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NOTES.

UNIVERSITIES.—We have lately heard not a few persons, some of eminent fame, deplore the fact that in Canada universities are multiplying. These persons are of English training, and their ideas are English. England has many colleges, few universities, or examining and degree-conferring bodies. Germany has a host of gymnasia, corresponding very closely with our colleges, but she has also twenty-five universities. Switzerland has five German universities, Austria eleven, and Russia one (at Dorpat). Berlin has 241 professors and lecturers, and an attendance of over six thousand students yearly; Leipzig has 171 instructors and 3,166 students; Munich, 2,049 students; Breslau, 1,682. The total number of students at these universities is over twenty-five thousand.

IN performing its great function of establishing all the social relations between man and man, the voice readily calls forth sympathies and antipathies; its quality reveals better than words the true feelings of the heart. A voice that is clear, pure, limpid, conveys the expression of frankness; one that is hesitating, drawing, betokens dissimulation; a harsh grating voice indicates an evil disposition; while a voice that is sweet, harmonious, affects us as though it were the breathing of a gentle soul. Besides the effects of nature we have those of art. An orator wishing to make himself heard, or to produce a sensation, opens his mouth widely, and derives from the resonant cavities all the aid they can supply; if the

mouth be opened very widely and the breath emitted with force, the voice becomes imperious; such is the tone in which a military officer gives the word of command. Words simple enough in themselves become offensive when uttered in a harsh tone. When the sounds are uttered softly and rather tremulously, the words succeeding one another with deliberate slowness and imperceptibly lowering of pitch, the sympathy of the hearer is awakened. The orator who possesses a good voice, and who can at will assume the tones that best agree with the sentiments, emotions, and passions which he would arouse, will win the hearts of his auditors, whereas the grandest oration, delivered by an unpractised speaker, would fail to move them.

WE are pleased to notice the manly and decided stand taken by the newly-appointed Minister of Education, Hon. G. W. Ross, in reference to the much-mooted "Reader" question. It is certainly an anomalous thing that there should be three or four different series of "Readers" authorized at one and the same time for the public schools of a province like Ontario, and in declaring that there shall be but one, Mr. Ross is certainly conferring a boon on both parents and children, though possibly taking a step which will prove disastrous to more than one enterprising publisher. "The greatest good to the greatest number" is and ought to be the maxim guiding all true legislation. The question of university support, which has of late been so exhaustively discussed in the daily press, is also a very serious matter for the management of the Educational Department, and will tax to the utmost the energies of a talented and careful Minister to bring it to a satisfactory conclusion. We will anxiously await developments in this as in other questions now pending, and most earnestly hope party feeling will not be allowed to prevail, and members of parliament become mere blind partisans, acting in opposition to their principles of honor, and contrary to their ideas of truth and justice, when matters of such vital interest are under consideration.

HENRY GEORGE, the great land reform agitator of the 19th century, and author of "Progress and Poverty," has met rather a chilling reception in the various towns and cities of England in which he has been lecturing. None of the leading men have countenanced him whatever, and some, as the Hon. John Bright, have spoken strongly in opposition to his views. Even some of the warmest Radicals have vehemently denounced the doctrines of Mr. George, accusing him of trying to introduce into England the morals of California in its gold-digging days, thus showing how little real dissatisfaction there is with the prevalent state of affairs. There is good reason for this, for in England an aristocracy is seen in its kindest aspect, and not to be compared with the exacting and tyrannical class seen in other European nations. Many of his ideas are, of course, crude and impracticable, and would, to effect their realization, place the nation under the rule of a mob, a tyranny ten times worse than that of the veriest despot. Still, as a thinking man Mr. George demands and deserves the respect of all; he, with others, sees that something is radically wrong, and strives to devise and suggest a remedy. Thus far he deserves the sympathy and encouragement of all, even though we cannot follow him to all his original and startling conclusions. A change will come, must come, as the signs of the times clearly show; nihilists and communists are not working in vain; but just how far their influence will extend, and where will be fixed the limit they shall not pass, is a question the future alone can solve.

OUR American cousins across the line are on the eve of another Presidential election, which, it may be assumed, will as usual set the whole Republic in an uproar. The "free and independent" certainly have ample opportunity there of exercising the franchise, probably too much so, for it seems to us excessive canvassing, with its attendant vices, and the turmoil and general depression of business incident to a general election, is one of the weakest planks in the Ameri-

can constitution. In the coming campaign it is evidently not the men and their respective merits which will occupy public attention so much as the proposed changes in the tariff. The movement now agitated is in the direction of free trade, towards which public favor in the world at large is undoubtedly turning; all the leading political economists speak strongly in its favor, and in our opinion, under certain conditions, it is decidedly the only true and proper basis for international commerce. Yet even so, the United States or any other nation must be exceedingly careful as to what measures it will introduce; a radical and sweeping change of this kind, even though in the direction of right, cannot fail to bring in its train suffering and disaster. There are whole industries in the United States to-day that depend for their very existence on the present tariff, and much capital would be destroyed and many workmen thrown out of employment by its abolition. This should certainly be taken into account by the powers that be, as no government, without cogent and valid reasons, has a right to inflict suffering and privation on even a fraction of the populace. We will gladly hail the day when free trade shall be put into operation in that country as well as our own, but, previous to such a step, we would like to see some measures taken to alleviate the distress of those who would otherwise be legislated into starvation.

QUERIES.

WHAT is the absolute unit of measurement ?

WHAT is the exact and definite work of the Spirit of God in relation to the human mind ?

WHAT is the difference between men and animals ?

WHAT is terra cotta ?

WHAT is cold ? Is it not a *power* similar to heat ?

WHAT is the explanation of sensation in limbs after amputation?

A QUERIST asks, "Why do our scientists and philosophers delay so long in preparing answers to queries?" It is easier to ask questions than to answer them. Our space is limited: our time is finite: our minds are fallible. Some questions need no answer: some need to be chewed and digested: some cannot be answered. We have placed this column here to stimulate thought, to awaken interest. These questions we leave in many cases for our readers to answer. We hope our readers will not delay too long in preparing queries, and that many suggestions such as the following may pour in:

SPACE.—In the last V. P. JOURNAL, J. J. Murphy is quoted as saying, "An intelligent being which should derive its knowledge of space from sight alone could have no idea of more than two dimensions of space;" and, "It would consequently be impossible for such a being to have any knowledge of the *properties of a plane surface*, or of any surface except a spherical one; and as a straight line cannot be drawn on a sphere, *it could have no idea of a straight line.*" To several statements we object, especially to two. "Such a being" *would* be able to gain an accurate idea of a plane surface from standing beside and walking around a common table. On the table could be placed a sphere, and an *intelligent* being, *by sight alone*, would soon clearly distinguish between the sphere and plane, and thus gain *some* "knowledge of the properties of a plane." Let such an intelligent being stand and watch a carpenter make a pencil mark on the top of the table—say draw first one diagonal and then the other—and he would at once grasp the idea of a straight line, especially if a meridian or latitudinal line be drawn around the sphere in the same connection.

LAW OF PERIODICITY.—"Is there not a Law of Periodicity running through all creation?" This question was asked in the December number. We answer, Yes. But it is the law of

adapting all things to an end. In a shorter form it is the *Law of Design*, absolute in time and space.

SEE page 57 of the November number. "What causes the water which is forced through the nozzle of the fire hose to *spray*?" After various tests, some of which have been performed in our laboratory, we attempt an explanation. Consider the stream as it jets from the circular opening. Think of it as a solid cylinder, through the centre of which passes an imaginary straight line. Suppose this line to be surrounded by a series of concentric shells or envelopes of water. There is an outer—the largest—envelope of moving water. This one *alone* meets with atmospheric resistance; and this resistance is on *only one* side of the outer envelope, viz., on the convex side. A little thought will show anyone the necessary result of this one-sided resistance. The small particles of the outer envelope are retarded by the atmosphere, and caused to revolve and move outward. By outward movement we mean motion from the axis of the solid cylinder. This also explains why the central part of the jet always goes farther forward and higher than the outward part.

TERRA COTTA.—This means baked clay, but is applied generally to a composition which, when heated, resembles in color the cover of this Journal. It is formed by mixing clay (alumina) with ground flint or broken terra cotta. It is then cast in moulds and heated. The color is due to the presence of iron. It is now used for window and arch ornamentation, for vases and statuettes. The art of modelling in this substance, which has been neglected for some time, shows signs of revival.

HEAT AND COLD.—Dr. Hall says: "It is well known that if one end of a bar or rod of iron of sufficient length be heated it can remain even red-hot for any length of time, while the other end remains cool so as to be comfortably held in the hand. Every blacksmith knows this, and has in his shop a

hundred proofs of its truth every day. And he also knows that if the hot end be slowly inserted into cold water, or pushed into a bank of snow, the heat, being a substantial entity or thing, will at once begin to travel along the bar toward the cool end by radiation or dispersion, keeping in advance of the cooling water or snow till it will soon blister the hand, if not let go, where just before the bar had been cool. This, of course, contains nothing new. But now for the demonstrative proof that cold is only a negative condition and not anything substantial. Reverse the experiment by freezing one end of the bar to as low a degree Fahrenheit as possible in a mixture of ice and salt, while the rest of the bar remains comparatively warm. Now, suddenly withdraw it and insert the frozen end slowly into a furnace at glowing heat, and if cold be a real substantial force the opposite of heat, it should act the same precisely as heat did in the other case, viz., it should travel along the bar toward the other end, driven by the advancing heat of the furnace. But, on the contrary, instead of the other end of the bar becoming cooler by the retreating cold of the frozen end thrust into the fire, *not the slightest lowering of its temperature takes place either near to or farther from the furnace!* Thus cold is demonstrated to be *nothing* as a substantial force, and is only the 'name' or term by which we designate the absence of heat, as the term *stillness* designates the absence of *motion*, *darkness* the absence of *light*, *silence* the absence of *sound*, or a *vacuum* the absence of air."

SENSATION IN AMPUTATED LIMBS.—Bernstein says: "A very interesting observation is often made in men in whom, for the purpose of an operation, a piece of skin is removed from its original position and made to grow in another place. In order, for instance, to replace a nose which has been destroyed by disease, or has been wanting from birth, surgeons detach a triangular piece of skin from the forehead, so that it is only attached by its apex to the root of the nose between the eyebrows; they then fold the piece over downwards, and sew it

on the skin of the face in the position of the nose. The new nose after a time grows on completely; if, however, it is pricked with a needle, the person does not feel the prick on the nose but on the forehead—the original position of the skin. This sensation does not continue long after the operation, and the person gradually becomes conscious that the locality of the sensation is now a different one, and thus, by experience, learns to determine the locality correctly. A similar and no less interesting observation is made in the case of persons who have undergone amputation. They very frequently make the remark that they have sensations in the amputated legs or arms, just as if the limbs were still existing. They feel in them the effects of frost and warmth; they say they feel pain in this or that toe of the lost leg; that they feel tickling, itching, etc., and distinguish the exact point where these feelings take place. The explanation of these facts is quite simple. In the stump of the amputated leg lie the divided nerve-trunks, which have provided the entire limb with sensory nerves. In the healed scar the nerve-stems are often irritated; and since the irritation of the nerves is conveyed to the brain, it causes sensation, and simultaneously produces—we might almost say from habit—the picture of the same part of the body in which they naturally end. The brain, therefore, refers all these sensations, from the experience it has gained, to the same limbs in which the irritated nerves originate, even when the limb itself is wanting.”

In Memoriam.

DEATH is a solemn reality; when it comes to our own circle of friends it is a sad reality; and when it takes away one who is just entering on life's work with grand capabilities and grander moral principles, it is a sorrowful reality. The cable has informed us of the sudden death of

Mr. P. T. Pilkey, B.A., in a foreign land, among comparative strangers; and the sad news has since been confirmed.

The first that we learned of him was his success as a student in the High School of Newburg, a quiet village prettily situated among the hills in the valley of the Napanee River. Here he was beloved by a large circle of friends, the pride of his teachers and the hope of his parents. In October, 1875, he entered Victoria University, worked honestly and ambitiously, won the esteem and respect of all with whom he came in contact, and in May, 1883, was crowned by the University with his well-won laurels, the winner of two Gold Medals and the Wilson Memorial Prize in Astronomy. After three months recreation among the beautiful Thousand Isles, he left for Germany, to complete his course in mathematics and astronomy at the University of Breslau. As he left us, strong in health, cheerful in spirits, confident in hope, we desired and thought that his ambition, perseverance and fidelity would be crowned with a long and successful career. As our hopes were brightening, however, he was suddenly cut down; a heavy cold and a complication of diseases, resulting in pneumonia, carried him off January 21st, 1884. His last days before his short illness were spent for the good of others. There are many events in this world beyond our explanation, and this is one. Of his many virtues we need add no more: to many of our readers he was intimately known; to all we hoped soon to have him better known as a regular contributor to our columns. A few words, written Dec. 22nd, 1883, have given to them a deeper and more lasting meaning by his death: "A strange feeling sometimes creeps over me when I think that boyhood's days are past, that already I am trying to fight my way upwards into the ranks of scientists. A long and tedious journey it looks before me to-night. I think I never before realized how much there is to be done, how less than little that which has been accomplished. And yet it is a road which leads by many flowery dales, and the traveller must needs leave *some* foot-prints behind him which, even if he does not reach the goal, may serve to guide a more fortunate successor."

May some of the foot-prints he has left behind make surer and brighter the path of his successors !

“ And, doubtless, unto thee is given
A life that bears immortal fruit
In such great offices as suit
The full-grown energies of heaven.”

A BELOVED AMERICAN POET.

WE walk up the street of a beautiful American village, noticing the peculiar feeling of coziness which seems to pervade the whole atmosphere, and which imperceptibly wins our hearts by its air of quietness and comfort. To our right stands a neat cottage, in front of which a hundred flowers smile on the weary peasant and prattling child. To our left, the village church rears its solemn form towards the sky, pointing with its glittering spire to the God who is worshipped within. Here we catch the pleasant jingle of the anvil, yonder the merry shout of the school-boy, so lately released from his day's toil. Here we listen to the twittering of birds on the old elm ; yonder the rich strains of a maiden's voice, as she lightens her duties with song. But who is this, walking so leisurely and with such dignity down the street, tall, erect, well proportioned, with fine features and a flashing, deep-set black eye ? His countenance and manner are so inviting that we imagine we have always been acquainted with him. We are drawn towards him, and soon find ourselves in conversation with him, for here etiquette forbids not such freedom. We find him very affable, using the plain, Quaker style of language, and, though seventy-six years of age, quite capable of talking on the current events of the day, or on subjects requiring close thought and deep study. We soon ascertain that we are by no means risking whatever share of good reputation we possess by being found in the company of this new friend, for not only does he receive the smile of recognition from the rosy faces of the little ones as they pass, but also apparently com-

mands the respect of everyone in the community. After a brief but pleasant conversation we take our leave, and begin to make inquiries as to who he is. The children tell us that that is "the man with the parrot," the parrot being a remarkable bird that stops the doctor's gig with his "whoa," and when the school bell rings calls from his lofty perch, "Run in, boys; run in." At last we ascertain his name, and find that we have unwittingly been in the company of, and engaged in conversation with, one who is loved by the whole American nation. He is none other than the accomplished poet, John Greenleaf Whittier. Curiosity then leads us to inquire for more particulars regarding himself and his home, and we glean some interesting facts. He has never married, but has spent his days in the companionship of his sister, whose tastes and personal appearance are very similar to his own. His home, like others in the community, is marked by neatness and pleasantness not to be found in the lordly mansions of the rich. The walls are tastily decorated with pictures and *souvenirs*, and the tables are covered with books, among which Irish ballads occupy a place of honor; while an old-fashioned Franklin fire-place, with polished brasses, throws its cheerful blaze over carpet, lounge and easy chair. Here he welcomed the master minds of his time; here he has sung song after song to the admiring millions of his listeners; and here he still loves to dwell, amusing himself by teaching tricks to the house animals, or playing with, and on demand writing nonsense verses for, the many children who take delight in visiting him. We then passed on our way, thinking that in such circumstances there is an ample reward for a life of virtue, and that the favor of the community in which one dwells, and the hearts of the people with whom one mingles, are more to be desired than the glittering baubles of the great or the teeming coffers of the millionaire.

"Words, without thoughts, never to heaven go."

—Shakespeare.

A NEW SCIENCE.

SCIENCE formerly meant knowledge. To-day, however, there is another idea to be attached to it in its most extended sense. To define the term, as now universally used, we write: Science is the examination of all the operations, states and nature of self and not-self, and of the relations existing between self and not-self.

Since all definitions are of the mind, they must be so given as to include at least the relation between the mind and the thing defined. There are only three basic and natural divisions of thought, viz.: *Self*, *not-self*, and the *relations* between these two. On this line of thought the above definition is given.

Theists would accept as a shorter and as an accurate definition, the following: Science is the examination of God's manifested thoughts. Atheists would accept this: Science is the examination of all phenomena. To my mind these three definitions are absolutely equal, and thus equally acceptable to all who may agree with the writer.

Under the threefold divisions made above, the limiting definitions may be given.

1st. The Science of Self is *psychical*.

2nd. The Science of Not-self is *physical*.

3rd. The Science of Relations is *metaphysical*.

Even the college freshman knows that for every distinct branch of study there is a specific name, as botany, chemistry, zoology, mathematics, physics, etc. All know that the intention of these distinctive sciences is to teach the inquiring mind concerning the whole range of phenomena circumscribed by the particular study. In *every* case the mind is inquiring after *fact*, or, as many put it, after *truth*. However, in a more exact sense, these two words are not synonyms. Truth is statement in harmony with fact.

There is an *un-named-as-yet* science to be added to the large list already laid down in our books. Not that it is new, or

very limited in application. It may, for the present moment, be called the Handmaid Science, or an accompaniment to all the sciences, since it is used by all scientists in every department of study. For years we have seen this science come to the aid of Darwin. It has often lifted Beale above danger. Huxley worships her. Haeckel's whole "History of Creation," and all his world-wide greatness, depend upon her presence. Tyndall, by her aid, can read life's potentiality in the fire-mist of his imagination. Spencer's "Data of Ethics," with all the burden of his life work, including his definition of evolution, is made wonderful through her benign influence. Electricians explain, in glowing terms, the wonders of all electric phenomena. Under the influence of this enchantress Dr. Proctor passes along the æons of time, *in both directions*, and visits the invisible realms of space, safely riding on her flaming chariot, like Æolus on the wings of the wind.

The "Selby Farmer," near Napanee, can see and explain all the operations of the "cranial molecules" through the light imparted by this modern goddess. Bob Ingersoll is able to curse the gods and die, since his life has been made to partake of "nobler activities," his mind to rise to higher thoughts, and his time to be spent in working out greater problems than are suitable for earthborn man; all through the nourishment derived by sucking suitable nurture from her chameleon-like breasts. Chemists can explain the shape, structure, size, weight and motion of an atom of hydrogen, or any other element, and even of an *ultimate* of matter. Acousticians can follow wave sounds in all directions, through every kind of medium, tracing every movement, contortion and gyration necessary to produce any given sound, or word, as Prof. Stahr, guided by her tremulous voice.

Dr. Hall, of New York, can walk through and over all the little and big sound contortionists of the century, because this sweet singing and ever ready songstress supplies him with celestial harmonies and terrestrial substantialism. Metaphysicians are especially lured into the intricate mazes and labyrinths of thought and expression by the charms of her

unintelligible mummerly. Divines frequently know no other medium through the aid of which they are enabled to explain "Unity in Trinity," "The God-Man Christ," resurrection, and all about heaven. Encouraged by the voice of her silly jabbering, they plunge into the bottomless abyss of theology as into a warm bath, launch out into the open expanse of the universe as into their flower gardens, and stand forth to explain the *infinitely unexplainable*, as if they were giving their children a few simple lessons on elementary arithmetic; all the while looking as if they *could* explain greater problems than the infinities and eternities if required.

The name we shall give to this universally used science is *Conjecture*, or, in common parlance, *Guessing*.

All veterans of study, every keen observer, and most young schoolmen know these statements are true. There is no over-drawing in the matter.

Go to the universities, medical schools, institutes, public schools, pulpits, club-rooms and *books*, and then if you do not agree with the above, try and know why. X.

ST. JOHN'S COLLEGE, WINNIPEG.

THIS institution is one of the thriving colleges in connection with Manitoba University, and it promises to keep abreast with, if not surpass, the other seminaries of learning in the Prairie Province. Its latest step in advance has been the erection of a new and commodious edifice at a cost of about \$50,000. This, for the present, is to be used as the main college building, but it constitutes only one wing of the structure as it will be when the plans are fully carried out—the main portion of the edifice, and another wing similar to the present one, being left to be added when increased accommodation will be necessary. The building is four stories high, besides the basement story, and is built of white brick, with a solid stone foundation. Two towers at the south-eastern and south-western corners add very much to the attractiveness of

the edifice, and these, together with the summits of the roof, are ornamented with iron cresting, presenting a rich appearance in colors of black and gold. The interior of the building is not a whit behind the exterior in beauty of design and elegance of finish. The neat lecture rooms, the beautiful library room, the healthy and commodious students' rooms, the massive oak staircase, all form a combination at once beautiful yet grand, chaste yet elegant. St. John's College, having departments of Arts and Theology, with five professors in each, is now in a position to furnish every educational advantage to university and divinity students, having all the convenience and accommodation necessary for the comfort of those in attendance.

VICTORIAN COMMEMORATION.

AT the late Commemoration service at Victoria University, the first in her history, Dr. S. S. Nelles, President of the University, delivered an admirable address, a portion of which we here present. He said: "We have met to-day to pay a tribute of respect and gratitude to the memory of the late Dr. Richey, father of the present Lieutenant-Governor of Nova Scotia, and the first Principal of this institution when as yet it was Upper Canada Academy. Dr. Richey was for many years a very eminent Wesleyan minister in the various provinces of British America, and filled at different times the highest offices in the gift of the Church. He was a man of extensive attainments in theology and general literature, an eloquent and graceful speaker, and a man of genial disposition and of great worth of character. His memory will be fondly cherished by all who knew him, and will go down identified with the work and fame of this seminary of learning. We wish also on this occasion to make honorable mention of the other noble men who were instrumental in founding Upper Canada Academy and Victoria University. Most of these men have gone to their rest, but some still survive, and one is

here present with us in the person of the clerical treasurer of this university. We have been accustomed to call them pioneers; let us so speak of them to-day. They were pioneers in religion, preaching the Gospel in the wilderness amid many toils, privations and dangers. They were men of heroic mould, and lived in a time when without heroism nothing could be achieved. They laid here the foundations of society where alone they can safely be laid—on the principles of morality and religion. They were pioneers in civil and religious liberty, and one of them (Egerton Ryerson) by the vigorous use of his pen overthrew the then prevailing ecclesiastical and political domination, and procured the precious boon of equal rights and privileges which all classes now enjoy. They were pioneers in education. We may refer with just pride to the fact that our excellent Public School System was chiefly the work of a Methodist minister. There was indeed a system of public schools before Dr. Ryerson's time, but it differed as much from the system which he originated as the rude plays and legendary tales adopted by Shakespeare differed from the immortal dramas which he created. Those pioneers in education established Upper Canada Academy more than fifty years ago, and Victoria University more than forty years ago. No other similar undertakings by voluntary contributions had yet been entered upon, except in the case of Queen's University, at Kingston, established in 1841. Both Upper Canada Academy and Victoria College were established as institutions of general education for the youth of both sexes, and were always open to all classes without distinction of creed, and, along with Queen's College, at Kingston, were the only institutions then conducted on such liberal principles. It has lately been said that they were a proof of the desire of the Methodist Church for an educated ministry. They were more than that, they were a proof of the desire for the wide diffusion of general learning among the people at large. So far from being schools for the training of ministers, they were rather defective in that particular. Theology, instead of being systematically taught here at that time, might rather be said to have been system-

atically neglected. Not until the year 1871 was there a theological chair in the university. Our fathers, not being able to do all things at once, recognized the sound principle that ministerial education should begin in a broad and liberal culture. The establishing of these higher seminaries was a proof that the Methodist people of that day had no sympathy with the very narrow view now expressed in some quarters in this Province by those who speak slightly of universities, and seem to regard the elementary schools as the only schools of any value to the people. They forget that elementary schools must derive their guidance from the colleges, both as regards the method of teaching and the matter taught. The teachers of high schools must be trained in the universities.. All higher learning and scientific discoveries will sooner or later reach the homes of the common people, and add in countless ways to their comfort and refinement. The streams which water the plains have their origin in the mountains, and are fed unceasingly by the showers of heaven. Never should the words of Bacon, that all learning is "a relief to man's estate," be forgotten. To plead for science and higher culture is to plead for the people. He who endows a university endows the homes of the whole population. There is a cry in behalf of the workshop; we re-echo the cry, but of all workshops the greatest and best is that college workshop which we call the laboratory. The scientist carries all the workmen in his bosom, and will bring them ere long into regions of good of which they have not yet even dreamed. Let, therefore, our fellow-citizens of the shop and the farm not be jealous of money given to colleges; they might as well be jealous of the sunlight of morning, which first gilds the mountain peaks, forgetting that it will soon flood the valleys and the plains. As well be jealous of the clouds which go floating darkly and coldly in the sky, forgetting how soon they will fall upon the earth, bringing 'the splendor of the grass and the glory of the flower.' As of the college professor, so we may speak of the physician, the lawyer, the minister. If any persons are disposed to regard these professional men as a superfluity, then we may

at least say this, that the greatest superfluity is an ignorant doctor or an ignorant lawyer. I make these remarks because of tendencies traceable in some of our public papers, and I may further add that many persons seem to forget the great changes introduced in college courses of study during the last few years. We can hardly complain now of too much time being spent upon Greek, for a man may graduate in many universities without so much as knowing a particle of Greek or even a Greek particle. What we called modern and progressive studies have largely displaced classical studies, and, as some persons think, have unduly displaced them. Let us remember that man does not live by bread alone, and to adopt the words of our Governor-General in his beautiful speech at Toronto, let us seek to 'diffuse that liberal culture without which material prosperity becomes a calamity rather than a blessing.'

ANGLO-SAXONS.

PERHAPS one of the most amusing features of the age among English-speaking peoples is their inordinate boasting and everlasting glorification of the assumed superiority of the "great Anglo-Saxon race." It is apparently forever our fate to hear of our "manifest destiny" as a nation, the same hackneyed, wearisome ding-dong about Anglo-Saxon energy, the rapidity with which the language is becoming universal, the race belting the globe, and supplanting the laws, customs and institutions of every other people. Since the Fifth Monarchy men of Cromwell's times there have not been altogether wanting a number of fanatics assuming superior intelligence and foresight in thus delivering themselves of their surplus ideas, to the great disgust of many unwilling and uninterested hearers. This cant has been echoed and re-echoed by lecturers and stump orators, in newspaper articles and parliamentary debates, till it has become the veriest nuisance.

In the first place, the very name Anglo-Saxon, as applied to the British, is an anomaly; the very idea of a race composed of purely Anglian and Saxon elements is the sheerest folly. Any student of ethnology must be well aware that the English or "Anglo-Saxon" race is an article most heterogeneous in its nature, having many constituents in common with the other European nations. The Germans, if not brothers, are at least first cousins, and many others are more or less related, thus showing the idea of our being a favorite, a pure and a chosen race, one of the most absurd ever entertained by mortal man. Anything more motley and heterogeneous than our so-called Anglo-Saxon blood can scarcely be conceived; and compared with us, the Romans, who first consisted of all the vagabonds of Italy, and later on comprised the greater number of the barbarians in all Europe, might be called a homogeneous race. As Defoe has put it, in halting verse and unpleasant plainness—

"A true-born Englishman's a contradiction,
In speech an irony, in fact a fiction;
A metaphor invented to express
A man *akin* to all the universe."

If we examine strictly his origin, the first element of which we hear is the Euskarian, a dark, under-sized race, soon to be incorporated with their conquerors, the Kelts, a larger and more florid race of people. When we meet a dark, small Englishman, or, more frequently still, an Irishman, we may possibly see in him one of the "oldest inhabitants," a lineal descendant of those dusky denizens who caught their game and cooked their fish in the wilds of Britain before Horace sang his deathless strains, or the eagles of the Cæsars flapped their imperial wings over the then known world. This, however, is sure, if he be Euskarian in his origin he does not know it, and anybody is welcome to call this ancient race the "lost ten tribes" or any other tribes, for aught we or he can tell of their ancestry. He must not, however, expect any one who has studied history ever so little to believe in Jews who have intermarried with each succeeding conquering race, in

sons of Israel who have been so thoroughly amalgamated as to lose their very identity.

We see too that the Kelt, with whom some would declare our race naturally in deadly antipathy, is an important factor in making up our modern Englishman. We have then two distinct races of Saxon conquerors of Teutonic race, one of which settled in the north of England, in Anglia or Northumbria, and who were, we might say, the first Englishmen, for it was their language that finally prevailed.

It is a noteworthy fact that they were the first English Christians, being converted, under the ministrations of St. Augustine, somewhere about the 5th century. This is the more remarkable when we remember that it was a mere cowboy's dialect, the Latin and French being used by the more wealthy and intelligent. This language was adopted not only by preceding races but by those who came after, and it was owing to their remarkable tenacity of speech, strengthened and elevated by the bright rays of a Christian dawn, that we derive our name *English* from that small tribe of Anglians in preference to many of the stronger invading families who from time to time held sway in our mother islet. The Danes, Romans and French, each powerful in their day, had comparatively little influence in determining our language, as all adopted, for the most part, the speech if not the customs of their conquered slaves. Taking Shakespeare as our standard, we find less than 20 per cent. of words of Latin or French origin, thus showing a great preponderance in favor of the old English tongue.

But though their language was the more tenacious, their numbers were not so great, and comparatively few English people are truly Anglo-Saxons; and of all the families that go to make up the race, each one we know to be connected with other European nations, excepting only the early Euskarians, both few and unimportant. Nearly all Europeans belong to the one great family, so if one is a chosen people, all are, and it is a manifest absurdity to claim for the English an

origin distinct from the others, or the peculiar destiny of a pure and unmixed race.

We have no reason, however, to be ashamed of our mixed origin. History tells us, again and again, that it is not the homogeneous races that rule the world, but by the *fusion of families* that strength and vigor are obtained. All the strongest nations of Europe have been built up, made anew, in this way, and it is everywhere seen that the most powerful nations are the most heterogeneous. The purest populations of Europe are the Lapps and Poles, confessedly the weakest and most insignificant. The English nation derives its strength from the combination of all the virtues inherent in each of its components, and it is from this that comes that remarkable pre-eminence of which we are so justly proud. Here we see the lively, impulsive nature of the Latin, the solidarity and perseverance of the Teuton, beautifully and harmoniously blended with the brilliant imagination and artistic excellence characteristic of the Kelt.

Nor perhaps is it our Saxon ancestry of which we should be most proud. Considering how much Keltic and Scandinavian blood runs in our veins, this Anglo-Saxon glorification becomes peculiarly distasteful and out of place. How much do we owe for our rights and liberties to those sturdy old Norman kings and barons who struck the strongest blows at tyranny at home and foreign interference: if we are proud of our Saxon descent, let us not forget that we have also the blood of the old Scandinavian nobles in our veins; and were it not for the infusion of fiery Norman blood into our cold Saxon natures, our civil and religious liberties might now be on a par with those existing in the lower class of continental states.

Whether, though, English influence is destined to surround the world and her language become universal, is a matter of very doubtful conjecture. She certainly has not the comparative influence in the world to-day that Rome exerted in her palmy days. Rome has long since fallen to the dust. Will Britain, too, fulfil that celebrated prediction of Macaulay? That remains a profound secret to man. There is at least a

possibility of her language becoming universal as far as commerce and diplomacy are concerned, but the question of its being the common and universal speech of man admits of very serious doubt. Some have looked upon it as the uniting and consolidating medium which shall transform the distracting Babel of the present and primeval worlds into the "Saturnia regna" of the future, when there shall be a universal language and a universal law. True, this is not impossible, and the French, the Italian and the Spaniard, may be forced to use but one language; but there is a terrible tenacity in dialect, a mother tongue, and things may go far into the future as in the present and the past. Britain has the proud distinction not alone of being akin but feeling akin to all peoples, and is the asylum and home of humanity, where all may come and stand on one plane of civil and religious equality—feel that, despite the lack of wealth and power, they are men "for a' that," and thank God they bow the knee to none but Him who rules on high.

WAS THERE A DELUGE ?

THE earth on which we live has been the scene of many strange incidents, of many wondrous transformations, during those long ages which have elapsed since first the "morning stars sang together," and our planetary system began to be evolved out of preceding chaos. Nature has written on the rocks the history of its origin, the varied forces at work in its formation, the changes which it has undergone, and none of these phenomena does she more unquestionably assert than the existence of a deluge. In proof of this we are not restricted to geological formations and material phenomena alone, for besides the account of Holy Writ, Egyptian and Assyrian records have been lying hidden for thousands of years, which are now brought forward to corroborate and establish beyond a doubt the facts already received from other sources. No sooner were these inscriptions found than the keen intellect

and prying eyes of man set to work to decipher them. His efforts in this direction have been highly successful during the past few years in unearthing ancient histories and traditions, and especially complete have we an account of the Flood. That same keen intellect, and those same prying eyes, have examined with the closest scrutiny those indelible inscriptions stamped by nature itself on the everlasting rocks, and lifted out of the earth's outer crust the hieroglyphics written there during countless centuries. From it we derive our modern geology, and no phase of the world's formation, viewed in the light of modern science, is more important and interesting than the Deluge.

But we may ask at the outset, leaving out the Bible account, "How do we know that this Deluge ever had an existence?" We have visible testimony to this phenomenon, living and tangible proofs of its existence, in post-tertiary formations of a heterogeneous nature, composed of varied and different elements known to geologists as *diluvium*, which brings before our eyes, as it were, the rapid passage, at some time or other, of a mighty, impetuous torrent—an immense wave, making great ravages in its passage, furrowing out the earth, and driving with it all sorts of *debris* in its headlong course. Its evidences are numerous—in the tearing away of the soil, in the breaking up of previously existing formations, and especially in the transportation of vast masses of rock far away from their native home. Some of these blocks, known as *erratic* blocks, are of considerable volume; some huge masses, weighing many tons, whose origin must have been in the mountains of Norway and Sweden, have been found in the more southern parts of Europe. One lying on a sandy plain of Prussia weighs 340 tons. This could not have been the result of glacial action, which it somewhat resembles, since glacial deposits are never found south of the 40th parallel in Europe and 50th in America, while such rocks and diluvial deposits are found much nearer the equator. The only way in which they could have been carried such a distance is, that, torn from the parent mass, they became enveloped in huge

icebergs, and in these were carried by the water over the intervening space to their present place of deposit; and besides, these erratic blocks preserve all the irregularities with which they were torn from their native mountains, and are not worn smooth and striated as those carried by glaciers.

Tradition too, among all known nations and tribes, also gives its evidence to the destruction by a vast flood of all mankind except their own direct ancestors, and all agreeing that only a very few persons were saved. The old mythologies are full of shadowy traditions, one of which seems more deeply impressed and widely spread than any of the others. The destruction of well nigh the whole of the human race seems to have so impressed the few survivors that their most remote descendants of the present day have not forgotten it. It now lives in the most distant countries and among the most barbarous tribes. Humboldt found, in the woody wilderness about the Orinoco, tribes of wild Indians whose very names are unknown to the civilized world, and yet among these forgotten races of the human family the tradition of the Deluge remained fresh and distinct. This belief is not confined to one nation alone, but forms one great system of historical tradition found in every nation, ancient or modern, of the entire world.

The similarity between these traditions is remarkably striking, showing them all to have had a common origin. The beautiful legend of Deucalion and Pyrrha, his wife, embellished by the vivid imagination of the Greeks, has been handed down to us by Lucian. The natives of Tahiti tell us that the Supreme God, a long time ago, being angry, dragged the earth through the sea, but by a happy accident their island broke off and was saved: while the Indians of our own land hold that the father of their tribes, warned by a dream, built a raft on which he and his family drifted about for many months, until at last a new earth was made for their reception by the "*Mighty Man above*." All seem to point to the one great general destruction, but withal having a local significance. And it is not in tradition alone that we find it, but

many of the most ancient writings extant bear witness to the fact.

Lucian has been already mentioned. Herodotus also speaks of it in the second book of his history. The cuneiform inscriptions found in the ruins of Babylon have been but lately translated by Mr. George Smith, after a great deal of almost hopeless toil.

The tablets on which these are written are all more or less broken up into fragments, which have been fitted together as far as possible, but many of them are as yet unrecovered. The largest tablet, and the one with the fewest fragments missing, contains an account of the Deluge, and to a great extent coincides with and evidently refers to the same event as the story of Noah in Genesis. There are some differences, it is true, but when we consider the many dissimilarities between the two countries, Chaldea and Palestine, these variations are not greater than we would expect. This is probably the oldest written testimony we have. Then besides Moses, there is Berosus, the Chaldean historian, who, writing at the time of Alexander, distinctly referred to it.

The Vedas, or sacred books of the Hindus, supposed to have been written about the same time as Genesis, probably about the year of the world 3300, make out that the Deluge occurred 1,500 years before their epoch.

Confucius, the celebrated Chinese philosopher and lawgiver, begins his history of China with the story of a famous emperor named *Jus*, whom he represents as making the waters flow back, which, raised to the heavens, washed the bases of the highest mountains, wholly inundated the plains and smaller hills, and destroyed nearly the whole of the human race. There is not a single feature in the Biblical narrative which is not discovered in one or several of the heathen traditions. Nor is the likeness in mere detail alone, but extends to the whole outline, to the tenor and spirit of the narrative. It is always the sin of man which makes a punishment by the all just Judge necessary; always one pious man with his family is preserved to form the nucleus of a new population; an ark

is always built, and birds sent out to ascertain the condition of the earth. And, moreover, with all this similarity, it is also evident they have not been copied from each other or from the pages of the Bible; they are wholly independent, with differences as striking and suggestive as their analogies.

The harmony between all these accounts proves it to be no idle invention. They have all had one common origin, but each has borrowed some distinguishing characteristics from the character of the people holding it.

The tradition has assumed the reflex image of the various peculiarities of races, but though the features were modified the general character was indestructible and remained strikingly visible. In addition to this, in the tradition of the Aztecs, an ancient people of Mexico, we find an interesting account of the diffusion of tongues. The only man and woman saved from Atonetiuh, or the Age of Water, had several children—children who were all born dumb—and a bird, said by some to be a dove, by others a humming bird, came and gave them different tongues; and from these we have the distinct nationalities now existing, and the many languages now spoken by mankind. There is ample proof to show that this Flood had an existence; but when we take a step in advance and inquire about its nature, extent and causes, nearly everything is shrouded in obscurity, and many are the conjectures and speculations, which we cannot now discuss, but which may be the subject of some future article.

HEAT IN ITS RELATION TO LIGHT.

II.

PLACE a glass prism with its edge vertical, and allow a pencil of sunlight to strike obliquely against its side; it will pass through the prism, being bent out of its original line of direction. Let the rays thus bent fall upon a white screen, and you will observe that what appeared as simple white rays of sunlight are compound rays, and that the

different kinds of rays are bent differently, so that you have a long row of colors, as follows, from right to left, violet, indigo, blue, green, yellow, orange and red, the rays on the left being the most refrangible. If we represent the intensity of light by a curve, we will have the maximum in the yellow. Scientists have concluded that difference of color is caused by a difference of wave length, the longest waves lying to the extreme left of the spectrum; thus the red wave length is nearly 3-100,000ths of an inch, while the violet is less than 2-100,000ths of an inch long. From these two facts we conclude that the longer the wave length the less is it refracted. The rays thus refracted are called the spectrum, and this band of seven colors is known as the visible spectrum. So much with respect to light. Let us substitute for the glass prism one of rock salt, which will allow all of the heat rays to pass, and by means of the thermopile and galvanometer measure the intensity of the different heat rays thus refracted, and construct a curve as before; our curve begins away beyond the violet, crosses the visible spectrum, and finds its maximum to the left of the red. Thus we see that our spectrum is much extended, and that the visible portion constitutes but a small share. Sunlight, however, possesses another quality besides luminosity and heat, viz., a chemical power, which is observed by its action upon chloride of silver, turning it black, a property made use of in photography. By observing and measuring the effect of the rays upon chloride of silver, we find that the rays to the right, extending even beyond the violet, possess this chemical power, and we have thus a third division, viz., that of the chemical rays. Our spectrum has thus three divisions:

1st. A heat spectrum, with a maximum of heat to the left of the visible.

2nd. A visible or luminous spectrum, with a maximum of light in the yellow; and

3rd. A chemical spectrum, with a maximum probably in the violet, extending beyond the visible spectrum to the right.

If the temperature of the source be high we have heat, light and chemical action, but as it decreases the chemical action disappears, the light decreases, and below red heat nothing is observed except the dark or obscure heat rays. We have rays possessing three different qualities—heat, light, and chemical action. You will observe that heat rays occupy the whole spectrum, light rays only part, while the chemical rays are still more confined in number and power. We have now reached the vital point towards which all of the preceding remarks have been concentrating themselves, and we are now face to face with the questions which, of necessity, present themselves. Is the spectrum caused by three sets of rays differing in their constitution, one set producing heat, one light, and the other chemical action, and all mixed together to form sunlight? Or are these rays all similar in constitution? From the apparent presence of heat, light and chemical rays in one part of the spectrum, we would naturally incline to the theory of three sets of rays. Since we are not concerned with the chemical effect of the rays, we may for the present drop them, and confine our attention to the heat and light portions of the question. If heat and light rays are similar, or identical, we would of course have different qualities of heat, just as different qualities of light, *i. e.*, different colors, and by this means we would explain why different substances allow heat to pass through them differently, since one substance would stop one quality of dark heat rays, and another another quality.

To answer our questions, we refer again to the spectrum—the solar spectrum—and in it we observe a great number of dark lines crossing the bands of light. What are these bands? Bands of darkness, of course, caused by interruption somewhere. All solid bodies, when heated, give continuous spectra, *i. e.*, spectra unbroken by bands of darkness; while gaseous bodies give discontinuous spectra, *i. e.*, spectra consisting merely of bands of light peculiar to the different gases. Gases absorb the same light which they emit, as we stated before, and so the light from the sun, passing through

certain vapors, or gases surrounding the sun, is deprived of the very light which these gases or vapors would themselves give out when heated sufficiently, and thus result these dark lines. What interests us at present is that they signify absence of light at these particular places. However, if light and heat are produced by the same rays, we would also expect in these spaces absence of heat, and so it has been proven by very delicate instruments. Likewise where chemical blanks exist there also is an absence of heat. Thus we are led to conclude that heat, light, and chemical power are possessed by some rays, heat and light by some, heat and chemical power by some, while all rays possess the characteristic of heat. We conclude that there are not three sets of rays; that there is but one; that all rays are heat rays varying in degree, which variation is due to variation in wave length or variation in motion, whatever that motion may be. You ask, then, What is the difference between heat and light? Why do some rays also possess the quality of light, and some that of chemical power? Is it an extra characteristic? We reply that the phenomenon of light is not a new phenomenon different from heat; it is merely *a different translation of the same motion*. The body perceives the vibrations of the ether, and through it the mind translates them *heat*; the eye takes up these same vibrations within certain limits, and through it the mind translates them *light*; the chloride of silver takes up, in a certain manner, some of these same vibrations, and the mind translates this mode of reception *chemical power*. The eye is limited in its power of receiving vibrations, and hence all rays are not visible; all substances by their nature are not capable of being affected in a certain manner by all vibrations, and hence all rays do not possess chemical power. Light depends upon the eye; if we had no eye we would have no light; and if we had another organ capable of receiving these vibrations and transmitting them to the brain through a different channel, we would have a new series of phenomena. But still there would remain but the one cause for all.

We uphold the identity of heat and light because, 1st, of *simplicity*; 2nd, *beauty*; and 3rd, *necessity* of such a theory.

And we conclude that the true physical measure of the power or *vis viva* of a ray is to be measured by its heating effect; that the phenomena of light depend upon the constitution of the eye, and the chemical power upon the nature of substances and the changes undergone.

CORRESPONDENCE.

MOCK MOONS.

To the Editor of V. P. Journal.

DEAR SIR,—Last evening, between the hours of six and seven, there was the most brilliant lunar display I ever witnessed.

The moon had risen about 40° above the eastern horizon when the phenomenon appeared most brilliant.

When the writer first observed it, there were two very bright mock moons, one on the north and the other on the south side of the moon. Extending laterally to these, and vertically above and below, were columns of hazy light, brightest near the moon, and growing gradually more dim as they extended outward. A faint band of light encircled the moon with a radius equal to the distance to the mock moons.

Far above the moon, almost in the zenith, there was a very brilliant crescent, with all the colors of the rainbow: its length from tip to tip was about three times the diameter of the moon, the convex side being turned towards the moon.

Passing through the moon, and parallel with the horizon, was a faint band of light extending in a complete circle, and on the western side of this band were two very faint mock moons. The display lasted about half an hour. I may add that this is a wonderful country for celestial phenomena. The auroral displays here are very grand. I may describe these in a future letter.

Yours, etc.,

Winnipeg, Jan. 12th, 1884.

E. L. BYINGTON.

TORONTO NEWS.

To the Editor of V. P. Journal.

DEAR SIR,—In the academic atmosphere of Toronto there is a lull—the pause of exhaustion and expectation, rather than of conclusion. The dailies and their readers are weary of the wordy struggle; their correspondents are written out (perhaps because the papers are too full of politics to give them room), and the tumultuous wrath of the 'Varsity and "Residence" men has subsided. The next move will be the onslaught upon the Legislature. If the matter comes up during the present session, which seems unlikely, as its promoters are laboring with astonishment and indignation at the vigor of the opposition, it can hardly get past a committee. The contest so far, however, is only the preliminary skirmish, and with a singular generosity each party has, by means of the newspaper assaults, been sharpening the other's weapons. The next move will rather be political, and perhaps help to form a new party line in the approaching break-up of the present political ranks. The battle will be fought on the floor of the House, and members are conscious that their divisions will be closely scanned by the galleries.

The University Club has collapsed hopelessly. At the last meeting of the committee, at which three members only were present, it was decided to issue a letter to University graduates in Ontario, asking for support. However, as only a fourth of the \$20 required to print the letter was forthcoming, the scheme has perished.

The University dinner at the Horticultural Gardens is the topic of the hour. It promises to be a success, though some of the junior alumni seem to feel it more of a duty than a privilege to contribute the needful two dollars. The conversation for Trinity College takes place to-night. It has become one of the social events of the year. Everybody (using the word in the society sense) goes, and everybody spends a pleasant evening. The bringing of *Convocation exercises and conversation together*, as we do at Victoria, however, gives a

more collegiate tone to our meeting, and adds interest to both exercises.

The stock amusement these days, is spending an occasional hour in the galleries of the House. There is nearly always a biting cross-fire of wit and badinage to relieve the baldest efforts, and sometimes a hot and exciting passage that makes one quiver to be below and have a part in the contest. Very few of the members seem to make any effort at preparation, but depend on the spur of the moment for their utterances. The consequence is often a dreary waste of time and patience. It is, however, well worth the relaxation; and to see the vast ease with which large sums are assigned for trivial purposes when the estimates are being carried, relieves one immensely from the pinching sense of hard times there is outside the House.

But at present in the city there is quite a stagnation of interest from a collegiate point of view, and it is difficult to say very much worthy of space in your pages.

ALUMNUS.

Toronto, February 7th, 1884.

SUMMER RAMBLINGS.

It is past now. I have seen the memorable, soul-inspiring mountains, vales, lakes, rivers, waterfalls and gorges of Switzerland. When, now that I have had a breathing spell, I look back and think of the fresh, invigorating air, and that flow of spirits which the exercise of climbing those mountains induces, or the quiet rest of being rowed over the glancing, bluish lakes, with their clear snow-water, still cold from the glaciers which repose far above us on the mountain sides, I do not feel so contented with the smoky, impure atmosphere of the great city, its stone streets and cheerless houses. I entered Switzerland at Constance on Boden-See, and, after visiting the Rheinfall, which, although beautiful, was nothing to be compared with the grandeur of our Canadian rivers or falls, I went by rail to Zurich. This is a commercial city of no mean importance. The people are much more active and energetic in their

motions than the slow but sure German. One is surrounded by a different spirit. Perhaps nothing strikes the American traveller more here in Europe than the sudden and at first unaccountable changes of customs to be found in such short intervals. At home we have been accustomed to travelling immense distances, in which one language, one people, one aim in life is found. Here, one day I hear German; the people drink beer and philosophize; they sit over the beer glass, while the Jew, up early in the morning and active till late at night, is gradually but surely, in spite of their imprecations, reaping the profits of their land, pocketing their cash, running their newspapers, their trade, their manufactories. The next day I am among the Swiss. They speak French near France, Italian on the boundaries of Italy, and in the central provinces both languages; but the German predominates. They drink wine; beer is not to be had, except imported for travellers. They are lively in their actions, brisk in business, clean in their private life, and moral and religious in character. There is a freshness in their faces which is delicious to behold, after seeing for months the dark rims about the eyes of the idealistic German. Well, from Zurich on foot to Zug, on the sea of the same name. Next morning I was off early by boat for a small village, Art, which lies at the foot of the mountain, so celebrated, Righi. For three centuries this has been one of the most visited resorts in the Alps. The mountain is not very difficult to climb—about three or four hours' work—and is not dangerous, while the view from the peak is enchanting. Pushing the crowd of guides, boys and men, not any too gently, out of my way, I decided to walk in preference to taking the train up. There are two railroads which ascend the mountain, and some 30,000 people reach the summit annually. The mountain sides are the pasture ground for 4,000 head of cattle; and here the delicious Swiss cheese is manufactured in small wooden houses upon the green hill side. Some twelve lakes can be seen from the peak, lying in all directions in such green vales, through which little rivers wind their course, while upon their banks the white cottages, here and there

clustering together and forming little villages, add much to the natural beauty. I descended the other side, and after a short sail found myself in Lucerne. Here is the fashionable life we hear so much about—palatial hotels, in which music, beauty and money are in abundance, quiet resorts for health-seekers, and more modest hotels for the tourist; the attendant curiosity shops and exchange offices make up the city. No manufactory with its vile chimney impurifies the air—here are but pure breezes, fresh from their mountain caves, careering in the first joyousness of their new found liberty. Here the streets are made—not for the heavy, jolting cart, the lumbering, creaking waggon, but for the carriage and pedestrian. There are fine walks, a nice park, and a well laid out botanical garden. From Lucerne I left by boat, and then climbed Pilatus. Here the view was grander than from Righi. There were fifteen of us together, all English, upon the top. In the far distance were the snow-capped peaks of the Alps and nearer lay the rivers, lakes, valleys and pine forests. When we came down again the day was almost past, and we were pretty weak-kneed after the continual jolt of the weights of our bodies upon the stony path. After this I reached Interlachen, passing over some smaller lakes and through many quaint villages. In one of the latter the people were all wood carvers, and very ingenious. Interlachen is another famous summer resort. Were I rich, I would like to spend a season in one of those fine hotels. After visiting some glaciers, and making many pretty excursions over the most frequented paths, I reached, by a roundabout course, the St. Gothard Tunnel. It takes about half an hour to pass through it. I rode far enough through to see a little of north Italian life, and returned the same evening. The ventilation, although as good as we can expect for so long a stretch underground, is none too good; the air has a musty smell. A peculiar sensation creeps over one as he thinks that high above him towers the mountain and rests the lake, or roars the torrent. Light after light is passed, giving us a glimpse each time of the regular stone arch which man's genius has built about

the road he travels through. From Switzerland, I entered Tyrol, and there, although I liked the scenery less, I liked the people more. They are much less accustomed to travellers, and are hence less given to extortion and begging, which in the Alps is something surprising. There are beggars there of great talent: if honest workers had half their perseverance, how much more would be accomplished! Tyrol is what we call pretty, not grand in general, although at some points it rivalled Switzerland. Innsbruck is a regularly built, smart commercial town; it was a comfort to get into a good barber-shop there, instead of being scraped and tortured on a straight-backed German stool. Breslau has put on her festive robes. The shop windows are decorated, and the busy streets filled with crowds of good-natured people, who are accustomed to jostling each other upon their narrow sidewalks. The markets are full of small stands, where you can buy most wonderful curiosities, which can be made to make most wonderful noises of all descriptions, except musical.

Yours, etc.,

P. T. PILKEY.

Breslau, Dec. 19th, 1883.

OUR REVIEW TABLE.

HUMBOLDT LIBRARY, No. 51: MONEY, AND THE MECHANISM OF EXCHANGE, No. II., by W. Stanley Jevons. Bankers and commercial men should read this and No. I.

THE CANADA EDUCATIONAL MONTHLY has lately made most satisfactory advancement by the addition of scientific articles, editorial notes, and intelligence and contemporary opinion.

CHOICE LITERATURE (John Alden, New York). This is literature, and it is choice. It is the cheapest, choicest, best selected eclectic magazine we have seen for the money. \$1 a year for this is a good investment.

ELECTRICAL REVIEW is a weekly journal of electric light, telephone, telegraph and scientific progress. It contains much useful information on the above subject, which is rapidly coming to the front rank in science. It is published at 23 Park Row, New York.

HUMBOLDT LIBRARY, No. 52: THE DISEASES OF THE WILL, by Th. Ribot. A most interesting work on an interesting subject. The subject is of vital importance to us all; but the explanations in places are rather vague, hidden behind long words and heavy phrases. We shall give our readers some selections from this work in a future number.

DAVIES' ELEMENTS OF SURVEYING, BY PROF. VON AMRINGE (Barnes & Co., New York, publishers). In publishing a revised and improved edition of Davies' Elements, Prof. Von Amringe has placed under obligations to him all students of surveying. The reader of this treatise who is acquainted with the elements of geometry and trigonometry, will find an exposition of the simple and more elaborate methods employed by the land surveyors of the United States. The mathematical formulæ are clearly developed, and the necessary instruments are well described and their principles of construction fully explained. *Lengthy and satisfactory chapters are here found on levelling, dividing land, surveying by compass, by transit, &c., as well as on the principles and methods of laying railway curves.* A unique feature of his work is the full treatment given to mining surveying, including the location of claims, underground traversing, &c. Many examples and problems, of which the number might probably have been increased, furnish the student useful tests of the clearness of his conceptions, and his ability to apply the knowledge gained. The printer too has done his work well, and both author and publishers have earned the young surveyor's thanks for this addition to his stores.

ASTRONOMY, BY PROF. PECK (Barnes & Co., New York, publishers). During the last few years there has been a

marked increase in the interest taken by the reading public in astronomical discoveries. The graphic and fruitful pen of Proctor, the lucid descriptions of Newcombe, the fascinating stories that come to us through the labors of the spectroscopists, and the revelations afforded by the splendid instruments that have been lately erected—all these agencies have contributed to this result, and have awakened an eager desire to learn of the starry wonders around us. Of the many works on this subject which the American press has furnished, few will be found at once so readable, so concise and accurate, as that by Prof. Peck, of Columbia College. As a text-book, it has perhaps been too shy of the severer mathematical treatment of the subject, and therefore left much to be supplied by the class-room lecturer; but it has succeeded in giving us a clear, succinct and interesting narrative of the latest results of astronomical labors and researches. Especially in the chapters on the sun and the comets will there be found a complete epitome of the facts established and the theories broached by such distinguished workers as Secchi, Longley, Young and others. One cannot rise from the perusal of this little work without feeling that Prof. Peck has done good service as interpreter of the most advanced laborers in this field, and largely helped to stimulate and intensify the interest taken in this "oldest of the sciences."

CORALS AND LIMESTONE.

BUT now, what is the limestone, and how did it get where it is—not into the mortar, I mean, but into the limestone quarry? Let me tell you, or rather, help me to tell yourselves, by leading you, as before, from the known to the unknown. Let me lead you to places unknown indeed to most; but there may be sailors or soldiers among my readers who know them far better than I do. Let me lead you, in fancy, to some islands in the tropic seas. After all, I am not leading you as far away as you fancy by several thousand miles, as you will see, I trust, ere I have done.

Let me take you to some island : what shall it be like ? Shall it be a high island, with cliff piled on cliff and peak on peak, all rich with mighty forests, like a furred mantle of green velvet, mounting up till it is lost among white clouds above ? Or shall it be a mere low reef, which you do not see till you are close upon it, on which nothing rises above the water but here and there a knot of cocoanut palms or a block of stone, or a few bushes swarming with innumerable sea fowl and their eggs ? Let it be which you will : both are strange enough : both beautiful ; both will tell us a story.

You will have to go ashore in a boat, over a sea which looks unfathomable, and which may be a mile or more in depth, and search for an opening in the reef, through which the boat can pass without being knocked to pieces.

You find one : and in a moment what a change. The deep has suddenly become shallow ; the blue white, from the gleam of the white coral at the bottom. But the coral is not all white, only indeed a little of it ; for as you look down through the clear water, you find that the coral is starred with innumerable live flowers—blue, crimson, grey, every conceivable hue ; and that these are the coral polypes, each with its ring of arms thrust out of its cell, who are building up their common habitations of lime. If you want to understand, by a rough but correct description, what a coral polype is, all who have been to the seaside know, or at least have heard of, sea-anemones. Now, coral polypes are sea-anemones, which make each a shell of lime, growing with its growth. As for their shapes, the variety of them, the beauty of them, no tongue can describe them. Only remember that you must reclothe each of those exquisite forms with a coating of live jelly of some delicate hue, and put back into every one of the thousand cells its living flower ; and into the beds, or rather banks, of the salt water flower garden, the gaudiest of shell-less sea-anemones, such as we have on our coast, rooted in the cracks, and live shells and sea-slugs, as gaudy as they, crawling about, with fifty other forms of fantastic and exuberant life. You must not overlook, too, the fish, especially the parrot-fish, some of

them of gaudiest colors, who spend their lives in browsing on the live coral, with strong clipping and grinding teeth, just as a cow browses the grass, keeping the animal matter, and throwing away the lime in the form of an impalpable white mud; which fills up the interstices in the coral bed.

The bottom, just outside the reef, is covered with that mud, mixed with more lime-mud, which the surge wears off the reef; and if you have, as you should have, a dredge on board, and try to haul off that mud as you row home, you may find, but not always, animal forms rooted in it which will delight the soul of a scientific man. One, I hope, would be some sort of *Terebratula*, or shell akin to it. You would probably think it a cockle; but you would be wrong. The animal which dwells in it has about the same relationship to a cockle as a dog has to a bird. It is a *Brachiopod*, a family with which the ancient seas once swarmed, but which is now rare all over the world, having been supplanted and driven out of the seas by newer and stronger forms of shelled animals. The nearest spot at which you are likely to dredge a live *Brachiopod* will be in the deep water of Loch Fyne, in Argyleshire, where two species still linger, fastened, strangely enough, to the smooth pebbles of a submerged glacier, formed in the open air during the age of ice, but sunk now to a depth of eighty fathoms. The first time I saw those shells come up in a dredge out of the dark and motionless abyss, I could sympathize with those feelings of mingled delight and awe which, so my companion told me, the great Professor Owen had in the same spot first beheld the same lingering remnants of a primeval world.

The other might be (but I can't promise you even a chance of dredging that, unless you were off the coast of Portugal, or the windward side of some of the West India Islands) a live *Crinoid*; an exquisite star-fish, with long and branching arms, but rooted in the mud by a long stalk, and that stalk throwing out barren side branches, the whole a living plant of stone. You may see in museums specimens of this family, now so rare, all but extinct. And yet 50 or 100 different

forms of the same type swarmed in the ancient seas: whole masses of limestone are made up of little else but the fragments of such animals.

But we have not landed yet on the dry part of the reef. Let us make for it, taking care meanwhile that we do not get our feet cut by the coral, or stung as by nettles by the coral insects. We shall see that the dry land is made up entirely of coral, ground and broken by the waves, and hurled inland by the storm, sometimes in huge boulders, mostly as fine mud; and that, under the influence of the sun and the rain, which filters through it, charged with lime from the rotting coral, the whole is setting, as cement sets, in rocks. And what is this? A long bank of stone standing up as a low cliff, ten or twelve feet above the high-water mark. It is full of fragments of shell, of fragments of coral, of all sorts of animal remains: and the lower part of it is quite hard rock. Moreover, it is bedded in regular layers, just such as you see in a quarry. But how did it get there? It must have been formed at the sea-level, some of it, indeed, under the sea; for here are great masses of madrepora and limestone corals imbedded just as they grew. What lifted it up? Your companions, if you have any who know the island, have no difficulty in telling you. It was hove up, they say, in the earthquake in such and such a year; and they will tell you, perhaps, that if you will go on shore to the main island which rises inside the reef, you may see dead coral beds just like these lying on the old rocks, and sloping up along the flanks of the mountains to several hundred feet above the sea. I have seen such many a time.

Thus you find the coral being converted gradually into a limestone rock, either fine and homogeneous, composed of coral grown into pulp, or filled with corals and shells, or with angular fragments of older coral rock. Did you never see that last? No? Yes you have, a hundred times. You have but to look at the marbles commonly used about these islands, with angular fragments imbedded in the mass, and here and there a shell, the whole cemented together by water holding in solution carbonate of lime, and there see the very same phenomenon perpetuated to this day. CANON KINGSLEY.

TEACHING must, in all fairness, ultimately be paid for as teaching, and scientific research must be provided for out of other funds than those extracted from the pockets of needy students, who have a reasonable right to demand, in return for their fees, a full modicum of instruction and direction in study. In the German universities the professor receives a stipend which provides for him as an investigator. It is an excellent thing for a man who is engaged in the one to give a certain amount of time to the other. It is a matter of experience that the best teachers of a subject are, *ceteris paribus*, those who are actually engaged in the advancement of that subject, and who have shown such a thorough understanding of that subject as is necessary for making new knowledge in connection with it. It is also, in most cases, a good thing for a man engaged in research to have a certain small amount of change of occupation, and to be called upon to take such a survey of the subject in connection with which his researches are made, as is involved in the delivery of a course of lectures and other details of teaching. Though it is not a thing to be contemplated that the researcher shall sell his instruction at a price sufficiently high to enable him to live by teaching, yet it is a good thing to make teaching an additional and subsidiary part of his life's work. This end is effected in Germany by making it a duty of the professor, already supported by a stipend, to give some five or six lectures a week during the academical session, for which he is paid by the fees of his hearers. The fees are low, but are sufficient to be an inducement; and, inasmuch as the attendance of the students is not compulsory, the professor is induced to produce good and effective lectures at a reasonable charge, so as to attract pupils who would seek instruction from some one else if the lectures were not good or the fees too high. Indeed, in Germany, this system works so much to the advantage of the students, that the private teachers of the universities at one time obtained the creation of a regulation forbidding the professors to reduce their fees below a certain *minimum*, since, with so low a fee as some

professors were charging, it was impossible for a private tutor to compete! This state of things may be compared, with much advantage, with the condition of British universities. In these, we hear, from one direction, complaints of the high fees charged, and of the ineffective teaching given by the professoriate; and in other universities, where no adequate fees are allowed to the professors as a stimulus to them to offer useful and efficient teaching, we find that the teaching has passed entirely out of their hands into those of college tutors and lecturers. The fact is, that a satisfactory relation between teaching and research is one which will not naturally and spontaneously arrange itself. It is believed by many persons that a man who occupies his best energies in scientific research can always make an income by writing. Anyone who is acquainted with the sale of scientific books knows that the situation is ludicrous. The writing of a good book is not a thing to be done in leisure moments, and such as have been the result of original research, have cost their author often ten years of labor, apart from the mere writing. Mr. Darwin's books, no doubt, have had a large sale; but that is due to the fact, apart from the exceptional genius of the man who wrote them, that they represent some 30 or more years of hard work, during which he was silent. We have, then, seen that there is no escape from the necessity of providing stipends and laboratories for the purpose of creating new knowledge.

SCIENCE AND THE CLERGY.

IF the Christian minister should be ever on the alert to expose false doctrines, then, surely, he should be equally on the "*qui vive*" to expose all scientific errors which relate directly or indirectly to the teachings of Scripture. And this for two reasons: First, because to release a truth is to prophesy its ultimate victory. Said blind John Milton, "Though all the winds of doctrine were let loose to play upon the earth, so *Truth* be in the field, we *do injuriously* by licensing

and prohibiting her. Let her and Falsehood grapple. Whoever knew truth *put to the worse* in a free and open encounter?" *And second, because it will influence the young of our land in the direction of Christly teachings, and Christly living.* Who has not observed that multitudes of the young men of America are being unsettled in their theological views by the fact that some so-called great men are sceptics? We must all admit that "No man who thoroughly accepts a principle in the philosophy of Nature, which he feels to be inconsistent with a doctrine of religion, can help having his belief in that doctrine shaken and undermined." Now, that the doctrine of development and spontaneous generation have this tendency is evident, not only from the rejoicing of infidelity at their first announcement, and the clearly logical argument of Haeckel based upon them in favor of atheism, but also from the almost universal scepticism which immediately follows the espousal of any type of either theory. How could Dr. McCosh do better work for God than show to the thousands in America, who are influenced by his teachings from the Hebrew Scriptures, that Gen. i. 21 and 27, in the fact that the verbs are identical in meaning, necessarily proves the Darwinian theory false, and that, therefore, Haeckel is erroneous in his opinion? Let him do that, and the confidence of thousands in the opinions and judgment of Haeckel will be destroyed, and thus *atheism*, as well as false science, will receive a stunning blow; for intelligent men will say, "If he err thus in the field of the 'seen,' we must not trust him in the sphere of the unseen," for "the things which are seen are temporal, while the things that are unseen are eternal." In any event, let the clergy of this land *teach and be governed* in their pulpit treatment of scientific subjects by that which Dr. McCosh has thus far only taught in this connection: namely, that "the relation between revelation and facts is one thing, and the relation between revelation and theories another thing"—and that, "while acknowledging their obligation to admit undeniable facts, theologians are at liberty to receive or reject the theories deduced from those facts. Such theories are human

speculations, and can have no higher authority than their own inherent probability." "Theories are of men; facts are of God. The Bible often contradicts the former, never the latter." This ground religion will not surrender, and if it cannot sustain itself by the clear and consistent doctrines of the Bible, it must take the field, and through the clergy fight the battle with the weapons of science and philosophy, with those *facts* which the God of Nature has provided for His ultimate triumph.—*Wilford's Microcosm.*

FRIENDS AND FOES.

"Nature teaches beasts to know their friends."—*Shakespeare.*

"There surely lives in man and beast
Something to warn them of their foes."—*Tennyson.*

COWS hate dogs instinctively from their earliest calthood upward. I used to doubt once upon a time whether the hatred was not of artificial origin, and wholly induced by the inveterate human habit of egging on every dog to worry every other animal that comes in its way. But I tried a mild experiment one day by putting a half-grown town-bred puppy into a small inclosure with some hitherto unworried calves, and they all turned to make a common headway against the intruder with the same striking unanimity as the most ancient and experienced cows. Hence I am inclined to suspect that the antipathy does actually result from a vaguely inherited instinct derived from the days when the ancestor of our kine was a wild bull, and the ancestor of our dogs a wolf, on the wide forest-clad plains of Central Europe. Such inherited antipathies seem common and natural enough. Every species knows and dreads the ordinary enemies of its race. Mice scamper away from the very smell of a cat. Young chickens run to the shelter of their mother's wings when the shadow of a hawk passes over their heads. Even man himself—though his instincts have all weakened so greatly with the growth of his more plastic intelligence, adapted to a wider and more

modifiable set of external circumstances—seems to retain a vague and original terror of the serpentine form. Our own infants in arms have no personal experience of the real meaning to be attached to angry tones, yet they shrink from the sound of a gruff voice even before they have learned to distinguish their nurse's face.

If we think of parallel cases, it is not curious that animals should thus instinctively recognize their natural enemies. We are not surprised that they recognize their own fellows: and yet they must do so by means of some equally strange automatic and inherited mechanism in their nervous system. One butterfly can tell its mates at once from a thousand other species. Babies notice human faces long before they notice any other living thing. In like manner we know that most creatures can judge instinctively of their proper food. One young bird just fledged naturally pecks at red berries; another exhibits an untaught desire to chase down grasshoppers; a third, which happens to be born an owl, turns at once to the congenial pursuit of small sparrows, mice and frogs.

GRANT ALLEN.

VARIOUS FORMS OF COINS.—From time to time coins have been manufactured in very many forms, although circular coins vastly predominate in number. Among the innumerable issues of the German States may be found octagonal and hexagonal coins. A singular square coin, with a circular impress in the centre, was issued from Salzburg by Rudbert in 1513. Siege-pieces have been issued in England and elsewhere in the form of squares, lozenges, etc. Some of the most extraordinary specimens of money ever used are the large plates of pure copper which circulated in Sweden in the eighteenth century. These were about three-eighths of an inch in thickness, and varied in size, the half-daler being three and a half inches square, and the two-daler piece as much as seven and a half inches square, and three and a half pounds in weight. As the whole surface could not be covered with a

design, a circular impress was struck near to each corner, and one in the centre, so as to render alteration as difficult as possible. Among Oriental nations, the shapes of coins are still more curious. In Japan, the principal part of the circulation consists of silver *itzibus*, which are oblong, flat pieces of silver, covered on both sides with designs and legends, the characters being partly in relief and partly incised. The smaller silver coins have a similar form. Among the minor Japanese coins are found large oval, moulded pieces of copper or mixed metal, each with a square hole in the centre. The Chinese *cash* are well known to be round disks of a kind of brass, with a square hole in the centre to allow of their being strung together. The coins of Formosa are similar, except that they are much larger and thicker. All the copper and base metal coins of China, Japan and Formosa, are distinguished by a broad, flat rim, and they have characters in relief upon a sunk ground, somewhat in the manner of Boulton and Watt's copper pence. They are manufactured by moulding the metal, and then filing the protuberant parts smooth. Such coins stand wear, and preserve their design better than European coins, but they are easily counterfeited. The most singular of all coins are the scimitar-shaped pieces formerly circulated in Persia.

THE TOWERS OF SILENCE.

“**T**HOU shalt not defile the earth” had Zoroaster taught; and, mindful of this teaching, no dead Parsee is laid in mother earth to taint her with his corruption. Stone towers are built, upon whose summit are exposed the bodies of the dead to all the fowls of the air, who quickly remove all flesh from off the skeleton; and the dead body, giving fresh strength to the living, is more quickly returned to its elements than by our slow and repulsive method of interment.

This manner of disposing of their dead, so repugnant to some feelings, has always had for me a curious attraction; so when I was in Bombay some time ago, I induced my friend, Mr. Jehangir Rustumjee, an intelligent and well-educated

Parsee gentleman, with whom I lived for some weeks in very close companionship, to obtain for me permission to visit those Towers of Silence, that are the strange last resting-place of his race, and that will be, at some future period, of himself. This permission was gained with some small difficulty, but at length it was obtained, and one hot, cloudless day we drove to Malabar Hill for the purpose of visiting that weird place of sepulture. An old and venerable Parsee received us and conducted us the whole time that we stayed within the grounds. He led us first along a well kept pathway to an old stone-vaulted building with open colonnades all around; this is the house of prayer, where the friends of the deceased remain whilst the body is placed upon the tower. Near by, in somewhat similar buildings, dwell the custodians of the place, and the bearers of the dead, who live apart. There, too, is the bathing house, where at each funeral the corpse-bearers change their clothes and wash themselves clean from the defilement of having touched the dead. In front and around these buildings is a garden of flowers as luxuriant and beautiful as constant care and attention can make them. From this garden we enter a wild and uncultivated part where the towers are placed. There are six in all, five placed together, some of which are very old and closed, and one, that stands apart, where the bones of notorious criminals of their faith lie crumbling in eternal separation from those of pure living and good repute.

It is somewhat misguiding to call these buildings towers, for they are not high, though how else to describe them is difficult. They are low, massive, circular structures of about thirty yards in diameter, but not more than five or six in height. They are built of most carefully joined blocks of granite, and then plastered all over with a white cement, so that none of the water that falls upon the tower can possibly defile the earth by oozing out, except at the proper outlets for it, where are placed filters of sandstone and charcoal for its purification. The tower stands in a shallow, dry moat, and there is one narrow stone bridge which leads from the ground

to the small square door through which the body is taken. The top of the tower, which is the platform where are laid the bodies, is quite hidden by a parapet that completely surrounds it, on which, in one close, unbroken rank, the vultures perch, motionless themselves as stone, with their bare heads half sunk in their bodies. Facing inwards, there they rest, silent and still as all around them, till the white-robed bearers of the dead place the corpse upon the floor below them. Then all swoop down.

All the Parsees that I have ever talked with upon this subject have expressed a strongly affectionate feeling for their mode of sepulture. Nor is there anything more painful to the feelings of the survivors in this manner of burial than in ours. They do not see the sudden downflight of the birds upon the corpse, for they are then devoutly bowed in prayer in the temple near at hand. But half an hour elapses from the time the corpse is laid reverently upon the platform till these winged assistants have ended the work that takes, perhaps, months with us; a fortnight later the same men that carried in the corpse visit once more the tower, and with a kind of tongs place the dry and separated bones in the central well.

The impression that the whole place gives is very far from repulsive; there is little to shock one, and much to admire, in this the Parsee mode of burial, and in the place of their sepulture. The air is sweet and pure thus high upon the hill; the constant sun, archetype of their deity, shines bright and clear, and the flame-rayed bed of crimson roses in their garden is a promise as well as a present joy; and as the calm, white-robed old Parsee said as he gave me a bunch of the glowing blossoms when I left, "This life is not the end of all things."
—*Cornhill Magazine*.

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