Shall we then say that it is the sun that lives within us? Shall we then say that it is the sun that thinks and moves our being? This is the conclusion that the materialist must ultimately reach, but in this consideration of our subject all that we need admit is that as mind and body are at present united and conditioned the sun is *necessary* for our thoughts, not the originator of them.

We could continue, had we space, to enumerate how the other phenomena of the earth are dependent upon the sun, but we presume from what has been mentioned that you can form some idea of the influence of the sun upon the workings of the world.

Though separated by so great a distance, how intimately connected with every movement upon the surface of the earth is the condition of the central star of our small system!

If the earth is an offspring of the sun, as many scientists declare, what a close relationship binds the offspring to the parent! How dependent is the one upon the other! How necessary for the welfare and progress of the child is the unvarying condition of the parent sun! The sun it is that gives it heat, and thereby determines the condition and relationship of the different chemical elements; it gives it light and adorns it with its various colors; it purifies its atmosphere, controls its electricity, causes the breeze to blow and the rain to fall, bedecks the heavens with clouds, bends the rainbow, gilds the polar regions with the auroral light, lays up fuel and provides all food; and for man in particular how necessary—warming, lighting, clothing, feeding him, being even necessary for his every thought. Instead of the question, "What does the sun for us?" we might better ask ourselves, "What does not the sun for us?"

We can hardly wonder at the ancients bending the knee to such a god as this, on which they were so dependent, even though ignorant of the greatness of that dependence.

Let us look now more closely into some of these phenomena that we have here enumerated.

The sun, we said, draws the earth toward it, and the earth draws the moon, and the moon the earth to such an extent that the water on account of its movable nature is attracted into an immense tidal wave. These bodies possess power, they overcome resistance, and are capable of doing work,—in other words, *they possess energy.* The moving wind does work, it overcomes the resistance of the sails, so we say the wind possesses energy. The coal that drives our engines does work, it also possesses energy. The rays of light are able to decompose the carbonic acid gas, cause the water to evaporate, expand the air and do work in various other ways, so that the rays of the sun also possess energy, and this energy is termed radiant energy. The clouds are capable of doing work, for when circumstances are favorable the cloud will fall in the form of rain and work will be done, so that the cloud also possesses energy. From these examples you will readily see what is meant by the scientific term energy—it is the power of doing work, of overcoming resistance in any and in every form.

We said that rain possesses energy, and that a cloud also possesses energy. They are quite different examples—the rain is in motion while the cloud in all probability is at rest, and is therefore not actually doing any visible work as is the rain, but they are both said to possess energy. Suppose there is a weight upon this table: I shove it off and it falls to the floor, and as it falls it is able to do work, and therefore possesses energy; but as it lay upon the table it possessed energy as well; action and reaction being always equal and opposite, it required the upward pressure of the table to keep it in its place, and when this upward pressure was removed it shewed its energy as it fell. This energy possessed by a body while in actual motion is called kinetic energy, while the energy due to a favorable

position is called potential energy. Thus the weight *at rest* upon the table possesses potential energy, but as it falls, as soon as it begins to move, this is changed into kinetic energy. It is somewhat similar to the man who is skilled in surgery, he is called a surgeon whether he be in actual practice or not—he is as much a surgeon before the limb is amputated as while engaged in the amputation, for he possesses all the powers and capabilites for doing the work when the circumstances require.

Energy is visible in the universe under various forms, but they may all be reduced, as far as known, to eight heads, though scientific research may any day simplify them or add some additional forms. Let us briefly enumerate them.

1st. We have visible energy of actual motion, which is observed in everything that moves. The storm, the stream, the moving vessel, the train, the cannon ball, the movements of animals, are common examples.

2nd. Visible energy of position, as examples of which we may mention the rain cloud, a stone placed on the top of a hill, or a head of water from which the miller can draw as he desires.

These two forms of energy belong to the visible world; for the remainder of our energies we must go to the molecular world, and instead of dealing with things visible we must consider the different forms of energy possessed by molecules and atoms.

The third form of energy that we will mention is one that we have already touched upon, and called radiant energy—the energy of the rays of heat and light. If we allow the rays to fall upon a body, a gas for instance, two operations seem to be performed: the molecules are pushed or caused to more farther apart and thereby do work, and manifest—

4th. The energy of molecular separation. The value of this energy is observable in the steam engine, where the molecules of steam separating with such mighty force push forward the piston rod and thereby propel the train. But some of the heat that is absorbed disappears in some manner not observable in the expansion or heating of the gas, being employed in giving

some other motion, rotary it may be, to the molecules. This is termed—

5th. Energy of absorbed heat. It is the same as that usually called latent heat.

These last two forms of energy are more intimately connected with the world of molecules, but, as we mentioned before, these molecules are made up of atoms. The atoms have an attraction for each other—the atoms of hydrogen unite with the atoms of oxygen to form molecules of water, but in so doing resistance has to be overcome, therefore these atoms existing apart and at rest possess an energy that is called—

6th. Energy of atomic or chemical separation. This is the energy that makes our wood and beds of coal of value, for the atoms of carbon in the coal unite with the atoms of oxygen in the air with such force that heat results.

We have reserved for the last that wonderful and mysterious agent, electricity which is of late being so widely used, and is being developed into such a powerful assistant to mankind. Electricity is of two kinds, positive and negative, as they are called, which are of such a nature that a body positively electrified is attracted towards a body negatively electrified, and hence, on account of this attraction, energy is manifested which is called—

7th. Energy of electrical separation. This is a form of energy of position. If a piece of glass be rubbed with a piece of silk, the glass will become positively electrified, and the silk negatively, and we will have here a store of energy of electrical separation.

Electricity, however, displays its power in another form, viz., in the electric current, or in electricity in motion, which is our eighth and last form of energy.

We have already, to some degree, shewn how these different forms of energy are interchanged, how one form of energy gives rise to another. The principle source of the energy of this earth is from the sun being, for the most part, made up of radiant energy—the energy of heat and light. Let us again

follow some of these rays, and observe the different changes or transmutations of energy. When the rays strike the leaves of plants the radiant energy is changed into the energy of chemical separation, the rays of light are gone, they exist no more but in the carbon of the wood, and the oxygen, if set free in the air, lies stored up, this energy waiting for the approach of man. The coal or wood is taken to the furnace of the engine, where the energy that has lain dormant, as it were, springs into activity as the carbon and oxygen again rush together and give rise to heat or radiant energy, which, coming in contact with the water in the boiler, changes it into steam, the radiant energy being now manifest under the new form of energy of molecular separation, and the power of this we soon see as it pushes forward the piston rod and sets in motion the whole machinery of the engine; and now, as the train rushes along at the rate of thirty miles an hour, we see the energy under the head of visible energy of actual motion. We are carried along so comfortably and so quickly, and it is of such a common occurrence, that we little think we owe it to the sun, nor does the thought impress us, true as it is, that we are carried by a train of energy that started from the sun ages upon ages ago at the rate of 186,000 miles per second. Suddenly the whistle blows, the brakes are down, and in a moment we are standing still; our visible energy of motion is gone, but where? If you examine the brakes and rails you will find them hot—friction has stopped the train and converted the energy of visible motion into heat; but gradually the brakes are growing colder, and soon the heat is gone, and with it has gone the energy. It is gone under the form of radiant energy of low temperature; it is no more within our control, it is no longer available for the wants of man. As radiant energy it came to us, it has undergone various changes, been locked up for centuries, and now, once more returned to the form of radiant energy, it has gone to return no more; gone on a journey through the boundless limits of space, to increase the quantity of useless energy that fills the interstellar spaces;

it has gone, as an author states, "to swell the waste-heap of the universe."

Let us consider the transmutations of energy as connected with the animal world, which may be more interesting as affecting us more personally. An animal is an animated machine, complicated in its manipulations and delicate in its construction, and of such a nature that the mind, the agent that controls it, is as it were within it, and very intimately connected with it and its doings.

To run this machine fuel is required in the form of food, and for this the vegetable world is held responsible, since the animal world ultimately subsists upon vegetation. Food, as we have shewn just before, possesses energy of chemical separation, which, after entering the system, is manifested under the forms of energy of bodily heat and visible energy of actual motion, which, under the direction of the mind, is able to manifest itself in such a multitude of ways. Every action is thus due to the transformed energy of the solar rays. Who would imagine that the rays of the sun, as they start so many millions of miles away on their journey through space, were to undergo such wondrous changes, and perform so many offices in the workings of the world? Those little vibrations of particles, utterly beyond all power of comprehension, united in their power and determined and unyielding in their action, cause a whole world to tremble, and traversing all space with lightning speed, shake with their tiny fingers the whole universe.

Thus could we trace the transmutations in other cases, if time permitted. Going backwards we would ultimately arrive at the sun as our source of energy in nearly every case, the only valuable exception being in the case of the tides, which of course are due to influence of the moon. Going forwards, and following up the course of the energy, we would in most cases be able to trace the various changes of the energy, until at last we would lose track of it, as under the form of radiant energy of low temperature it left the earth to swell the quantity of unavailable energy in space.

There are two conclusions that we may draw from this: First, if we are dependent upon the sun as our source of energy, and if, as scientists tell us, the sun, by its great outpouring of radiant energy, is gradually burning low, a time will come when, deprived of heat and light, and all the accompanying phenomena which we before enumerated, the earth will be a machine to all intents and purposes dead and useless. Second, if the different forms of energy are all changing, and gradually deteriorating into the energy of heat of low temperature, a time must come, inevitably, when all the fires of the heavens will be exhausted, and the whole universe become an equally heated mass, utterly worthless for the production of work.

In all these transmutations there is observed one thing upon which they depend, viz., that energy is never obliterated or destroyed; the energy that reaches us as radiant energy, again leaves the world under the same form. At times energy may appear to be destroyed, but it is only lying stored away, as in the case of coal and all energy of position waiting for the proper time to again manifest itself. This is one of the principal ideas which this essay intended to present, that while all these energies may be inconstant, ever changing from one form to another, yet, as a whole, they are always the same—the combined sum or quantity ever remains the same, so that no new energy can be created, and none destroyed. "Energy," one author says, "may be like the magicians, of whom we read that they had the power of changing themselves into a variety of forms, but were nevertheless very careful not to disappear altogether."

Can you, with your finite mind and finite power, conceive yourself able to create anything anew, whether it be matter or whether it be force? Can you out of nothing develop something, or obliterate something into nothing? Can you, out of powerlessness, create a power or reduce a power, an energy, to nothing? If living, rational man cannot do it, how can we expect dead matter to accomplish it? Such can only

belong to an Infinite Being possessed of omnipotence. This theory, that while the eight forms of energy are continually changing from one form to another, the sum of all at one time, the whole quantity of energy in the universe, is the same as that at any other time—this theory has been developed of late years, being upheld by most of the leading scientists of the day, and has by them been termed the theory of the conservation of energy. This theory, however, must be applied to the universe as a whole, not to a part, as for instance, to our own small world, for, as we have already shewn, the available energy of this earth is gradually becoming less.

SAVET IMER.

SAVET IMER was a man of retiring disposition, quiet and reflective. Being the heir to a large fortune, and also of industrious habits, he determined to use both for the improvement of the world and for the acquisition of an immortality of fame. He sat down and thought. Eight hours for sleeping, two for eating, two for recreation, one for dressing, one for resting and gossiping, and ten for business made up the average day's routine. He said to himself: "I require eight hours' sleep because I have worked hard for ten, and I work that I may earn sufficient to buy food. I require two hours' recreation to offset my work. I dress because I sleep and eat. I rest and gossip after my meals. If I didn't work and sleep, I couldn't eat; and if I did not have to eat, I wouldn't have to work, and perhaps would not have to sleep. Eating, working, resting, sleeping, all are dependent the one upon the other, and if I can but dispense with one the others must also disappear. *Eureka!* I have found my life work: I shall devote my talents and time to the solution of this all-important problem, *Life without eating*, and thereby introduce the grand millennium; for if we do not eat we shall not need to rest and sleep. Time shall be redeemed, the twenty-four hours shall be snatched from the

hand of this cruel tyrant, and I shall use them for—for—for the contemplation of my own giant intellect and reflection upon the greatness of my discovery."

This decision reached, Savet Imer set himself to work upon his herculean task. He rented a long, narrow garret with one single window that looked upward to the stars, and through which the philosopher was wont to gaze for hours, seeking for inspiration in the vast depths of blue or the faint specks of gold that flecked the sky. Gradually he reduced his hermit allowance of bread and water, and with it both the desire and necessity to walk up and down his narrow cell. In the course of a few weeks he had so disciplined himself that he was able to lie upon the floor continuously, with a hardened crust of bread and a jug of water beside him. The only interruption to his peering through the narrow opening above him was when at the break of day he broke a bite from the crust, and, dipping it in the water, put the moistened bread into his mouth. Hope and faith in his undertaking sustained his spirits, for he was already able to spend twenty hours of the day in silent contemplation. Not possessing the needless luxury of a glass, he was unable to observe his shaggy appearance, his long, knotted hair, attenuated cheeks, and large, terrifying eyes. Another week and he had robbed sleep of its fourth hour. Slowly he gained upon the time-destroying monster, and the prospect of success gleamed from his eyes with piercing brightness. The three hours dwindled into two and the two into one. But a few crumbs remained and scarcely sufficient water to moisten his tongue; but in another day he would need no more food, and time must hand itself over to him, a willing slave. One by one the moistened crumbs dissolved in his mouth, and the hero prepared himself for the last struggle with time. Twenty-three hours of the day crept by, and the last, with tardy steps, followed on. Second after second, and a moment was gone; moment added to moment, and at last but one remained. Time was his, and the keen sense of success animated him. He slowly raised himself with difficulty and stood erect, the conqueror of all time.

Words had not escaped his mouth for weeks; but now, as the last seconds ticked by, he raised his hand and prepared for an exultant shout. "I"—a feeble whisper shook his whole frame and caused a grating sound—"have": he trembled like an aspen leaf, and his eyes, blurred and rolling about beyond control, refused to let in the light of day. Another effort; but as the faintest whisper escaped his lips he shook and rattled to the floor. The last ray of the sixtieth second of the twenty-fourth hour shone through the window on a little heap of crumbled dust. Savet Imer had solved the problem; he had conquered sleep and work and had no longer need of food; he had all eternity before him for the contemplation of his own littleness and the reflection upon his follies.

TEMPUS FUGIT.

SELECTIONS.

PROF. CHARLES K. ADAMS, of the University of Michigan, has been appointed to succeed President White, of Cornell.

JAMES RUSSELL LOWELL defines a really civilized woman as "one who knows the difference between literature and books."

BY music we reach those special states of consciousness which, being without form, cannot be shaped with the mosaics of the vocabulary.

NO one thinks he owes us anything who hath borrowed our time, when this is the only thing which even a grateful man cannot repay.

THE different species of insects are believed to number 222,000, of which beetles form 93,000, orthoptera 7,000, and neuroptera 4,000.

IT has been observed by Professor Holdefleiss, that beet seed sown in a pot in which the soil was exposed to the electric light by night germinated two days earlier than similar seed without the action of electric light.

MOUNT KINCHINGINGA takes it name from four Tibetan words, signifying "a handful of great snowy peaks." Mount Everest's local name is Devadenga, "God's home."

DR. CHARLES MACKAY says: "The true origin of the word 'Angles,' is the Celtic or Gaelic *on*—the definite article—and *Gaidheil* (in which the consonants *dh* are not pronounced), which signifies the *Gael* or the *Celts;* whence *An-geal,* not *Angles.*"

ALL the people now living in the world, say 1,400,000,000, could find standing room within the limits of a field ten miles square, and by aid of a telephone could be addressed by a single speaker; in a field twenty miles square they could all be comfortably seated.

THE *Microscope* describes a pretty experiment: Upon a slip of glass put a drop of liquid auric chloride or argentic nitrate, with a half grain of metallic zinc in the auric chloride, and copper in the silver. A growth of exquisite gold and silver ferns will form before the eye.

THE organ of hearing is generally double, but not always located in the head. In the clam it is found at the base of the foot; some grasshoppers have it in the four legs, and in many insects it is on the wing. Lobsters and crabs have the auditory sacs at the base of the antennæ.

QUERIES.—What would be the effect of an irresistible force striking an immovable body? Why does a long-handled screw-drive have more power than a short-handled one? As the mouth of the Mississippi river is two and a-half miles higher than its source, does the river run up-hill? If from the stern of a vessel which is sailing directly east, at the rate of twenty miles an hour, a cannon ball be fired directly west, and the ball move with a velocity of twenty miles an hour, how far will the vessel and ball be apart at the end of an hour?—*Ans.* Twenty miles.

How Large is the Sun?—If we were at its centre our moon would revolve in its orbit but little more than *half way to the sun's surface.* If it were a hollow sphere, there would be sufficient room to accommodate more than 1,200,000 balls the size of our planet. The earth is a mere homœopathic pill in comparison with such a body, and if projected on its bright disk would, from our orbit, be absolutely invisible to the naked eye.

It is in the Pacific Ocean that what is probably the deepest water on the surface of the globe has been found. In latitude 11 deg. 24 min. N., longitude 143 deg. 16 min. E., English scientific explorers dropped the sounding line to 4,575 fathoms—about five and one-fifth miles. The American steamer *Tuscarora* sounded 4,600 fathoms east of Japan. Thus it would seem that the greatest heights of mountains and the maximum depths of the sea very nearly correspond.

Spiders' Silk Stronger than Steel.—The strength of spiders' silk is enormous compared with that of metals. A bar of iron one inch in diameter will sustain a weight of twenty-eight tons; a bar of steel, fifty-eight tons; and, according to computation based upon the fact that a fibre only one four-thousandth part of an inch thick will sustain fifty-four grains, a bar of spiders' silk an inch in diameter would support a weight of seventy-four tons. In other words, spiders' silk has nearly three times the supporting strength of iron.

The ignoring of the importance, grandeur, and beauty of the human body is common to both educated and uncultured. The latter does not know, the former does not reflect, that the conscious *ego* has no demonstrable existence independent of the aggregation of organs and apparatus which constitute the body. The spirit tenant might chafe unheard, unfelt, unknown, if the avenues of the senses were also closed, and consciousness, emotion, be never manifested were the brain, out of which they were evolved, not rightly formed.—*Dr. G. Ven.*

HENRY GEORGE remarks:—"What more incongruous than the administering of Custom House oaths and the searching of trunks and hand bags under the shadow of the statue of "LIBERTY ENLIGHTENING THE WORLD."

HOPE AND FEAR—A FRAGMENT.

HOPE is a sunbeam, bright and gay,
Dancing about on a summer day;
Fear is a shadow, gaunt and grim,
Always hiding away from him;
Hiding behind each tree and tower,
Dodging around each leaf and flower,
Skulking away, in the dark to grope—
Fear is afraid of the light of hope.—*Chicago News.*

OMITTING London with its four million inhabitants, the fifteen chief cities of the British Empire are as follows, including three colonial cities in order:—

Glasgow	674,095	Dublin	249,602
Liverpool	573,202	Edinburgh	236,000
Birmingham	421,258	Bristol	215,457
Manchester	338,296	Belfast	210,000
Leeds	327,324	Bradford	209,564
Melbourne	305,000	Nottingham	205,298
Sheffield	300,563	Montreal	200,000
Sydney	250,000		

NOR should it be forgotten that though in the extreme division of labor there are many occupations that do not add directly to the stock of wealth, they do in many cases not only add to the sum of enjoyments, but in this way indirectly aid the production of wealth. For man does not live by bread alone. He is not an engine, in which so much fuel gives so much result. A good song tells like muscle on a capstan bar or a topsail halyard, and a "Marseillaise" or a "Battle Hymn of the Republic" counts for bayonets. A hearty laugh, a noble thought, a perception of harmony, may add to the power of dealing even with material things.—*Henry George.*

SOME of the material used to color glass is extremely valuable. Oxide of gold gives a ruby color; and often, to save expense, a plain white dish, bottle or cup is veneered with a thin coating of ruby, thus giving the same effect. Sometimes the clear glass is allowed to show through in some form of the design, thus giving a transparent picture upon a ruby background, as is the case, though in different colors, of course, with cameos. Oxide of cobalt is used in making a blue color, oxide of manganese in amethyst, copper scales and iron ore in green, iron ore and manganese in orange, etc. It is a peculiar fact that all the colors of the spectrum may be produced by oxide of iron.

TO THE CONSTANT.

I AM not constant as you constant rocks
That have their bases under ocean's floor,
That yield no piteous span, receive no score,
Though ships make thither, waves deal shocks on shocks:
I am but constant as the sea, whose flocks,
How wide soe'er they wander, evermore
Morning and evening crowd the vacant shore
At beck of her who smiles through silvery locks,—
Constant but as the oak, now bare and dry,
That soon the genial season shall restore
And its gray arms with fluttering honors fill,—
Or as the violet, that seems to die,
Yet can its azure angel lift it still
To greet the coming springtime as before.—*Atlantic.*

SOMEBODY says that "Man is the only animal that blows his nose." The alligator has a nose nearly two feet long, yet he never blows it; the elephant can reach over his nose and tickle his hind legs, and he often does, but he never blows it. The blue-nosed baboon has a cerulean proboscis of which the noblest animal must feel proud, but it goes unblown. The double-nosed pointer has immense capacity for blowing, but he never will; and the oyster, whose nose reaches clean round to his

back, refrains from exercising it. Man alone has to reach to the height of a pocket handkerchief, and he proudly waves his bandana as a sufficient proof of his superiority.

AN EDUCATED MAN.—According to Ruskin, an educated man ought to know these things: First, where he is—that is to say, what sort of a world has he got into, how large it is; what sort of creatures live in it, and how; what it is made of, and what may be made of it. Scondly, where is he going—that is to say, what chances or reports are there of any other world beside this, what seems to be the nature of that other world. Thirdly, what he had best to do in the circumstances—that is to say, what kind of faculties he possesses, what are the present state and wants of mankind, what is his place in society, and what are the readiest means in his power of attaining happiness and diffusing it. The man who knows these things, and who has his will so subdued in the learning of them that he is willing to do what he knows he ought, is an educated man; and the man who know them not is uneducated, though he could talk many tongues.

LIBRARIES.—The following statement will suggest some idea of the vast amount of literary labor which has been employed in the making of books, and of the comparative size of public libraries: Germany has more books in its libraries than any other nation. There are over 1,000 libraries in Austria, Germany and Switzerland, twenty of which contain over 100,000 volumes. France has six libraries of over 100,000 books, besides the National Library, which is the largest in the world. Great Britain has only nine libraries of over 100,000 volumes, and the British Museum pays out $10,000 annually adding to its collections. Spain has thirty public libraries containing altogether 700,000 volumes. The library in Washington contains 518,000 volumes and 170,000 pamphlets, and there are but five larger in the world—the French National, with 2,500,000; the British Museum, 1,500,000; St. Petersburg, 1,000,000; Munich, 900,000, and Berlin, with 750,000.

MR. ARLO BATES tells in the Providence *Journal* a story illustrating the extremes to which the worship of literary greatness has at times gone in Boston, whatever may be its present state. "In the latter part of Mr. Emerson's life, when his mind had failed somewhat, his daughter came into his library one morning and found him entertaining a stranger, a Boston woman. As Miss Ellen entered, the sage looked up with an expression of hopeless bewilderment. 'Ellen,' he said, 'I wish you would attend to this lady; she wants some of my clothes.' Trained by long experience to the vagaries of the lion-hunting female, Miss Emerson was yet rather taken aback by this somewhat startling announcement; but the visitor proceeded with a voluble explanation that she was making a 'draw-in' rug, 'a poet's rug,' made of poets' cast-off clothing, Mr. Longfellow had given her an old shirt, and 'if Mr. Emerson had a pair of worn-out pants——.' Whether she got the trousers report sayeth not, 'but surely,' says the Chicago *Standard*, 'such ingenuity of impertinence deserved some reward!'"—*Literary News.*

"AN odd and common error," said a microscopist, "is that every drop of water we drink is teeming with animal life. There never was a greater mistake. It is very rarely, indeed, in water, that any animalculæ are to be found. If a little bit of grass or shred of meat, or any other organic matter be left in water for two or three days, there they can be found. It is supposed that a peculiar kind of organism like eels can be found in vinegar. It may be that away back in the country where they make vinegar out of apples and not out of aquafortis, there may be some, but they don't seem to thrive in city vinegar. Another thing, people think that hairs are hollow. The hair is no more hollow than a fence post, and the coloring matter, instead of being filled in a tube, is mixed up in the cells of the hair. The mistake never would have occurred if it had been recollected that the hair is but a modification of the epidermis. Then there is another idea that the human skin is as full of pores as a sponge." The fallacy of this idea was

demonstrated by the microscopist's taking a slice with a razor off his hand and putting it on a slide. The reporter was surprised to find that the pores were very scarce indeed, appearing to be about a fiftieth of an inch apart.

THE human species may be divided into those who do and those who do not worship Browning. The term worship is no exaggeration. Societies, as is well known, have been formed for the purpose of mutual help and invigoration in interpreting the sacred volume and bringing to light the boundless treasures which are supposed to lie hidden beneath its inspired but enigmatic language. Dante had a chair founded to interpret him immediately after his death; but Browning has received a similar honor in his lifetime. The sceptical are in the habit of remarking that it is singular that people should be tasking their brains in concert to discover Browning's meaning when the living oracle himself is there and might, if appealed to, at once resolve their doubts. But the exploration of the mysterious is an intellectual luxury in itself, and nobody wants the propounder of the riddle to tell him the answer at the same time. Besides mystery is a wholesome exercise of faith. Why cannot Browning be as intelligible as Æschylus, Goethe, and Shelley, who are just as subjective and just as deep as he is? This is the question which the despairing student of "Gordello" or "Paracelsus" asks himself; and perhaps he begins to suspect that the age of poetry must be past and that the age of science must have fully come if the great poet of the day can be the most brain-cracking of metaphysicians. The difference between the Browning-worshipper and the non-Browning-worshipper, we take it, is the work of Nature and congenital, so that to turn one into the other by reasoning or intellectual appliance of any kind is impossible. But if conversion were possible, it would be wrought by the fervid faith, the rich language and the impressive delivery of Archdeacon Farrar. There are some who would rather listen to the commentator than read the text. —*The Week.*

CHAFF.

EPITAPH.—"He was shot by his attendant. Well done, good and faithful servant."

"STRIP majesty of its externals and it is merely a jest—m) a jest (y."—*Edmund Burke.*

TEACHER.—"What is velocity?" Pupil—"Velocity is what a man puts a hot plate down with."

THE dude is a hybrid, though not high-bred animal. Its clothes are ridiculously perfect, and it is perfectly ridiculous.

THIS very sage advice was given by an aged priest: "Always treat an insult like mud from a passing vehicle—never brush it off until it is dry."

A SCHOOL of fish are very much like a school of boys—they play hookey, are caught lyin', are brought up sharp with the rod, and feel the effects of the baiting.

A GALVESTON school-teacher had a great deal of trouble making a boy understand his lesson. Finally, however, he succeeded, and drawing a long breath remarked:—"If it wasn't for me you would be the biggest donkey on Galveston Island!"

THE following epitaph is to be found on a tombstone in Montreal:—

"Freddy, dear, you are here alone,
Johnny wants to know, for little Joe,
Where do you now stay,
Or with what little boys do you now play,
Or where do you roam,
For the little iron cot your mother bought
Still waits for you at home."

THE following original observations on astronomy are from a Welsh curate preaching to an English congregation:—"A starr is but a litl dot in the skyee. Saw many starrs mek one plannat. Saw many plannats mek a constellesshon. Saw many constellesshons mek one milkee we. Six milkee wes mek one rorriborriallis."

Valuable Books for Ministers and Students.

Parkman's Works. Popular edition. 10 vols. 12mo, cloth. $15.

Montcalm and Wolfe. By Francis Parkman. 2 vols. 12mo, cloth. $3.

Popular Lectures on Scientific Subjects. By H. Helmholtz, Professor of Physics in the University of Berlin. Translated by E. Atkinson, Ph.D., F.C.S. In two vols. 12mo, cloth. $2 60.

The Puzzle of Life; AND HOW IT HAS BEEN PUT TOGETHER. A short history of the formation of the earth, with its vegetable and animal life, from the earliest times, including an account of pre-historic man, his weapons, tools, and works. By Arthur Nicols, F.R.G.S. Illustrated. 12mo, cloth. $1.25.

The Principles and Practice of Electric Lighting. By Allan A. Campbell Swinton. 12mo, cloth. $1.75.

Lays of Ancient Rome. With Ivory and the Armada. By Lord Macaulay. With several illustrations. 12mo, cloth, gilt edges, $2.10. Cheaper edition, cloth, 35 cents. Cheaper edition, paper, 20 cents.

Language and Languages. Being "Chapters on Language," and "Families of Speech." By Rev. Frederic W. Farrar, D.D., F.R.S. 12mo, cloth. 412 pp. $2.10.

Prophecy and History in relation to the Messiah. By Alfred Edersheim, M. A., Oxon. D.D., Ph.D., author of "Life and Times of Jesus the Messiah." 8vo, cloth. 391 pp $2.75.

First Principles of Faith. By Marshall Randles, author of "For Ever," "Substitution," etc. 8vo, cloth. $2. "Another strong book."—*The Methodist.*

Movements of Religious Thought in BRITAIN DURING THE NINETEENTH CENTURY. St. Giles' Lectures. By John Tulloch, D.D., LL.D. 12mo, cloth. 336 pages. $1.75.

Why We Believe the Bible. An hour's reading for busy people. By J. P. T. Ingraham, S.T.D. 12mo, cloth. 155 pages. 75c. The dedication to this manual indicates briefly its purpose:—"To the Jews, from whom the Bible came; to the Gentiles, to whom it came; and to all who would like to confirm their faith in the Bible, but who have not leisure for large volumes, this book is respectfully inscribed."

The Pentateuch; ITS ORIGIN AND STRUCTURE. An examination of recent theories. By Edwin Cone Bissell, D.D. 8vo, cloth. 484 pages. $3.50.

In the Volume of the Book; OR, THE PROFIT AND PLEASURE OF BIBLE STUDY. With introductions by Revs. Joseph Cook and J. H. Vincent, D.D. (Standard Library No. 135.) By George F. Pentecost, M.A. Price, paper, 25c. "His freshness and suggestiveness, and his great knowledge of Scripture, admirably fit him to guide young converts in their Bible study."—*The Watchman.*

Letters From Hell. A startling and thrilling book, with introduction by George MacDonald. 12mo, cloth. $1.20. "This book was originally published in Denmark. In Germany it appeared very recently in a somewhat modified form, and has there aroused almost unparalleled interest, running through upwards of twelve editions in the course of a year."

The People's Bible. Discourses upon Holy Scripture. By Joseph Parker, D.D.

Now ready—
Vol. I., Genesis.
Vol. II., Exodus.

8vo, cloth. $1.75 each. (Other works by the same author in stock.)

Sam Jones: His Sermons and Sayings. 8vo, paper. 50c. net. "These shorthand reports give all the 'applause,' 'laughter' and 'side remarks,' adding vividness to the discourses. It is safe to say there is nothing like them in all pulpit literature."—*Zion's Herald.*

Sermons Preached at Ibrox. By Joseph Leckie, D.D. Cr. 8vo, cloth, 282 pp. $2.00. "A new—new at least to us—and original preacher has appeared. There is a strange impress of power in these discourses. They combine a frequent beauty and finish of expression of the newest kind."—*Expositor.*

Inspiration. A Clerical Symposium on "In what sense and within what limits is the Bible the Word of God?" By the Ven. Archdeacon Farrar, Principal Cairns, Prebendary Cairns, Stanley Leathes, Edward White, Prof. G. W. Olver, M.A., and others. 12mo, cloth. $2.00.

Bishop Simpson's Sermons. Sermons by Rev. Matthew Simpson, D.D., LL.D., late of the M. E. Church. Edited by Rev. Geo. R. Crooks, D.D., LL.D. 8vo, cloth. 454 pp. $2.75.

☞ Any book in this list sent, post free, on receipt of retail price. Usual discount to Ministers and Students. Send for our new Catalogue.

WILLIAM BRIGGS,

78 & 80 KING STREET EAST, TORONTO.

C. W. COATES, MONTREAL. S. F. HUESTIS, HALIFAX, N.S.

ONTARIO LADIES' COLLEGE,

WHITBY, ONT.

COLLEGE WILL RE-OPEN SEPTEMBER 3rd, 1885.

Parents thinking of sending their daughters from home to be educated are asked to consider the following **Special Advantages**, which have contributed to the present success and popularity of the ONTARIO LADIES' COLLEGE:—

1. An advanced literary course, with the privilege of preparing for professional or matriculation examinations.

2. A graduation course in **Instrumental and Vocal Music**, such as is given in the leading American and European Conservatories.

3. A graduation course in the principles of **Fine Art**, such as is given in the Ontario School of Art, with the same examinations.

4. Judicious training in home and social life by Miss Adams, the Lady Principal.

5. Beautiful buildings, capacious grounds, exhilarating exercises, low rates.

For Calendar and further information, apply at once to

REV. J. J. HARE, M.A.,
PRINCIPAL.

UNIVERSITY OF VICTORIA COLLEGE,

COBOURG, ONTARIO.

This Institution, so long and favorably known, is making rapid advances, presenting full courses in the Departments of

ENGLISH, FRENCH, GERMAN, THEOLOGY, CLASSICS, MATHEMATICS, MENTAL AND MORAL PHILOSOPHY, AND SCIENCE (Theoretical and Practical).

In May, '84, seventy-nine degrees were conferred in

ARTS, SCIENCE, LAW, THEOLOGY, AND MEDICINE.

Ladies are admitted to all the privileges of the University, and the number in attendance is steadily increasing.

For calendars and particulars, address

SECRETARY VICTORIA UNIVERSITY,
COBOURG, ONTARIO.