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V. P. JOURNAL

VOL. I.]

MARCH, 1884.

[No. 6.

NOTES.

A VIPER.—A metaphorically-inclined friend of ours, whom we greatly respect for his enthusiasm, earnestness and insight, has lately, in an outburst of feeling, termed us a viper. We must thank our friend for the new name. Viper comes from the Latin *viperæ* or *viviperæ*, which is derived from *vivus* (alive) and *pario* (I produce), meaning a live production. Now for the secret—forgive our want of bashfulness, but we cannot help it—cherish and remember it, endorse and sanction it: V. P. means *Viviperæ*, a live production. We are willing to be called hard names, if thereby we can direct attention through ourselves to the necessities of education and free discussion. We are willing to be considered as having life, if thereby we may inject some life into half-living questions. We are unwilling to be denied freedom of discussion. We are unwilling to accuse others of flinging poisoned darts that we may fling more poisonous ones ourselves. We are unwilling to be dragged further into useless controversies, for Holmes says “controversies equalize men and fools.” We are unwilling wrongfully to wound anyone. We do not profess perfection or infallibility. Our aim is to say what we believe to be true, and to abide the consequences. What we have written we have written.

LONGFELLOW.—The memory of Henry Wadsworth Longfellow has been honored in England by the unveiling of a bust of that poet in Westminster Abbey a few days ago. It occupies a conspicuous place between the busts of Chaucer

and Dryden, and bears the following inscription left by Dean Stanley: "This bust was placed among the memorials of the poets of England by English admirers of an American poet." Though not an Englishman, the author of "Evangeline" and "Hiawatha" has not received more than due honor, and this event must have the tendency not only to encourage the advances of literature, but also to increase the friendship between Great Britain and the United States.

HICCOUGH AND SNEEZING.—Hiccough is caused by a convulsive contraction of the diaphragm when its nerves become over-irritated. The inspiration is violent, but the ensuing expiration takes place quietly, and during an attack, one inspiration in about four or five is thus affected. As a rule, when persons are afflicted in this way, they are more anxious to get rid of their trouble than to examine into its nature, so perhaps a prescription or two would not be out of place here. One remedy is to allow an exceedingly protracted, and, at the end, forcible expiration to follow a long and quiet inspiration. Another is to direct the mind quite attentively to some delicate manipulation or experiment, as, for instance, trying how near you can hold your fingers to one another without touching. This will cause an involuntary tendency to breathe quite slowly and steadily, and have the same result as the former plan mentioned, namely, a speedy and effectual cure. Sneezing, on the contrary, is due to a violent spasm during expiration. It generally occurs as a result of the irritation of the mucous membrane lining the air passages of the nose. Its audible and visible signs need no description, though there are so many marked differences between its numerous forms, as they vary from the "cat-sneeze" of the fashionable belle to the loud "Horatio" of the uncultivated rustic. Sneezing is not an observer of times and seasons, and often seems to choose the most inopportune moment for exhibiting its power. In such a case the impending catastrophe may be averted by pressing firmly upon some branch of the fifth nerve, say in the upper lip close to the nose.

HUXLEY.—No. 53 of the "Humboldt Library of Science" is a collection of some essays by this celebrated English scientist, embracing, among others, Animal Automatism, Science and Culture, Universities: Actual and Ideal. Though we cannot agree with all of his conclusions, we must admire the beauty and clearness of his language, respect his independence and earnestness of investigation. By many the modern scientists are all classed as atheistic or agnostic, and, without investigation, Huxley is very frequently spoken of as an atheist. A paragraph in his first essay may be interesting to some of our readers, as giving his own views. "But, as I have endeavored to explain on other occasions, I really have no claim to rank myself among fatalistic, materialistic, or atheistic philosophers. Not among fatalists, for I take the conception of necessity to have a logical and not a physical foundation; not among materialists, for I am utterly incapable of considering the existence of matter if there is no mind in which to picture that existence; not among atheists, for the problem of the ultimate cause of existence is one which seems to me to be hopelessly out of reach of my poor powers. Of all the senseless babble I have ever had occasion to read, the demonstrations of these philosophers who undertake to tell us all about the nature of God would be the worst, if they were not surpassed by the still greater absurdities of the philosophers who try to prove that there is no God." He closes his interesting essays by a short translation from Goethe, as follows:

"Would'st shape a noble life? Then cast
No backward glances toward the past:
And though somewhat be lost and gone,
Yet do thou act as one new-born.
What each day needs, that shalt thou ask;
Each day will set its proper task.
Give other's work just share of praise;
Not of thine own the merits raise.
Beware no fellow-man thou hate:
And so in God's hands leave thy fate."

WE would like to see :

The Kindergarten system of training introduced into public schools, especially into the lowest forms.

Industrial schools established, for the benefit of street urchins and embryonic loafers, under Government control, sustained by the products of their own work.

Technical schools for apprentices, where the primary elements of trades and of general education could be obtained at the same time; these to be self-sustaining.

The appointment of an inspector, practical and scientific, to inspect and arrange plans and situation of school buildings; to oversee and provide means for comfortable and sensible seating accommodation, improvement in lighting, uniform heating, with purity of atmosphere; to advise concerning acoustical properties, color of walls, decorations, means of encouraging cheerful surroundings, such as pictures, statuary, flowers, lawns, shade trees, etc.

An improvement in salaries, greater inducements held out for good men to remain in the profession, and not to make it a stepping-stone to something more lucrative.

Regulations requiring schools to be provided with more complete sets of maps, charts, diagrams, models, works of reference, encyclopedias, dictionaries, histories, etc.; also grants to acquire and improve the same.

Regulations defining more clearly the work required of each teacher, the maximum size of his classes; the rights of teachers placed on as sound a basis as those of school boards.

Further improvement of our collegiate institutes, handing over to them the present Freshman work of the colleges and the gradual development of them into colleges granting diplomas or certificates which shall be recognized as matriculation into any university.

The development of our colleges and so-called universities into genuine universities, where the broad general foundation of the colleges may be developed either on a broad basis or in special lines, the professors being granted more liberty in lecturing, having less tutoring, and being paid partly by fixed

salary and partly by the fees of those attending lectures. The fittest will survive.

MISTAKES.—It is a mistake to suppose that a man or woman, working six hours in and three at least out of school, working in close quarters, breathing impure air, shut in by blank, dirty walls and dingy windows, rewarded by \$500 per annum (grumbings gratis), can possess the patience of Job, teach in four departments, be a master of all, preserve a good Christian spirit, and inspire the pupils with grand truths and an insatiable thirst for knowledge.

It is a mistake for some College Boards, and some rich Christian denominations, to imagine that devotion and small salaries, *inspiration and indifference, ambition and want of encouragement*, go hand in hand. If the professors of Canadian universities have done so much already on small salaries, it is a mistake to suppose that they could not bear success, and do better work on larger salaries. The trial is, at least, worth the outlay.

It is a mistake to think that we have the purest systems of government in the world; that it is natural, a mark of design, that forty men should always think alike, and eighty always take the opposite view; that politics must necessarily be corrupt; that men of ability are justified in standing aloof when the interests of their country demand their assistance; that we will have right, honesty and justice, so long as each party is controlled by the remnants of the community.

It is a mistake to think that English is the only language presenting anomalies in spelling. Phoul hands us the following. After a careful translation, we return to common-sense, phonetic English, thankful that we write with words whose spelling is not *more* difficult:

PHOUN PHOURR PHOURRUINNEARZ.

Weardze ove Eighreisch weollsh ahnned ghrayntch,
 Ear duighuyquult edu sepayl,
 Boot Einglish wurredes scowe ize er,
 Du yough soe? Eigh sough teoze wayl.

QUERIES.

THE last number contained the query: "What is the difference between men and animals?" The following is Prof. Wuttke's statement of the distinction drawn by Thomas Aquinas, and is evidently the true one: "Man is the image of God principally in virtue of his reason; but an essential element of reason is the freedom of the will, namely, the free determining of our own activity. All activity, and hence, also, that of irrational creatures, has an end; hence human activity must have a rational end, and one which man knows as such, and which is aimed at by free will-determination; whereas irrational creatures seek their end unconsciously and from natural instinct. But rational ends converge and terminate in *one* last and *highest good*, namely, in communion with God."

WHAT is the cause of mock moons?

Mock moons, halos, coronæ, etc., are produced by the reflection and refraction of the rays of sun or moon, caused by the existence of ice or snow crystals in the atmosphere. These crystals are in the form of hexagonal prisms, sometimes capped by pyramids. From the sides are reflected and through the edges are refracted the rays which, thus uniting, cause the peculiar phenomena sometimes perceived.

DOES *vacuum* mean simply absence of air?

A vacuum means the absence of *everything* except the hypothetical universal elastic ether, which pervades all creation. An *absolute vacuum* of course we cannot obtain; the nearest approach being that produced over mercury. A vacuum usually signifies absence of all appreciable matter

How is it that if a spoon be put into a glass and boiling hot water be then poured in, the glass is not cracked, as would be the case if the spoon were absent?

We have not as much faith in this experiment as our querist seems to have. We would advise him to perform it

it for himself again carefully. It may be, and is true within a *very small* limit, since metal is a good conductor, and will thereby conduct away some of the heat. The cracking of a thick glass is caused by unequal expansion: the inside expands under the influence of heat to so great an extent before the outside is reached that a separation of the interior particles takes place, resulting in a crack. This danger is removed in the case of a thin glass, since both sides are heated equally at the same time.

DOES light always travel at the same uniform rate of speed?

No The greatest speed (186,000 miles per second) is attained in vacuum through the ether. In passing through media, such as air, water, etc., the resistance to the motion results in a retarding of the rate of travel. The rate of motion then depends upon the resistance to be overcome, *i. e.*, upon the density of the medium through which the light passes. Upon this fact depends the refraction of light, or bending aside of a ray of light in passing from one medium into another.

QUERY for the querists: Who discovered the mode of liberating Antonio from the clutches of Shylock—Portia or Bellario? If Portia, when—before the trial in consultation, or as the trial proceeded? Give your reasons.

TRUTHS IN SMALL THINGS.

WE appreciate knowledge that we struggle to obtain; we value nuggets that we delve deep to find; we prize a truth by the difficulties in the search. How few things in this world we estimate by their true inherent value alone. There is no such thing as independence; laws are closely linked together; thoughts are interwoven; matter and thoughts are not disjoined. The man who can truthfully say,

“ To me the meanest flowers that grow may give
Thoughts that do lie too deep for tears,”

has indeed commenced to read aright the pages in nature's book. Many of us do not yet know the alphabet. Most of us are still puzzling over the curious, unintelligible forms, sceptical of the great truths they represent. All of us perhaps wish to think great thoughts, to evolve great laws, to conceive great ideas, and illogically conclude that we need to be transported to a higher sphere to have greater means at our disposal. But it is not so; truths and laws may be and are lying all about us, overlooked because of their very nearness and their simplicity. To study the laws of nature we have not to go to the limits of space. Then let us not despise *small* things. The most beautiful imagery of a poem, the history of a revolution in society, the highest laws of thought, may all be stamped upon a little word. The most marvellous conceptions of harmony and beauty may be seen in a snow-flake. “Nature is greatest in that which is least.” Then open your eyes and look around you. Do not shut yourself up away from the beauties of creation. “The microscope will reveal, in the tissues of any wood, of any seed, wonders which will first amuse him, then puzzle him, and at last (I hope) awe him, as he perceives that smallness of size interferes in no way with perfection of development.” So speaks a clergyman. But with unaided vision we may behold truths and laws imprinted upon the smallest objects of nature, and as we are able to read these truths and recognize these laws, so will our conceptions be elevated and broadened, and our pleasures increased. Holmes says: “Nothing is clearer than that all things are in all things, and that just according to the intensity and extension of our mental being we shall see the many in the one and the one in the many. Did Sir Isaac think what he was saying when he made his speech about the ocean—the child and the pebbles, you know? Did he mean to speak slightingly of a pebble? Of a spherical solid, which stood sentinel over its compartment of space before the stone that became the pyramids had grown solid, and has watched it until now! A

body which knows all the currents of force that traverse the globe ; which holds by invisible threads to the ring of Saturn and the belt of Orion ! A body from the contemplation of which an archangel could infer the entire inorganic universe as the simplest of corollaries ! A throne of the all-pervading Deity who has guided its every atom since the rosary of heaven was strung with beaded stars."

To that man a pebble is more than a pebble or rounded stone. Emerson also looks beneath the surface ; with one glance he views the shell, its laws of formation, and the Law-maker. "Motion or change, and identity or rest, are the first and second secrets of nature—motion and rest. The whole code of her laws may be written on the thumb nail or the signet of a ring. The whirling bubble on the surface of a brook admits us to the secret of the mechanics of the sky. Every shell on the beach is a key to it. A little water made to rotate in a cup explains the formation of the simpler shells ; the addition of matter from year to year arrives at last at the most complex forms ; and yet so poor is nature with all her craft, that, from the beginning to the end of the universe, she has but one stuff—but one stuff with its two ends—to serve up all her dream-like variety. Compound it how she will—star, sand, fire, water, tree, man—it is still one stuff, and betrays the same properties."

ELEMENTARY SCIENCE IN OUR SCHOOLS.

SO deeply impressed was I at the successful results of technical education in various countries, as shown at the Centennial Exhibition of 1876, that soon after my return from it I prepared a popular lecture, entitled "A Plea for Elementary Science and Industrial Training." This lecture was delivered at several places in the Province. It was well received, and resolutions were often passed endorsing the general principles and conclusions of the paper. The lecture was, of course, an unofficial statement of what was felt by the

lecturer to be the grounds on which the subject should commend itself to parents school trustees and teachers. In urging upon the attention of these parties the importance of the question which I discussed, I was well aware of the objection so frequently made—that we had already too many subjects of study in our schools. To meet this objection, I sought to place the matter on a rational and practical basis, and to suggest a few general principles applicable to the subject. I stated:

1. That the course of instruction in these schools should not go beyond the reasonable capacity of the pupils for which it was intended.

2. That it should be adapted not only to the wants and circumstances of the country, but also to the taste and genius of classes, or groups, of pupils—such, for instance, as those intended (or who displayed aptitude) for agricultural, mercantile or mechanical pursuits.

In seeking to discuss this subject practically, and by way of application, I said:

As a general rule, we know that boys and girls are naturally curious and observant. It is a great misfortune to them, therefore, not to be able to turn such instincts to practical account early in life. Thousands of young men would, with God's help, be saved in after life from many a snare and temptation were their undeveloped tastes and rational instincts directed into such simple scientific channels while at school. Many an "idle hand," too, would be saved from "mischief," to which they are so prone; and many an invaluable contribution to scientific research might owe its origin to the stimulated curiosity of a school-boy, whose undeveloped germs of thought were kindly fostered by some sympathetic and judicious school-master.

It may be said, and with some certainty, that even if what I advocate were carried out, few, after all, would practically benefit by it. True; but there are few schools in which there is not one or more boys possessing latent scientific, inventive or industrial talent and rare constructive

genius, which is never called into play, much less awakened, aroused or stimulated. As to the question whether for these few, or even for one boy of genius, the country should be put to the expense of their special education and training, let me answer it in the words of Professor Huxley. He says:

“To the lad of genius, *even to the one in a million*, I would make accessible the highest and most complete training the country could afford. Whatever that might cost, depend upon it the investment would be invaluable. I weigh my words when I say that if the nation could purchase a *potential Watt*, or *Davy*, or *Faraday*, at the cost of a *hundred thousand pounds* (£100,000) down, he would be dirt cheap at the money.” He further says: “It is a mere commonplace and an everyday piece of knowledge to say that what these *three* men did (in their special departments of practical science) has produced untold millions of wealth for England and the world—speaking in the narrowest economical sense of the word.” “Therefore,” he says, “as the sum and crown of what is to be done for technical education, I look forward to a provision being made of a machinery for winnowing out the capacities of boys at school, and giving them scope and opportunity in practical science. When I was a member of the London School Board, I said in the course of a speech that our business was to provide a ladder *reaching from the gutter to the university*, along which every child in the three kingdoms should have the chance of climbing as far as he was fit to go.”

Dr. Andrew Wilson, in an address at the Dollar Institution, in Britain, regarded it as a strange anomaly in this advanced age of culture and thought that “boys and girls were allowed to leave school without the slightest information regarding the material world and its surroundings, in which they lived and formed a part. He took his stand on the broad principle that in a child’s mind there exists a distinct niche, which is destined to be filled and occupied with a knowledge of the material world. Why, the very first questionings of childhood are about animals and plants, and regarding the universe and the common objects around us; and would any

sensible parent object to a system of training which is adapted to answer the natural and spontaneous inquiries of childhood? But let them also think how much of beauty and pleasure any one, old or young, loses through inability to discern purpose, and use, and contrivance, in the domain of nature."

Under the dwarfed "read, write and cipher" system of to-day, he asks: "How very many persons go through life literally with their eyes shut to the countless sources of intellectual and physical delight which await them in the simple study of natural science. Many persons have no knowledge, for example, of the causes of a rainbow, and there are comparatively few who can give an intelligent explanation of 'the reason why' grass is *green* and the sky is *blue*. Yet, what a vista of knowledge and information the contemplation of such subjects opens up. The study of natural science may fairly be said to have no equal in training the observant faculties, and imparting habits of order and method which would bear fruit when the school days and science lectures are things of the past. It is, in fact, one of the characteristics of science study that it teaches its own method. You will not find the science teacher unreasonable in his demands. Give him but a tithe of the time devoted to the ordinary branches of education, and I will answer for it that you will be well repaid."

Carlyle, who of all men is the least likely to speak without purpose, says: "It has been one of my chief regrets, that no schoolmaster of mine had a knowledge of natural history, at least so far as to have taught me something of the grasses that grow by the wayside, or the little winged and wingless messengers that are continually meeting me with questions that I am unable to answer."

Dr. Andrew Wilson further observes: "If the advance of education foreshadows any one thing more than another, it is that those who either oppose or neglect science in schools will soon find themselves lagging behind. In days like these, it behoves the educationist to bethink himself of securing the aid of science in the work of training the young. For I make

bold to say that, ten years hence, a school without science will represent the condition of a certain primitive village which I have 'in my mind's eye,' wherein a six days' old newspaper is thought to contain the *very latest news*, and wherein the oldest inhabitant declares that no event of public importance has occurred since the battle of Waterloo."

Enough for the present; especially as the editor desires short papers. I may discuss other points in another contribution.

J. GEORGE HODGINS.

Toronto, 3rd March, 1884.

IMAGINATION.

THE faculties of the human mind are so mutually dependent, that it could scarcely with justice be said that any one is more essential than another; but there are degrees in the pleasure or advantage derived from their several exercise, as well as in the nobility which each imparts to the human intellect. None is brought into play more constantly, and none serves to distinguish the intellectual powers of man from those of the other animals to a greater degree, than the imagination. Incapable of being scientifically analyzed, or of being subjected in its action to any fixed laws, this mistress of the mind may be compared; for as subjects are essential to the existence of a queen as such, so the other faculties, such as memory and comparison, are essential to the simplest acts of the imagination; while, with these as subjects, she becomes, if well disposed, the pride and ornament of the realm, but if vitiated, the bane and scourge and weakness of her people. Or perhaps, to draw our comparison from the realm of nature itself, the other faculties might be still more aptly likened to the varied colors of the spectrum, and the imagination to the simple yet all-embracing ray of white light.

With this faculty is sometimes confused an apparently similar action of the mind known as fancy, which, however,

is a mere parody on imagination, and bears no higher relation to it than the monkey to man. A distinction is sometimes made by saying that imagination results from an exercise of the will, while fancy is spontaneous. The fancy pictures an object for the sake of the picture alone; the imagination connects the picture with some conception of the mind which is embodied in or illustrated by it. Fancy amuses, but imagination elevates. This may serve as a distinction; but to speak of defining imagination would be to fall into the error of self-contradiction; for definition implies limitation, and the expression would simply mean the bounding of the boundless. Imagination alone can comprehend its own limits and its own possibilities.

In all the higher occupations of life this faculty is brought into active operation, and in many cases its aid is indispensable, although we are accustomed to regard its exercise as a luxury in which only poets can afford to indulge. Man may climb the steep hill of science in his chariot of reason: but when, buried in the clouds of uncertainty, he can no longer guide his steeds upon the rugged way, rising on the strong wings of imagination he pierces far up the heights of the unknown. Untrammelled by the restraints of logic, its work begins where reason ends.

But it is in art that the imaginative faculty is brought most prominently into play. It is it that inspires the poem and the drama, that breathes life into the canvas and the marble. It is by this faculty that all forms of ideal beauty or perfection are conceived. Scarcely any of the arts can be said to be flourishing nowadays as they did in the past. This arises from the fact that in this fast age—this age of commercial activity and of material prosperity—men, to their own loss, can find no time for the exercise of this glorious faculty. Productions of art are admired in these days more because it is fashionable than from any real appreciation; for, in order to derive the full amount of pleasure from a work of art, one must have the spirit of an artist. It is a suggestive fact that that nation which has at least the first claim to be

called the home of modern art—Germany—is, perhaps, of all highly civilized nations, the most unprosperous commercially, but retains to the highest degree that spirit of chivalry and self-sacrifice which characterized the imaginative ages of the past. Art is the reproduction of nature, but in a peculiar sense. If it merely consisted in the mechanical imitation of disconnected natural objects, then any of the arts could be learned as a trade, and the adage, "*poeta nascitur, non fit*," would be untrue. But in art there is required that power of preserving a nice balance between opposite qualities, of associating the idea with the image, and of so harmonizing all circumstances that everything conspires to produce a unity of effect. And of this power the living element is imagination. As it has been said, "Good sense is the body of artistic genius, fancy its drapery, motion its life, and imagination the soul that is everywhere and in each, and forms all into one graceful and intelligent whole."

But not in art and science alone is this attribute of genius displayed. It is the inspiration of oratory, and the vital power of all religious systems. To nothing has the Roman Catholic Church for centuries past owed its power as to the appeal made to the imagination by the eloquence of its church music, and by the mysterious character of the service—not entirely unbecoming, we must admit, when we consider the incomprehensible character of the Being to whom it is addressed. The conception of divinity and divine things is possible only with the aid of the imagination: and it is not easy to distinguish between the gift of the true poet and that of the seer.

But what is there in man so high that it cannot be degraded? What power so pure that it cannot be made the instrument of evil as well as of good? The imagination, like all else in nature, is as potent to curse as to bless. A most wonderful faculty is this jewel of the intellect—the first to mature, the last to decay, but ever susceptible of influences for better or for worse. Among men of brilliant imagination we find the extremes of good and evil both as to character

and influence. Fortunately, however, the former class is vastly in preponderance. Hence the importance of guarding this gift as a parent guards a tender child, on whose sensitive nature every impression is a beauty or deformity, even as is the trace of the chisel upon the marble. Hence also the importance of the cultivation of this faculty, which, prudently developed, is the one great means of human advancement, and the source of the highest and only genuine pleasure.

“Weak is the will of man, his judgment blind;
 Remembrance persecutes, and hope betrays;
 Heavy is woe; and joy, for human kind,
 A mournful thing—so transient is the blaze!
 Thus may *he* paint our lot of mortal days
 Who wants the glorious faculty, assign’d
 To elevate the more than reasoning mind,
 And color life’s dark cloud with orient rays.
 Imagination is that sacred power—
 Imagination lofty and refined:
 ’Tis hers to pluck the amaranthine flower
 Of faith, and round the sufferer’s temples bind
 Wreaths that endure affliction’s heaviest shower,
 And do not shrink from sorrow’s keenest wind.”

W. J. CHISHOLM.

POSSIBILITY OF ELEVATED MORAL CHARACTER.

DOUTBLESS many, endeavoring to outgrow their former moral selves, and finding a measure of defeat not unfrequently attending their efforts, with anxious hearts ask the question, “Is elevated moral character a possibility?” To this query of the anxious heart, we answer, Yes; we may make virtue our brazen walls; we may so live that we shall be conscious of no guilt, and turn pale by no crime; we may ever wrap ourselves in such virtue as shall shine with unsullied honor. While we say this, we know it is not always the easiest thing to stand forth the best illustration of integrity, and the best exhortation to its practice. Indeed, as things now are, the man who is true, wholly true and constantly true, to his

highest conviction of right, will have very great need of moral courage, for neither the Church nor the world is, in this our day, blest with the highest moral principle expressed in action. It would not be difficult to show that in morals the pulse of the Church is to-day wavering; and that, by the wretched shuffling of many who are called great, both the Church and the world, in no small measure, paralyze the hearts of those who would be pure, and furnish an excuse, though empty, for the weaknesses and errors of those who live void of noble purpose. And further, both the Church and the world join hands, at least in practice, in perpetuating the false and baneful doctrine that wealth, as popularly understood, is the basis of worth, and thus render self-satisfied those who are vile, though rich, and paralyze the hearts of those who are good, though poor. Indeed, to be popular with the crowd, to be granted a place in what the world calls refined society, to be caressed by those who look no deeper than the surface, a man seems to need but money, or, in its absence, a fair share of policy, and he is safe. To him, though his mind may be without culture, his heart without tenderness, and his soul without truth, aristocratic society will bow; while frequently the man who has soul, culture, eloquence, truth and virtue, if he have not money, use not policy, put not himself forward, fawn not on the so-called great, court not the crowd, pull no wires, is in this age frequently forgotten, at least for a time; but being faithful to himself and his God, only for a time; for he is needed, and the great world, sick at heart of sham, will soon seek him, endorse his principles, and thank him for his manhood. Yes, though the world in its outward manifestations seems not unfrequently against the thoroughly virtuous, at heart it is with him; and as soon as it gains moral courage enough to break the incrustation under which its better nature struggles toward the light, it will crown the hero who gave it inspiration by proving true to his highest conviction of duty, in the midst of discouraging circumstances and in spite of retarding forces. But let it never be forgotten that in this, as in every matter of vital importance, if we

would enjoy the palm, we must, for a time at least, endure the dust. And even in the midst of the dust, that man has a satisfaction to which all wavering hearts are strangers, who can say that when duty calls he is no craven-hearted mortal. Yes, even should he meet naught but coldness from friends, and stern opposition from those not so friendly, he should still be happy because right. Macaulay puts into the mouth of Horatius the words :

“How can man die better
Than facing fearful odds
For the ashes of his fathers
And the temples of his gods ?”

May we not, catching inspiration from that great man, say with much more truthfulness :

How can man live better
Than struggling for the right,
Though all the world endeavors
That honest life to blight ?

But may a man not swerve a little with advantage ? Will he not gain influence thereby ? No ; the man who sells his moral bravery for position, fame, gold or anything, will, with all who have any high aspiration in them, become less influential. Such a man will add disgrace to his manifest weakness, for weak as the world may be, it trusts not moral imbeciles but men—men of tested moral value. There is truth in the oft repeated statement, that rogues prefer to do business with honest men. Again, the man who, under any circumstances, sinks to the performance of a weak act, should he endeavor to become true, cannot take the position of trust among men which he would have enjoyed had he consistently maintained his integrity. A reputation once broken may possibly in a measure be repaired ; but the world will ever keep their eyes on the spot where the scar was. And further, the soul, once dyed in sin, will find it no easy matter to rise to medium moral excellence, and will find, very likely, the highest moral life an utter impossibility. There is no little truth in the words of Horace, “Neither does virtue, when once

it has departed, care to be replaced to those who have deteriorated." Sterling rectitude, then, in thought and act should be the pole-star of our navigation. Yes, every man can and should so live that his language to the great world about him would be that of the brave Socrates when he said to his judges, "Acquit me or acquit me not, I cannot do otherwise than I have done, though I should die a hundred times." Get what we may, without this thorough rectitude the heart will be its own tormentor, for though riches may increase and our affairs move on smoothly, yet a certain something, not easily definable, will be ever wanting to our wretched fortune. But having this moral character, we have that desideratum, and we erect, in the very character we build, a monument more enduring than anything earthly, and which the flight of time and the cycles of eternity are powerless to efface. Here the question, How can we most certainly acquire this elevated character? arises. How can we reach that point where duty, as such, pointing out our path, will be sufficient to impel us to the performance of any task, however difficult? I think we must acquire the deepest possible knowledge of the Divine Being. As we scan the pages of history, there is nothing writes itself more deeply on the mind than the fact that those who have known least of God have ever been lowest in the moral scale. Seeing this, I think we may justly conclude that, were the knowledge of God completely blotted out, all true morality would disappear from our world. Recognition of and reverence for the Lord of all is at the very basis of rectitude. But this knowledge, though intrinsically valuable, is effectually valueless unless it cause us to act. In order to reach the highest type of true manhood, we must act reasonably toward ourselves, those around us, and those who shall follow us. We must do our utmost to improve our complex nature. A poor sickly morality is that which despises the body and equally despises the intellect, and tries but to cultivate morbid or ecstatic feelings. An equally despicable morality is that which wraps itself up in the *ego*, and forgets that there are others who have claims upon us. Indeed, if we

would cultivate what is best in us, we must, as we have ability and as they have need, give kindly aid to all around us. If we but candidly consider what good might be done directly to the world and by reflex influence to our own nature by thus acting, we would, I think, practically endorse the language of Ruskin, when he says, "No very good man can be very rich very long." Nor is it sufficient that we do our duty toward ourselves and those around us. We are under great obligation to those who have preceded us, and can best pay our debt by aiding those who succeed. With a slight change, I would here use the words of another, and say, "Go call the race, instruct them what a debt they owe their ancestors, and make them swear to pay it by sending down, in highest efficiency, those sacred rights to which themselves were born." Yes, the way to true character is action. Again, in the struggle for a noble character it is of great importance to place the standard high. It is of great advantage to aim not merely at being very good men, but at being men characterized by a moral strength which will not waver under any pressure, however intense. There will be trying crises in all lives. There will come to all moments when everything heroic in the soul will be strongly tested, and that without our going where the mills of destruction grind out health, honor, happiness, and every manly virtue from thousands of lives. In our ordinary intercourse with men, there will be afforded the opportunity of showing that it is our settled purpose to understand, in the breadth and depth of its signification, what it is to be true men, and more, to live our knowledge. Every man will have the opportunity of showing the world that living reasonably will bring out and develop the virtues which adorn human character, whether in the common concerns of life or in those seasons of rare culmination when manhood rises into heroism. And let it never be forgotten that, by thus cultivating what is noblest in us, we cannot fail to find what is most pleasurable in all things, both for this and a future life.

“ Ah, if our souls would but poise and swing
 Like the compass in brazen ring,
 Ever loyal and ever true
 To the toil and the task we have to do.
 We should sail securely, and safely reach
 The fortunate islands, on whose shining beach
 The sights we see, and the sounds we hear,
 Will be those of joy and not of fear.”

If we, then, taking as our motto, “ I would do all that best be seems a man,” and believing that who spends for all that is noble and gains by naught that is vile, is really a model, earnestly try to work our life material into something beautiful and good, we shall find that joys are not all to those whom the world calls wealthy; and that, though we may pass in quietness through the world, we have not lived in vain.

JAMES ELLIOTT.

HEAT IN ITS RELATION TO LIGHT.

III.

IN speaking of heat, light and chemical powers of rays, we have frequently used the term intensity, and in connection with the curves drawn, have told you that the maxima of intensity of heat, light, and chemical action lie in the ultra-red, the yellow, and the violet respectively. What does this mean? It is a question which we are perhaps liable to overlook. Again, why are not the maxima of heat and light the same, if light and heat are identical? This latter question is one that may present difficulties. Analogy must assist us here, and sound, the sister of light, lends her most useful assistance. A piano, as you know, is simply a series of strings of different lengths, which, being struck, vibrate; these vibrations are taken up by the atmosphere, and transmitted to the ear. The value of a piano consists in the fact of each string retaining its own sound. Each string, if it remains intact, always gives forth the same tone; each string possesses what is termed its fundamental tone, which varies according to

length, etc., *i. e.*, varies with certain circumstances. If I sound any notes into the piano, I will hear the gentle response echoed back as each separate string has taken up the vibrations peculiar to itself, and no others. Thus every string will be caused to vibrate by the same vibrations of the air which it would return to it when caused to vibrate itself. We now proceed to the more hidden world, and see if we can find an analogy.

Matter in its constitution is composed of molecules, and these molecules are again made by the union of two or more atoms. These molecules and atoms are the strings upon which the vibrations of the ether fall. Every molecule and every atom has its fundamental tone or vibration; when caused to vibrate it will vibrate in a manner peculiar to itself, and when a number of vibrations fall upon it, it will take up that vibration alone, which is peculiar to itself, while the others will have no effect upon it. We may in imagination have here in the dark a round ball, which is composed of molecules, which are capable of vibrating, and of being most vigorously affected by vibrations of certain wave lengths. We heat the ball, its molecules begin to vibrate, they collide with each other, they need more room—if they vibrate they must have room to vibrate, they therefore seek this room by pushing each other aside; in other words, the body expands. But the body is not yet luminous, it has no color whatever, because the vibrations are not capable of causing the molecules in the pupil of the eye to vibrate, they are not of sufficient wave length. But as we increase the heat, just before we reach the red, we obtain the vibrations which harmonize or synchronize most nearly with the fundamental vibrations of the molecules of the ball. As we increase the heat, we increase the intensity of the fundamental vibrations, and besides add other vibrations, which, however, are shorter, and hence do not synchronize, and do not affect the molecules as much. These extra vibrations, however, fall upon the pupil of the eye, and slightly agitate its molecules; and now, for the first time, the eye is conscious of the presence of the ball, and the mind

interprets these vibrations by saying that the ball is red. As we proceed still higher, the additional vibrations become shorter and shorter, and soon we have reached some that will shake the little atoms composing the molecules. These atoms will vibrate, and at last, when the vibration becomes vigorous enough, will shake themselves free, split up the molecules, and chemical dissociation will take place; upon this depends the chemical power of the rays. Heat thus depends upon the capability of the molecules of bodies to vibrate in harmony with certain other vibrations transmitted through the ether; light depends upon the capability of the eye to vibrate in harmony with certain vibrations; while chemical action depends upon the capability of the atoms of the molecules to vibrate in harmony with certain vibrations, and upon this capability of harmonizing in vibration consists the intensity. The maxima of our curves have determined that in heat our instruments are most affected by the vibrations lying to the left of the red; in light our eye is most affected by the yellow vibrations; in chemical action the atoms are most affected by the vibrations of the violet rays.

No two bodies are exactly alike in constitution; and so we have lately heard of photographs taken with red rays alone, and we may reasonably expect to hear of their being taken in the dark. All eyes are not alike. Some persons can detect more colors than others; some can see beyond the violet and some beyond the red. Upon this theory of vibration we can explain the phenomena of heat and light most beautifully. A body, when heated, gives out the same vibrations which it took in when cold; a body, when heated in the dark, gives out the same color that it absorbs when in the light; as, for instance, a black and white vessel will, when heated in the dark, shine out white and black—the portion that was white before now appears black, and the portion that was black now shines white. A body is red because it absorbs all of the rays except the red, which are reflected to the eye. Its true color might perhaps be called blue, the complementary of red, since it is the blue ray that harmonizes with

its vibrations; it is red merely because the eye is not capable of taking up its true vibration, which, however, is manifested as heat. It is, in fact, red from a negative reason.

Did you ever think of what heat and light are doing for this world alone? Blot them out, and what would be the result? It would never be our lot to stay and see the results. Nothing would then exist, and the universe would be returned to naught, whence it was first evolved. Light travels at the rate of 185,000 miles a second. Can you conceive of it! In viewing with delight a little yellow buttercup, the mind has to translate in one second seven hundred millions of millions of vibrations! Man has computed it, and yet he is astounded with the immensity of his calculations. Facts they are, and as such we must receive them. Facts are truth, and science is built upon such. Science to us means truth, but we must also remember that it means the search for truth. These grand theories must attract and please us; but if we could lay aside the veil and see beneath the years of toil and labor, the lives of self-sacrifice and devotion, crushed hopes and rewarded perseverance, the pleasure of success and the gloom of defeat, we would view the future with a different aspect, we would animate our souls with new determination, and, unmindful of future results and secondary objects, we would desire to add some grain of knowledge to the world's increasing store, and wait with patience for the grand results which time cannot deny. Let us search for truth, not only for the pleasure of the search, but for the sake of truth itself.

HONORS AT HOME AND ABROAD.

IN our last issue we referred to the unexpected death of one of our most promising contributors, Mr. P. T. Pilkey, B.A., at Breslau University, Germany. Letters have since been received which show that the esteem and honor conferred in the foreign land have equalled, if not surpassed, that conferred

in his native land. The celebrated astronomer, Dr. Galle, whose lectures Mr Pilkey was attending, says: "You may easily imagine how deeply we are moved through this painful and entirely unexpected occurrence. I am more especially borne down by sorrow and grief, since Pilkey was the most intelligent and diligent hearer of my lectures on astronomy. He became so interested in the subject that last fall he chose astronomy as his chief subject." The kind and loving interest shown by so great a man towards a stranger will be long remembered by Canadian students. Greatness and goodness are one. Many other friends also have our sincere thanks, especially Herr Lindner, Herr Classen and Mr. Burnett, a student at Halle. The latter says: "I found much excitement in the city over his death. This was due partly to the suddenness of it, the strange complication of diseases, partly to the fact that he was an American student; but mostly, among professors and students, as well as others, to his popularity. He had quite an extensive acquaintance among students, and was a member of the Turn Verein. Many persons spoke of his "Liebenswürdigkeit." He was a special favorite of Prof. Galle, who wept while he spoke of him at Prediger Edward's. It was a sad scene when we came together in the chapel adjoining the hospital, at three o'clock this afternoon. Not many of the great crowd could be admitted. The coffin, covered with wreaths, stood in the middle of the somewhat broad central aisle. The exercises were very simple, reading from the Bible and prayer by Mr. Edwards, as Pilkey had desired. The audience were very much affected. Then the coffin was carried out and the procession made up, consisting of the Turn Verein (in uniform) and various societies, scientific and otherwise, connected with the university. Then came a great crowd of students in general—I thought the whole university must be there—followed by professors, ladies and others in carriages. There were many people along the streets, and it was altogether a remarkable demonstration, more remarkable than the funeral of Prof. Ulrici, in Halle, which I lately attended."

Our opinion of German student life has been much improved. We have the rough side so often presented that we are apt to think that students are cold-hearted, inconsiderate; but we have yet to hear of American students showing such high honors even to an American. The influence of Mr. Pilkey at Breslau has been much felt, and others who may follow in his footsteps will certainly meet a hearty welcome among the students at Breslau.

The magnificent metallic casket, still covered with wreaths of everlasting flowers, garlands of evergreens and tokens of respect, passed through Cobourg on Feb. 20th, where the faculty and students of Victoria University met to pay a tribute of respect, after which a short, impressive memorial service was held in the college chapel. On Thursday, Feb. 21st, the last rites were solemnized at Uxbridge with academic honors. Drs. Haanel and Coleman, of the Faculty, spoke a few appropriate words, and the coffin was removed by six members of the Science (V. P.) Association.

May his example ever encourage us! may his memory ever cheer us! may his influence ever improve us!

NEWSPAPERS.

THREE hundred years ago such a thing as a newspaper was unknown; people depended for their news on the irregular arrivals of their letters, and such verbal accounts as could be gathered from those better informed of passing circumstances. The first English newspaper, the *Weekly News*, made its appearance in 1623, and, after the abolition of the Star Chamber in 1641, tracts and newspapers issued forth in shoals during the contest between the Crown and the Parliament. After the Restoration the publication of periodicals was entirely under the control of the Parliament, and printing was strictly confined to London, York and the two universities, while the restrictions governing such publications were so severe that all ceased except two government

papers, the *London Gazette* and the *Observer*. The particulars communicated by these were very meagre and inaccurate, and as the editors were on their good behavior, they invariably advocated the cause of the king in all questions of political import. The deficiencies, however, of these periodicals were partly supplied in London by the coffee-houses which, as a result, sprang into existence. The development of newspapers in England from that time to the present is a most interesting and instructive part of the history of the country. At first they were small and mean-looking, printed, for the most part, on scraps of dingy paper, such as would not now be thought good enough for street ballads. At one time their existence was threatened by the hostile attitude of the Government; at another their cause was eloquently pleaded by Milton in his "Areopagitica;" for a time the liberty of the press was hampered by the Stamp Duty on Newspapers; again all England was in a state of excitement over the "North Briton" and the "Letters of Junius." Through all these vicissitudes the press made steady and decided advances, until in 1832, if not at an earlier date, the freedom of the press was completely established.

What a vast difference there is between the newspapers of two hundred years ago and those of to-day. At that time they contained little more than the prices of stocks, puffis of new projects, and advertisements of books, quack medicines, chocolate, civet-cats, surgeons wanting ships, valets wanting masters, and ladies wanting husbands. In the present day, this age of shorthand and electricity, when freeborn citizens can even demand the right of utterance of their sentiments at a time and in a manner that may please them, we have not only our *Mail* and *Globe* as general organs of Government and Opposition, but every city and town of any consequence in the country has its two or more local periodicals, in which all may express their views, and from which every one may obtain a correct account of all that is transpiring around him. In 1695 the circulation of the *London Gazette* was only about eight thousand, much less than one to each parish in the

kingdom; to-day the number of periodicals having at least this number of subscribers may be numbered by thousands, while the leading publications reckon their circulation by hundreds of thousands.

One reason for this vast increase is the different field of operation in which the newspapers of to-day perform their work. At first only certain political matters were allowed to be published; now the whole range of occurrences at home and abroad is at the disposal of the reporter. Then nothing could be inserted but what could be taken in scattered notes; now every word a public speaker utters finds its way, for weal or woe, to the homes of thousands of readers.

Have not newspapers a very important duty to perform? Is there not a great responsibility resting upon their publishers? The minister has necessary and exalted work to do in dealing with the immortal souls of his hearers, but newspapers often enter homes where the gospel is comparatively unknown, and are read by people who scoff at the very name of religion. The teacher, to a great extent, moulds the minds of the youth under his care, and, as it were, leads them by the hand along the right path, past the besetments and allurements of their younger days; but the newspapers form a large part of their mental food during the most of their lives, chiefly after they have passed from the hands of the school-master, and during times when elevating and useful counsel is most necessary.

Now, is there any lofty ideal towards which every newspaper may endeavor to advance? Is it possible for a political paper to appear before its readers with all its reports unbiased with partyism? Is it possible for a religious journal to present to the people orthodoxy in its purest form, untinged with any shadow of denominationalism? Can even the ordinary accounts of everyday transactions be given so as to have a beneficial effect on the minds of the vast army of news-seekers? We think all these questions can be answered in the affirmative. Newspapers not only have these abilities, but, if directed in an opposite direction from this high ideal,

exert an incalculable influence for evil, which leaves its impress not merely upon the several individuals who may read them, but also on the country at large. We hear much these days about the evil effects of bad books, and the demoralizing influence of sensual fiction. It is a question worthy of serious consideration whether, in the presentation of facts to the people, many of our newspapers should not be included in the list of injurious literature. All periodicals have their influence; if it is not for good, it is for evil; if it does not tend to raise the intellectual and moral status of the country, it unquestionably tends to depress it.

One great object of newspapers should be to furnish its readers with entertaining and elevating truths. The object must be useful, and the means must be of such a nature as will be attractive to those for whom it is intended. The most of our pernicious literature is written in a very pleasing style; by its outside appearance it commends itself to all, and this is one reason why its wide-spread circulation is obtained, and its evils disseminated so extensively over the land. How much good could be done if all beneficial facts were communicated in an attractive form! How much more vast would be the army of readers! How much keener would be the desire for noble and useful knowledge!

The brighter sides of life should be presented. Prominence should be given to everything of a useful and pleasant character. All anxiety to picture the degraded acts of humanity should be repressed. People are not anxious to have blood-curdling descriptions of events about which they cannot think without shuddering. Why cannot the day soon arrive when such paragraphs will be almost, if not entirely, wanting from the pages of our newspapers, and instead will be found the bright, the joyous, and the happy phases of character portrayed before us? When this is the case, newspapers will be in a far better position to improve the minds of their readers than when they make a practice of presenting horrifying details of actions which are entirely foreign to respectable society.

A newspaper that is true to all principles of right and justice will cry down all shams and dishonesty. It must be admitted that in this Canada of ours there are those who prefer secret and tricky dealing to open-heartedness and plain, honest truth, as long as they obtain their desired object. The newspapers of our country have a work to do towards either clearing out this band of intruders or raising them up to a higher standard of moral responsibility. If possible, let the latter be done. Let these degraded practices be banished *in toto* from the land—their room is better than their company; but let the unfortunate victims of such practices be freed from their chains, and placed in the company of the good, the noble and the pure.

The life and condition of all classes can be improved. We have not yet reached perfection. There is still work left for every one to do to make us more perfect in life and thought. The moral and mental tone of society needs elevating and strengthening. Let our newspapers feel their great responsibility in regard to this matter, and we need not fear that they will neglect any means in their power to promote the good cause.

If these are the principles on which all our periodicals are founded, we shall have a circulating literature that will be a pillar to the State. The hands of all good workers will be strengthened, and their tasks made lighter. At last, we shall hear no more of the disastrous effects of unhealthy reading on the minds and habits of youth. A taste for what is useful and elevating will be developed, the appeal "crowd out pernicious literature" will be unnecessary and only a thing of the past, and the amount of good that will ensue will be incalculable. The effect produced on all will be for the best; people in youth will be pure and frank, and in manhood morally and intellectually strong. The effect on the nation will also be beneficial, raising it up in the eyes of the world, making it an example, in honor and righteousness, to be followed by all the people of the earth.

MANY arguments have been brought forward, and many theories advanced, to show that the deluge was partial or universal, and to support each of its supposed physical causes; yet it seems to us that each one is in some point defective, and no clear and accurate idea can be formed.

Geologists, after carefully examining the *diluvium*, have come to the conclusion that there have been at least three great deluges in the eastern hemisphere; two prior to the appearance of man, and one coming after him, commonly known as the Asiatic or Noachian deluge, which well nigh proved fatal to the entire human family. This last inundation has been the cause of almost endless disputes and dissensions among both Christians and infidels. Nearly every geological change ever observed has been at some time or other ascribed to this wonderful deluge, however improbable the idea may be.

There are two leading theories advanced, both of which appear to me very extreme, and incapable of substantiation. The first is, that the whole earth was literally deluged with water, so as to cover all the mountain tops to the height of several miles above the sea level. This idea is simply absurd, for to cover such peaks as the Himalayas, it would require eight times the quantity of water now on the whole earth. And if, by some miraculous means, such a prodigious quantity of water could be added, the additional quantity of water would probably derange the mechanism of the universe, and force our earth from its accustomed orbit. This theory is generally regarded as untenable, for besides the above, we are not at all sure that the phrase "all the earth" should be taken so literally.

Marcel de Serres, a distinguished French philologist, contends that the Hebrew word "haarets," here translated "all the earth," is often used in the sense of *region* or *country*, and that here Moses used it to express only that part of the earth then peopled, and not its entire surface. Whether this be true or not I will not attempt to decide, but leave the question to some of the learned Hebraists of the age.

The second theory is almost equally improbable, and says the deluge was confined to the valley of the Euphrates. But, even so, imagine the waters piled up to the tops of the mountains of that district, and they must have extended over a considerably larger area. Besides, it is very unnatural to suppose that during 25 centuries—the time supposed to have elapsed before the Flood—mankind would not have wandered outside of this limited section, and that they swarmed in millions in a narrow valley, without migration. To an impartial observer the conclusion is almost irresistible, that the deluge could not have been confined to that narrow tract of country.

A happy mean between the two seems to me by far the more probable theory. Man, in his wanderings, would likely remain near the sea coasts, and hence a partial submergence of the continents would be sufficient to destroy him in those places.

Again, the fact is established among scientific men, that man did before the Flood inhabit the southern part of Europe, and seems to have been suddenly swept away. Now, if this deluge is to be confined to the valley of the Euphrates, what is to be done with the early men of Europe, who would in that case have survived. And, on the other hand, the idea of a deluge covering the whole world with water six miles deep is too absurd to be entertained. To obviate the difficulty, it has been suggested by some that by means of the ark the local and domesticated animals were preserved, and that the large carnivorous animals, more migratory and better fitted to journey long distances, could seek refuge in the highlands of the interior.

But, it may be asked, was not a pair of every species of animals preserved with Noah in the ark? In reply, we may say it was not only highly improbable, but impossible, that a pair of every species of animals now known, together with food sufficient for a whole year, could be contained in the ark. It was, without doubt, of vast dimensions, and the only rival it has ever seen upon the waters is that leviathan of modern times, the *Great Eastern*.

The different species of mammalia are variously estimated at from 1,000 to 1,600, 6,000 kinds of birds, 1,500 reptiles, and innumerable amphibiae and other smaller animals. The ark, large as it was, was far from being capacious enough to receive all those creatures, especially when we remember that seven pairs of all clean animals, and one of the unclean, were preserved.

We see also that every great continent has its own race of animals peculiar to that locality. In South America we have the puma, jaguar, tapir, etc.; New Holland and Australia are inhabited by the different members of the kangaroo family; Asia and Africa boast of their fierce and beautiful carnivorous animals; and so on all over the entire world. Not only do they exist there now, but animals of the same genus, of fabulous size, inhabited those same districts in prehistoric times, as shown by remains which have been found.

These several animals come from no common origin, and must have had an existence before the Flood. Had the deluge been universal, there would have been one grand centre for dissemination—the ark—instead of the many we now see. In such a case, how could animals, unfitted for travelling, reach the distant islands and far off lands now their home.

It is also a well known fact that the cones of volcanoes are formed of loose scorïe and ashes which, when exposed to the action of water, are easily washed away. For example, a few years ago, as the result of volcanic action, a small island of considerable altitude was thrown up in the sea. The waves beating against its sides speedily carried it away, and now all that remains of Graham's island is a dangerous reef. Judging from these effects, Sir Chas. Lyell has come to the conclusion that no flood could have passed over Mount Etna, and other volcanoes which he visited, for the past 12,000 years.

In seeking for the physical causes of this deluge, I do not at all mean to detract from its miraculous nature, for God always uses natural means when they will answer His purpose. The warning of Noah was miraculous; the destruction of the rest of mankind we may consider as only providential.

There are three distinct and leading theories offered in explanation of this wonderful phenomenon. The first is that it was the result of the upheaval of a large tract of land by volcanic action. One of the fissures made in the crust of the earth, in the course of its cooling formed an immense crater, from which issued lava, accompanied by masses of steam or watery vapor, which condensing, fell in torrents of rain on the extensive plains around, and this, with the volcanic mud, completely deluged them.

The permanent result of this upheaval we see in the volcanic cone of Mount Ararat and the vast plateau on which it rests, altogether 17,323 feet above the level of the sea. We have had something similar in modern times, which reminds us, on a small scale, of the great deluge. In June, 1759, a vast plain of Mexico, many leagues in extent, fertile and well cultivated, was shaken by frightful earthquakes lasting two whole months. The entire plain then gradually rose to the height of 500 feet, finally opened, and now forms the volcanic mountain of Jorullo. When the elevation began, the rivers of course flowed backward, and inundated all the surrounding plains.

Another theory, and, to our mind, a much more plausible one, is that the deluge was the result of the upheaval or depression of continents. We know from actual experience and observation that the earth is constantly changing its form and appearance; that some portions are constantly rising, and other places sinking to a lower level. For example, Chili and the northern parts of the Scandinavian peninsula are at the present time being slowly yet perceptibly elevated, and the Baltic sea, from deposits and this gradual rising, is becoming shallower; and according to its present rate of progress, the time is within the bound of human calculation, though of course yet far distant, when its present site will be dry land. On a part of the coast of Scotland, away down through the clear waters may be seen the remains of forests once above the ocean level.

Can we not easily imagine that for a special reason a certain tract could be made to sink somewhat faster than its usual swelling and panting, and from this we may readily see the signification of the Scriptural phrase, "All the fountains of the great deep were broken up." Were a continent thus to sink say 5,000 feet in the 40 days, its inhabitants would not be sensible of it. All they would see of what was taking place would be simply a persistent rising of the sea at a little more than its usual rate of flow during spring tides. Ocean, as if forgetful of her ancient bounds, would encroach upon the land, first filling the valleys, then covering the smaller hills, and slowly yet surely climb the highest mountains. An observer would see constant flow without ebb, until he would be encompassed by an apparently shoreless ocean. The effect would be precisely the same if, instead of a continent sinking, the bottom of the ocean should rise. The waters would flow from it over the dry land in exactly the same way as before described. Upon such an hypothesis it has been seriously asked if the Garden of Eden and the scene of Noah's childhood has not ever since been washed by the waters of the Indian ocean. The ark would quite probably drift inward, and become stranded on some highlands long before the place from which the ark started became free from waters, if indeed it has ever done so. Hugh Miller claims that the Caspian and the immense valley surrounding it was the scene of the deluge. It is now considerably below the level of the sea, and all the rivers are turned inland. The existence of marine shells and other alluvial deposits goes to show that the Caspian was once much larger than at present; also the sea of Aral; and from this he conjectures that this whole basin, the cradle of the human family, by a gradual sinking was covered with water, and at the expiration of the 150 days arose again, though never to its former altitude.

The third and last theory which I shall mention, is that the deluge was the result of the melting of those huge masses of ice aggregated during the long winter of the glacial period. It is easily seen, that when from the relative position

of the earth the summers are shorter and winters longer in one hemisphere than the other, that ice and snow will collect in great volumes round that pole. Some stop here, and say the ice accumulated to so great an extent as to affect the centre of gravity of the earth would bear one end down, as it were, and the waters would thus naturally flow down from the other hemisphere, effecting a general submergence. The glacier-melting theory is plausible in many respects, but to my mind one great difficulty presents itself—how this melting could take place suddenly enough to so overflow the continents. It surely could not do so if the precession of the equinoxes are alone responsible for the change. Many attempts are made to obviate this difficulty. One is that the orbit of the earth was suddenly changed by some means or other, bringing it into closer proximity to the sun, and hence receiving greater supplies of heat. The manacles of ice were loosened by the genius of a geological spring time. There was an interchange of temperatures, the rocky glacier yielded to the touch of the warmth, and the sunny smile of summer breathed out over the desolate domain of frost. The advocates of this theory would make the deluge coincident with the general submergence of land which took place at the close of the so-called Champlain period, when there was great heat and a universal reign of water which annihilated the mighty race of mastodons, and of the huge *elephus primogenius*.

However it may be for the Old World, most scientists are of opinion that this Champlain period was the deluge which affected America. Ontario was then nearly submerged, and the waters of Lake Ontario were 580 feet above their present level. Then was formed the immense valley through which the mighty Mississippi drains off the waters of a continent. Just in this connection it is interesting to note the late report of Prof. Henry to the U. S. Government. He, after careful examinations, stated that the Mississippi had not been flowing in its present course more than four or five thousand years. This time would also harmonize very well with the deluge,

for modern theologians are in favor of giving mankind a greater antiquity than the present chronology affords.

During this epoch were probably formed the basins of our great lakes. The glaciers never went farther south; and stopping here, the impetuous torrents rushing out from beneath the ice-bound mass scooped away those hollows, which have ever since been the standing receptacles of water.

The water in them was at that time salt, but has been drained off ever since to the ocean, and the vacancy supplied by fresh water from the surrounding streams, diluting it so much that the salt is now imperceptible to the taste. Science, however, has invented an instrument with sensibilities more alert than ours, and it has detected the saline element still remaining in those waters, which we fail to perceive.

There are difficulties confronting all those theories, and not one of them can satisfactorily explain this great fact of history. Here we must be content with suggesting, without hoping to solve this formidable problem. We see that many and great changes have taken place in the formation of the world; and judging from present appearances, with the same material and the same forces at work as in the past, may we not infer that our terrestrial sphere will not always preserve the form in which we know it—that it is open to great modifications in the future.

This, however, we do not know; we cannot fully understand the past, and can only guess at the future. Nature is to us a great mystery. There is much that geology cannot determine, much which it can only conjecture, as it gropes in the darkness of the past, expectant of some gleam of light hitherto unseen to guide its steps and encourage its progress.

The more we study, the more we wonder; the more we discover, the greater is our admiration; and often in dealing with things known only to the Creator of worlds, we are forced with awe and reverence to say what true science is never ashamed to confess, "We do not know."

SKETCHES IN JAPAN.

It is a great relief, indeed a pleasure, to escape from the filth and dirt of China to the refreshing neatness and attractiveness of Japan. There is a most striking dissimilarity between the two nations, though by many supposed to be closely allied as types of a common race. As far as my own judgment goes, I am not inclined to accept this theory, since in personal appearance many of the Japanese more nearly resemble the Malay race. It is difficult to form any correct judgment on this point, because many characteristics of both races are prominent. The probability is, the Japanese are a mixed race.

Twenty-five years ago Japan was perfectly unknown to Europeans, with the exception of the accounts of a few Dutch traders, who had an establishment at Nagasaki. In 1858 commercial treaties were made by which five ports were opened to foreign trade; but, until ten or twelve years ago, only a few official expeditions, under the protection of the Japanese Government, had been made into the interior. Even now Europeans cannot travel outside the treaty limits without a permit or passport. The Japanese are distinguished by an almost overpowering politeness. Trifles amuse them, and they possess unbounded curiosity. They spend a great deal of their time in their amusements, and make a happy combination of their religious exercises and their pleasures. Their temples are usually surrounded by theatres, archery galleries, and tea-houses, as they call their hotels.

The Japanese have two religious systems. One is Buddhism, imported through the Chinese, and, strange to say, Japan is now the most flourishing stronghold of that religion, India and China having in a great measure deserted its tenets. Buddhism is the religion of the masses, consequently it has largely interwoven with its original tenets a host of superstitions and absurdities. Minor deities are numerous, and their worship supersedes everything else. Idols have become so intimately associated with Buddhism that the purer religion, as

promulgated by its founder, is lost in idolatry. In the Temple of Asakusa, in Tokio, there is a figure of a deity who is supposed to have great power to cure diseases. His image is popularly invested with the same power, so the devout Japs, when afflicted by any bodily pains, come here and pay their devotions. Part of the ceremony consists of alternately rubbing with the hand the part of the body which is in pain and the corresponding part of the image. This means of cheating the doctors has been popular, for the image has been rubbed until it is now almost out of any semblance to a human figure.

The ordinary costume of the Japanese is exceedingly simple. During the greater part of the year their only garment is a sort of loose wrapper with long, open sleeves. This garment is folded about them and confined at the waist by a belt or sash, the men wearing a comparatively narrow belt, but the women indulging in a broad and often highly ornamental sash with a huge bow behind. The men dress their hair in a peculiar manner. They shave off a strip about two inches wide, from the forehead to the crown of the head. The hair from the sides and back of the head is gathered together and tied in a short queue about five inches long, is turned up over the top of the head, and rests on the shaven portion. The women have as elaborated a coiffure as the Chinese women, and quite too complicated for me to describe.

The Japanese are strict vegetarians, rice being the great staple of food. With different vegetables they manage to have a great variety of dishes. They have odd tastes too: sea-weed is a favorite edible; lily roots are raised in large quantities for food. A Japanese meal is rather a difficult undertaking at first. As they have no tables nor chairs, you have to seat yourself on the matted floor; then a nezan, or waitress, brings each person a little stand or tray, upon which are arranged a dozen or more little dishes of soups, vegetables, pickles and relishes. The nezan also brings a large vessel filled with plain boiled rice, which she serves out to each as he wants his supply renewed, the rice being the basis of the meal. The great difficulty is the management of the chopsticks; but a

little practice soon overcomes this, and you learn to eat rice and soup without spilling very much. Fish is eaten in considerable quantities, but no other animal food. Cattle are not numerous, and are used as beasts of burden. Sheep are unknown; I had the pleasure of paying two cents to see one in a small menagerie in the city of Kioto.

In commercial pursuits, the Japanese do not equal the Chinese; but in every other respect they appear to be superior. In the mechanical arts they are wonderfully clever, their buildings, especially the temples, being perfect marvels of the joiner's art. They are exceedingly artistic, the love of the picturesque seeming to prevail universally. True, their ideas of beauty are rather odd to us, and even grotesque; but the growing adoption of Japanese designs by Europeans is a proof of their genuine worth. Their manufactures of porcelain and bronze are world-renowned both for workmanship and design, while in the manufacture of lacquer ware they are unequalled.

It is a matter of great interest to observe Japan just at this period of its history. It is in a sort of transition stage. Twenty years ago it was closed to the world. Now the Japanese are making every effort to Europeanize themselves as rapidly as possible. They have already two lines of railway, and are projecting several more. A most complete telegraph system has been constructed all over the country, and is in constant use. They have as thoroughly organized a police force as any country in Europe. A Japanese company own a fine line of steamships that do all the coasting trade, and the Government possesses several fine ironclads. Extensive silk works, paper factories, and a mint have also been established. All these have been organized within the last ten years, and are chiefly under the control of the Government. At first, European managers and operatives were employed to teach the natives, but now they are rapidly dismissing the foreigners' help, and are succeeding very well by themselves.

There are three or four large colleges, with European and Japanese professors, and a large number of students in at-

tendance. These are clever, and easily acquire first-class attainments.

As all these enterprises are of so recent an inception, the general effect upon the people is as yet not very marked. A great revolution is, however, being accomplished, especially amongst the better classes. Numbers of them go to Europe and to America to be educated, and so cannot but see the deficiencies under which they have labored so long. The Mikado, or Emperor, and his court are most forward in adopting the reforms. European costumes have been adopted for all official occasions. The Emperor makes his appearance in public occasionally, something unknown until recently. I had the pleasure of seeing both the Emperor and the Empress, on the occasion of his return from one of his trips through the country. The Emperor was a tall, well-built man, of about thirty or thirty-five years of age, and wore a uniform similar to an English artillery officer. The Empress was in native costume. If the Japanese continue to adopt these reforms as rapidly during the next ten years as they have done in those just past, they will scarcely be recognizable as the same nation.

F. W. BARRETT, M.A.

CORRESPONDENCE.

WHAT IS THE DIFFERENCE BETWEEN MEN AND ANIMALS ?

To the Editor of V. P. Journal.

MR. EDITOR,—Allow me to give a few points on the above query. Various theories have been advanced in answer to this interesting question, some of which are very plausible, while others seem to have fallen wide of the mark. A long article might be written on the subject, but I submit the following brief explanation to the judgment of your readers. The main difference seems to be one of degree rather than of number of faculties possessed by each. Animals, especially those in the higher orders, can be shown to have memory,

reason, and the other faculties with which man is endowed; but these faculties are far from being as acute or as easily developed as those of man. There is, however, one phenomenon peculiar to man which is wanting in animals, and which places, when pushed to its farthest extent, a wide gulf between these two orders of creation. This phenomenon is self-consciousness. Animals have no personality. From self-consciousness there is evolved in man the recognition of a Supreme Being, and of a divine law by which we are governed; in other words, man has a moral faculty which is not found in animals. Animals are guided by their own natural desires and instincts, and only when compelled do they recognize any higher law. The highest object of their thoughts is man, and even this is the result of actual and individual experience. It is the presence of this faculty of consciousness which illumines the whole mind of man, and renders all his mental powers so active and powerful, and its absence which suffers the lower animals to wander in comparative darkness during their existence.

Yours truly,

Cobourg, March 12th, 1884.

QUERIST.

INDIAN CORRESPONDENCE.

To the Editor of V. P. Journal.

DEAR MR. EDITOR,—I hail with great satisfaction the advent of the V. P. JOURNAL. The two numbers which have reached me here show that you are bound to succeed. The get-up is altogether good, and reflects credit upon the Society. I cannot say, however, that I admire the cover. I presume that the color, which offends my untrained and perverted taste, has some special scientific object in view.

I have a High School here under my care. It is for all sorts of people, and consequently I have a variety attending it. The majority are Hindus, a number Parsees and Mussulmans, a minority Christians. A few days ago my Persian master asked me to give him a testimonial, that he might get a few private pupils during his morning hours. Most Europeans like to get

a smattering of some sort or other of the language of this strange country. What I offered did not suit, so he drew up a "model," which I enclose. The man is a good teacher, a great authority in Persian, but I am sure you will think a "brag." On the contrary, he is very modest and unassuming—one of the meekest of men. The paper, however, lets light in on a phase of eastern thought that is worth studying. Success attend you.

Ever yours,

JAMES SMITH.

Ahmednagar, India, Jan. 10th, 1884.

MODEL TESTIMONIAL.

"I certify that Munshi Burkar Ali, Persian teacher of our High School, is competent enough in all respects in Persian, Hindustani, and a little of Arabic; and so far as I am able to judge, he is best of all the late Munshis of Ahmednagar put together, and am consequently glad to recommend him to any officers preparing for any Persian or Hindustani examinations, that they will be very much benefited by him, and at the same time apt to pass their examinations sooner if they take benefit of his tuition than they can be otherwise.

"He is long experienced in teaching, and bears superiority to any other Munshi, being brought up to this profession from his early age by his father, who no doubt is an excellent Munshi, and possesses brilliant testimonials from several officers whom he taught. I have strong reasons to say that he inherits, as it were, this profession from his forefathers, while such is not the case with other Munshis."

TORONTO NOTES.

To the Editor of V. P. Journal.

DEAR SIR,—The great social events of the college year at Toronto have come and gone. The Trinity College conversation more than equalled expectations. Toronto's youth and beauty were in full force, and the unanimous verdict among the young, after the headaches of the next day were dissipated, was that

"Maids were ne'er so fair nor youths so gay;"

whilst the elders were fluttered with complacency when told they had never so great a success before.

Following close on its heels came the University conversazione, when hundreds jostled along through library and hall of the splendid building. Good singing and music was supplied, and the Convocation Hall was crammed to suffocation during the programme, though perhaps the presence of Matthew Arnold on the platform with Dr. Wilson and Goldwin Smith aided the interest in the singing. The College Glee Club gave a couple of songs by way of interlude—*encored*, of course. Methought a little more practice and training would have aided materially, and that I had heard quite as stirring songs in a smaller but better trained club in our own Alumni Hall.

After the conversazione, a dance was held in the dining hall of the Residence. Some two hundred persons of opposing sexes wedged up and down in a perfect jam in the narrow place to very good music. They enjoyed it immensely, they say, though dancing was almost impossible.

The dinner at the Horticultural Gardens, of course, proved hilarious and jolly. The usual toasts were drunk and songs sung

But while all this jollity was going on, there came among us and—after a quiet lecture and a quiet drive through the city—passed on, one whose visit, in the thoughts of many, held an importance beyond the festivity of college reunions. Matthew Arnold delivered two lectures in our city, and was regarded by some with curiosity, but with a hushed attention by those who acknowledged his merit from afar. I confess myself quite disappointed in him, there was so little remarkable in his appearance; yet sometimes, when he lifted his drooping head, his eyes shot a glance of great intensity. He was the guest of Goldwin Smith, and it was quite a study to examine the two side by side, and see how the faces spoke the difference. The business-like intellectuality of the “By-stander” contrasted with the dreamy abstraction of the poet.

Another event of perhaps greater importance in educational circles in Toronto takes place to-morrow, when the Free Library will be opened to the public. The scheme is a splendid

one. It only remains to be seen whether the members of the Library Board can work together harmoniously enough to carry it to the success it should become. Their squabbles so far augur anything but well, and it is to be hoped they may henceforth sink their differences in the common benefit. The building is admirable for the purpose, and the gentleman at the head—ex-Alderman Hallam—is an energetic worker. The opening will be given more *eclat* by the urban semi-centennial to-morrow, and the auspicious event will be suitably ushered in with the salvos of guns.

In your next issue I can perhaps tell you more of the occasion.

Yours faithfully,

ALUMNUS.

PROFESSOR HAECKEL IN CEYLON.

NEXT to the Singhalese and Malabars the Indo-Arabians or moormen, form, according to number and influence, the most important part of the native population of Ceylon. They number perhaps 150,000, or one-tenth the number of Singhalese. They are descended from those Arabs who, more than 2,000 years ago, gained a firm foothold in Ceylon, as well as in other parts of southern and south-eastern Asia, and who, between the eighth and tenth centuries (until the arrival of the Portuguese) conducted the principal commercial interests of the island. The entire retail as well as a great part of the wholesale trade of Ceylon is still in the hands of these active and enterprising sons of the desert, who, by their speculative wisdom, craft, and pre-eminent skill for money-making, here play a similar role to that of the Jews in Europe. In many other respects they are like their remote kinsmen in Europe, who have no representatives in Ceylon.

The language spoken and written by the moormen is a mixture of Arabian and Tamil. They are chiefly Moham-medans and Sunnites. Their complexion is a brownish-yellow,

their physiognomy unmistakably Semitic. Hair and beard are generally long and black. Their powerful frames, which are clad in long white burnous and wide white trousers, appear all the more stately among the Tamils and Singhalese, because of the tall yellow turbans—shaped like a bishop's mitre—they wear on their heads.

In addition to these three predominant races, the population of Ceylon is made up of aboriginal tribes, the Veddahs and Rodiyas (of whom there are perhaps 2,000), Malays and Javanese (who are principally enlisted as soldiers), Parsees and Afghans (mostly money-changers and usurers), negroes and Caffres (soldiers and servants). The offspring of these different native races, by intermarriage with Europeans, exhibit the most diverse characteristics, and offer interesting difficulties to anthropological classification. To these belong the "Burghers," the descendants of the Portuguese and the Dutch, in whose veins runs more or less Singhalese or Tamil blood. This class furnishes the clerks and accountants in the offices and warehouses, the subordinate officers of the Government, in which positions they are highly esteemed. Lastly, the number of Europeans—the "foreign" rulers of the island—is only about three or four thousand, and these are chiefly English and Scotch. In the cities they occupy all the higher Government offices, and own all the larger commercial houses. In the mountain districts they form the numerous and remarkable class of "planters" with whose peculiar mode of life I became familiar during my travels through the highlands.

According to the census of 1857 (twenty-seven years ago), the total number of inhabitants in Ceylon then was only 1,760,000. In 1871 (thirteen years ago) it had increased to 2,405,000, and at the present time there are over 2,500,000 souls on the island.

As the superficial area of Ceylon is 1,250 geographical square miles, scarcely one-sixth less than that of Ireland, it might very easily accommodate six or eight times its present population. According to the ancient chronicles, Ceylon, 2,000 years ago, contained many more inhabitants—perhaps more

than twice its present number! The depopulated and, to some extent, desolate northern half of the island was in those days densely populated; and where now impassable jungles afford secure retreats for apes and bears, parrots and doves, flourished extensive fields, rendered productive by a system of irrigation that is worthy all admiration. The remains of these irrigation tanks, as well as the noble ruins of the vanished cities, Anarajapoora, Sigiri, Pollanarua, etc., to this day bear witness of their former magnificence. They show what might again be accomplished on this "jewel island," this "noblest pearl in the diadem of India."

SNOW-FLAKES.

MANY of our readers will perhaps be surprised to learn that no less than 1,000 different kinds of snow-crystals have been noticed by Scoresby, Glaisher, and Lowe, and that a large proportion of them have been figured and described. The patterns are of wonderful beauty. A strange circumstance connected with these objects is the fact that for the most part they are found, on a close examination, to be formed of minute colored crystals—some red, some green, others blue or purple. In fact, all the colors of the rainbow are to be seen in the delicate tracery of these fine hexagonal stars. So that in the perfect whiteness of the driven snow we have an illustration of the well known fact that the colors of the rainbow combine to form the purest white; for the common snow-flake is formed of a large number of tiny crystals, though their beauty is destroyed in the snow-flake through the effects of collision and partial melting. It may not be very commonly known that ordinary ice also is composed of a combination of crystals presenting all the regularity of formation seen in the snow-crystals. This would scarcely be believed by anyone who examines a rough mass of ice taken from the surface of a frozen lake. Yet, if a slice be cut from the mass and placed in

the sun's light or before a fire, the beautiful phenomena called ice-flowers make their appearance—"a fairy seems to have breathed upon the ice, and caused flowers of exquisite beauty suddenly to blossom in myriads within it."

When we remember that the enormous icebergs of the arctic and antarctic seas, the snow-caps which crown the Alps, Andes and Himalayas, and the glaciers which urge their way with resistless force down the mountain valleys, are all made up of these delicate and beautiful snow-flowers, we are struck with the force of the strange contrasts which nature presents to our contemplation. We may say of the snow-crystals what Tennyson said of the sea-shell. Each snow-star is

"Frail, but a work divine,
Made so fairly well,
So exquisitely minute,
A miracle of design."

Yet, massed together with all the prodigality of nature's un-sparing hand, they crown the everlasting hills; or, falling in avalanche and glacier, overwhelm the stoutest works of man; or, in vast islands of floating ice, show themselves to be

"Of force to withstand, year upon year, the shock
Of cataract seas that snap the three-decker's oaken spine."

PROCTOR.

"Oh, it is excellent
To have a giant's strength; but it is
Tyrannous to use it like a giant."

R. A. COLEMAN,
Barriater,
Solicitor, Conveyancer, etc.,
No. 6 KING ST. EAST,
TORONTO.