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V. P. JOURNAL.

VOL. II.]

JANUARY, 1885.

[No. 7.

WE send our second New Year's greetings to our readers, with the pleasant thought that the circle of readers has increased far beyond that of a year ago. Prospects are brightening. Our circulation has doubled during the past year, and we have been warranted in extending the period of publication from eight to twelve issues per annum. We promised to prove our JOURNAL as financial matters would guarantee—the extension to twelve numbers is the first step. We have not as yet a staff of paid editors or contributors, so that at present all receipts will be used for the improvement of the JOURNAL. Our readers, therefore, have it in their power to increase the value of the publication. You will kindly bear with us a moment in making an explanation of our position. We have been told that this JOURNAL has been started in direct opposition to another. To this we answer that, directly or indirectly, we have never entered upon any such opposition, we have purposely kept aloof from mere local matters. Again, we have been quoted as being the organ of a body of students; such is not the actual state of affairs. The V. P. JOURNAL has been started by the members of the Science Association, composed of some undergraduates and *graduates* (principally the latter) of Victoria University. To this body is it amenable, not to a body of students. The result of this is, that instead of taking the place of a *local* college paper, it has endeavored to voice the wants and wishes of graduates, and to make a place for itself among the ever-increasing class of thinkers in Canada and else-

where. We are liable to err as other human beings, but we hope to grow wiser by experience; and as this ripens with time we trust the value of our publication will increase. Again, as the organ of an Association, we do not wish to be misunderstood. Every journal must be started by some one, but it does not necessarily follow that any journal should be thereby limited or fettered in its range. The aim of this journal is to be free and independent—to take up the cause of students if desirable, to advance the claims of graduates if advisable, to let both alone if expedient. We place ourselves in such a position that the interests of higher education, whether at University College, Trinity, Queen's, or Victoria, shall be our field. Mutual intellectual improvement and recreation is our aim, and we ask a renewal of your hearty co-operation.

We have been termed a college paper; the intention actuating some, in thus endeavoring to place us in a position unclaimed by ourselves, will justify this explanation. We do not deride college journalism—far from it—but we do not claim to be a local college paper. Our journal itself should be sufficient answer to such remarks.

In closing, we extend our greetings and best wishes to our many friends in Canada, the United States, England, Ireland, and even away to distant India.

INTERCOLLEGIATE MISSIONARY ALLIANCES.

MOST of us have been agreeably surprised by the enthusiasm with which all the Protestant colleges have lately taken part in the Canadian Alliance. In this connection it may not be uninteresting to draw attention to the American Alliance lately held at Princeton, N.J. Thirty-five Theological Seminaries, of ten different denominations, were represented by 428 delegates. Besides representatives of nearly all the States and Canada, there were present natives from Africa, Armenia, Bulgaria, England and Wales, Germany, Greece, Holland, Ireland, India, Japan, Persia, Spain, and Sweden. A Choctaw Indian from Yale, an African from a western seminary, an

Armenian, a Bulgarian, a Hebrew, and others, made eloquent appeals for help on behalf of their several peoples. Nine returned missionaries supported these appeals. The result was that thirty-eight declared their intention to go to foreign fields. Canada, we feel certain, will not be behind her cousins in earnestness and devotion. The men who will afterwards guide the counsels of the Churches, organize missions, and lead on the great denominations, are now within the seminary walls. If on this common platform Episcopalian, Presbyterian, Congregationalist, Baptist, Methodist, and every other denominational representative, can meet in common brotherhood and lay aside the petty differences, we are justified in the belief that the walls of demarcation in future will not appear so high, but that the rising mists will reveal but shaky fences and tottering walls. We were lately struck by the remark of an Episcopalian (of the highest kind), who said: "These church differences are simply owing to the influence of a few leading men in each body. It is considered more honorable to be first in a second-rate Church than second in a first-rate Church. Church differences will soon give way when the leaders are willing to become followers." We do not quote this as endorsing the view altogether, but simply to show that there is a feeling prevalent towards co-operation. These Intercollegiate Alliances may tend to harmonize sects at home, and they may retard the introduction abroad of that sectarianism which is often the curse of missions.

THE ONTARIO READERS.

BOOK THE FIRST.—Hon. G. W. Ross has favored us with Vol. I. of his new series of "Readings for the Young." The type is clear and attractive; the stories simple and interesting; the illustrations equal to Scribner's; and the principle of teaching decidedly appropriate. To two points we wish to direct attention. First, the introduction of drawing-lessons is a great advance upon the old reader. The need of such lessons is at once apparent by the awkward and laughable efforts of even High School pupils to describe a circle, an equilateral

triangle, or even draw a straight line. A free and ready use of pen and pencil is one of the strongest recommendations to many positions to-day. Many great men are scrawlers, but it is not a necessity—neatness of writing would certainly set off their other qualities. The exercises in Book I. are all on straight lines. In our opinion, they are too simple. All the exercises in penmanship are on curved lines, so that the drawing of curves would not be in advance of the other portions of the book. Why not, in such books, add simple exercises that would *amuse*? Art is not a favorite pursuit with Canadians; perhaps we might foster and develop the latent talents by early calling into play the imagination and interest of our youngest pupils. At least no harm can be done. The drawing of straight lines may become monotonous—in fact, judging from the productions, we might say that it is easier to draw curves than straight lines. And then the cover. We all remember the unsightly, flesh-colored, limp cover, that was an eye-sore to us all, and gave many of us a dislike to the sight of school-books. We learn through the senses, and the eye must be attracted and the feeling of pleasure stimulated. The color of the new cover is brighter, and the binding neater—but we fear the new cover is more liable to split. The tendency of such covers under the action of heat and moisture is to twist and curl, destroying the appearance and durability of the book. Children should be provided with books that are *strong and lasting*; we have our doubts about the new cover; a strong, stiff cover would have been more serviceable in many respects. The only attractive part of the cover is its color. We think that some of the illustration and attractiveness of the inside might have been more profitably spent upon the outside. Taking it all in all, however, we almost wish we were boys (and girls) again together, that we might wipe out the dreamy hours in the old gloomy school-room by reciting anew our lessons or drawing pictures out of such a little treasury. He is a surly boy, and she is a sulky girl, who will not take delight in this new work. We congratulate the Minister of Education—peruse the work and you will do the same.

SKULLS.

" 'Tis distance lends enchantment to the view,
And robes the mountain in an azure hue."

NOT always, and yet how often, the colors are softened, the rough, sharp edges smoothed, the irregularities curved, until a mass of unsightly rock and stunted trees becomes a charming landscape, wreathed in mellowed light and softened tints. Distance blends and mingles colors in such a deceptive and bewitching manner, that at different distances the mountain looms up dark and unsightly, or gently thrusts its modest head, crowned with a wreath of tender hues, into the sky of white, and blue, and gold, and rosy red. Distance also softens sounds. The naturalness of music is at once apparent from the fact that musical tones and notes are carried farther than noise. The newsboy in the streets, as he sings out "Glo-bee, Ma-il, and Wur-reld," in musical cadence, is but taking advantage of this favorable law of nature. The clear, pure pianos and pianissimos will thrill in the ear of every intent listener in an immense hall, while the boisterous, harsh blusterings of a maddened stumper will but reverberate through his own harsh frame.

Again—

" Sing, and the hills will answer;
Sigh—it is lost in the air;
The echoes bound to a joyful sound,
But are slow to voice your care."

It is but another application of that law that seems to be increasing and widening in its force and beauty, "The fittest will survive." The universe is the home and guardian place of harmonies; noises must die the death of noisomeness. Would you be charmed by a landscape—view it from a distance; would you be fascinated by music—listen at a distance. The unsightly colors and the grating noises will sooner or later drop behind and lose themselves.

We have said *not always*. The reader of the *Scientific American* must lately have noticed a striking cut, an illustration copied from a painting by the Italian artist Gallieni. Seen

from the distance, it is a ghastly skull, the teeth yet grinning in all their hideousness. But approach, and the deathly shadows dispel themselves and fade into living tints and colors; the eyes resolve themselves into two beautiful children, between them a dog, and before them a row of playthings. Over and around all the light of heaven streams in between the drawn-back curtains of the window. The picture is one of the most interesting and suggestive that we have ever seen, and the appended "moral" that the artist has added carries its own weight and teaches its own lesson,—“Fear, increased by the imagination, is the best friend of the guest of the Ganges.” Cholera Morbus is the suggestive and appropriate name. The clouds will pile themselves into all sorts and manners of fantastic forms and shapes. It requires but little suggestion to set one's imagination at work conjuring up ghosts and picturing marauders. The world is altogether as we look at it—horrifying skulls or merry children.

ATHEISTIC SCIENTISTS.

THERE is a sort of men whose faith is all
In their five fingers and what fingering brings,
With all beyond of wonders great and small,
Unnamed, uncounted in their tale of things :
A race of blinkards, who peruse the case
And shell of life, but feel no soul behind,
Who in the marshalled world can find a place
For all things, only not the marshalling mind.
'Tis strange, 'tis sad ; and yet why blame the mole
For channelling earth? Such earthly things are they,
E'en should they muster everything in blank array,
Frames as in pictures, pictures with no souls ;
I, while this dædal dome o'erspans the sod,
Will own the builder's hand and worship God.

JOHN STUART BLACKIE.

REVIEWS.

THE *Cunula Educational Monthly* will soon enter upon its seventh year. It has all the appearance of a vigorous and well-sustained periodical. The *Monthly* is owned and controlled by a joint stock company of teachers and inspectors, and is thoroughly independent. The November number, just to hand, contains President Wilson's "Convocation Address," Sir William Dawson's valuable "Report on the Higher Education of Women," Inspector Scarlett's suggestive "Address to a Model School Class," and Prof. Adamson's masterly review of the new textbook, "Sully's Psychology," and much other interesting matter. Altogether the *Monthly* fills its place well, and deserves the support of the profession and the public.

"THE RELIGIONS OF THE ANCIENT WORLD."—By Prof. George Rawlinson. J. Fitzgerald, Publisher, 20 Lafayette Place, New York.

THE study of the religious systems of antiquity, of the forms assumed by religious ideas in their development among the Egyptians, Babylonians, Chaldeans, Greeks, Romans, and other ancient peoples; their mythologies, their curious rites and ceremonies, their beliefs as to the future state, etc., is one of the most important and interesting branches of historical research. No more competent guide in this fascinating study could be found than Mr. Rawlinson, the well-known author and Camden Professor of Ancient History in the University of Oxford.

SCIENCE AND NONSCIENCE.

THE microscope reveals that there are more than 4,000 muscles in a caterpillar and that the eye of a drone contains 1,000 mirrors. There are spiders as small as a grain of sand, and they spin a thread so fine that it would require 400 of them to equal the size of a single hair.

A LIVE tortoise was found in a solid cake of ice at Cornwall, Orange County, N. Y., recently. It measures eight inches in length and five in width, and was carefully cut out and taken to Mr. Clark's home, where, after it had lain in the sun a few hours, it began to show signs of life. It is now looked upon as a great curiosity, as the ice was gathered last winter, and the turtle was apparently none the worse for its congealed abiding-place.—*N. Y. Sun.*

THE potter stood at his daily work,
 One patient foot on the ground ;
 The other, with never-slackening speed,
 Turning his swift wheel round.
 Silent we stood beside him there,
 Watching the restless knee,
 Till my friend said low, in pitying voice,
 "How tired his foot must be !"

The potter never paused in his work,
 Shaping the wondrous thing ;
 'Twas only a common flower-pot,
 But perfect in fashioning.
 Slowly he raised his patient eyes,
 With homely truth inspired :
 "No, marm ; it isn't the foot that kicks ;
 The one that stands gets tired."—*The Continent.*

THERE is a species of wasp-like insect called the Sphex. The insect lays its egg in a hole excavated in the ground. It then flies away and finds a spider, which it stings in the main nerve centre of the animal. This has the effect of paralyzing the spider without killing it. The Sphex then carries the now motionless spider to its nursery, and buries it with the eggs. When the eggs hatch out, the grubs feed on the paralyzed prey, which is then alive, and therefore quite fresh, although it has never been able to move since the time when it was buried.—*Romanes.*

A SUNBEAM kissed a river-ripple—"Nay,
Naught shall dissever thee and me!"
In night's wide darkness passed the beam away,
The ripple mingled with the sea.—*Century*.

COURAGE comes from application
Of a heart that does not shirk,
And whose sweetest consolation
Is upheld by steadfast work.—*Joel Benton*.

PROF. H. N. MOSELY, of England, President of the Biographical Section of the British Association at Montreal, exhibited specimens of *Utricularia Vulgartsi*, holding in its embrace a number of young fish which it had caught. The taste of this plant is omnivorous. Of late Mr. Simms, of Oxford, placed 150 perch fry in a vessel containing specimens of the plant, and at the end of two days found that all except one or two had been entrapped.

IN Church and in State
It is rule or be ruled;
In courtship and marriage
It is fool or be fooled;
In logic and law
It is nick or be nicked;
In gambling and trade
It is trick or be tricked;
In treaty and war
It is beat or be beaten;
In the struggle for life
It is eat or be eaten.—*Ex.*

LIFE UNIVERSAL.—As is well known, the depths of the ocean were for centuries regarded as abysses inaccessible to the sight, and it was taught that no living being could exist in the darkness that reigned therein. Yet it was only necessary to cast the lead and trawl into the submarine valleys to discover therein

an entire flora of wonderful richness and beauty, and an entire fauna of singular beings regarding whose form and nature there could have been no suspicion. On another hand, the microscope has revealed the existence of innumerable animalcules in the least drop of water taken from any spot whatever on the surface of the ocean; and in the very place where it was believed that there could be nothing but inert matter, the presence of life has been discovered in its completest development. It is the same with the atmosphere. In that transparent, invisible, ungraspable air, in which for centuries nothing has been seen but winged birds and insects, the microscope shows us to-day a whole world suspended, unbeknown to us, amid the dust that is continuously floating about. The air is no less peopled than the ocean, and just as we see sediment, infusoria, and algæ in a drop of ocean water, just so we find in the least volume of air collected near the earth, dust, vegetable debris, living organisms, and infinitely small animalcules, which feed, develop, reproduce their kind, and live their little lives after the order of the most exalted existence. There is life everywhere, latent or active. It is co-extensive with the universe. How idle, then, is all speculation about spontaneous generation! —*Exchange.*

THE MAELSTROM.—The killing of a popular legend, even when baseless, is a slow process, but when it has some sort of slender foundation, which is commonly the case, its vitality is wonderful. This is curiously shown by the stories of the Maelstrom, which is still described as of old in some of our geographical text-books. I have just turned up a quotation from the *Leisure Hour* of last November which is amusing. We are told that an American captain visited this whirlpool in one of its calmer intervals, and ran along the edge of it with his ship. His estimate of its diameter was about a mile and a half, and he says that “the velocity of its current increasing as it approximates to its centre, and gradually changing its dark blue color to white, and foaming, tumbling, and rushing to its

vortex, very much concave, as much so as the water in a funnel when half run out; the noise, too, hissing, roaring, dashing—all pressing on the mind at once—presented the most awful, grand, and solemn sight I ever experienced. We were near it about eighteen minutes, and in sight of it two hours. From its magnitude I should not doubt that instant destruction would be the fate of a dozen of our largest ships were they drawn in at the same moment." All this, although in perfect accord with the regular orthodox story, is rank fiction. On July 10, 1856, I was sailing very near to the spot where the Maelstrom is marked on our maps, and therefore looked for it on the detailed sailing charts and other Norwegian maps that were on board. It was not to be found on any of them. I then asked the captain as to its whereabouts, he having had much experience in these parts. He told me the only information he had ever been able to obtain concerning it was derived from English geography books, and the accounts of English passengers; that the fishermen who lived on the islands on each side of it knew nothing at all about it in consequence of their ignorance of the English language.—*English Exchange.*

THE VELOCITY OF THE MOON.—We faintly picture, perhaps, how it would seem, from a station near the lunar orbit, to see the moon—a moving world—rush by with a velocity greater than that of a canon-ball in its swiftest flight; but with equal speed its shadow actually travels along the earth; and now, if we return from our imaginary station to a real one here below, we are better prepared to see why this flying shadow is such a unique spectacle; for, small as it may be when seen in relation to the whole globe, it is immense to the observer whose entire horizon is full with it, and who sees the actual velocity of one of the heaviest bodies, as it were, brought down to him. The reader who has ever ascended to the Superga, at Turin, will recall the magnificent view, and be able to understand the good fortune of an observer (Forbes) who once had the opportunity to witness thence this phenomenon, and under nearly a

cloudless sky. "I perceived," he says, "in the south-west, a black shadow, like that of a storm about to break, which obscured the Alps. It was the lunar shadow coming toward us." And he speaks of the "stupefaction"—it is his word—caused by the spectacle. "I confess," he continues, "it was the most terrifying sight I ever saw. As always happens in the case of sudden, silent, unexpected movements, the spectator confounds real and relative motion. I felt almost giddy for a moment, as though the massive building under me bowed on the side of the coming eclipse." Another witness, who had been looking at some bright clouds just before, says: "The bright cloud I saw distinctly put out like a candle. The rapidity of the shadow, and the intensity, produced a feeling that something material was sweeping over the earth at a speed perfectly frightful. I involuntarily listened for the rushing noise of a mighty wind."—*October Century*.

TRUTH-SEEKING.

TRUTH is being sought. Philosophy has been defined, by one of the most profound and reverential metaphysicians, as "the pursuit of absolute truth, or of the ultimately real, that is, of the true and real as they exist for all intelligence;" and the same author declares that this pursuit of the absolutely true, of the ultimately real, is conducted under the direction of the universal faculty in man, or, in other words, under the direction of necessary thinking. Every man who enters into his own inner self and asks the question, "What am I? whence am I? whither do I tend?" is a seeker after truth. Of course, the sincerity, the earnestness, the openness to conviction with which the above questions are asked, and with which the man struggles to solve them, will serve as an index both of his desire to know and his likelihood to find out the truth.

If we turn to the temple of science, we find that there, if anywhere, men are patiently, perseveringly, and with no small degree of success, seeking the ultimately real, the absolutely

true. They are asking their "deepest question undismayed by muttered threats, that some hysteric sense of wrong or insult will convulse the throne where Wisdom reigns supreme;" and their fearless, tireless efforts are blest with a success for which humanity can never be too grateful. Furthermore, thanks to mental philosophy, which is fearlessly reading what God has written on, or interwoven in, human nature, and to physical science, which is as truthfully and fearlessly reading the mind of God from the planets which move through space, from the rocks embedded in our earth, and from the atoms which dance in the sunbeams, even now theologians are beginning to lose sight of sect and creed, and may be found seeking, in their own department, the ultimately real, the absolutely true.

Truth is the soul's birthright, and, though she has sometimes sold it for "a mess of pottage," she has ever felt that she should buy the truth at any cost, and sell it not for any gain. It is the love of truth which makes us everywhere pursue even its vestiges, and interrogate, with passionate curiosity, those who before us have loved and sought the truth. What the true philosopher, the true scientist, and the true theologian are, with intense desire, struggling to find, is truth—truth which may be accepted alike by the reason and the heart of humanity. Between truth in theology, truth in philosophy, and truth in physical science, in the last analysis, there can be naught but perfect harmony. Why, then, should either cast jealous eyes on the other? All are brethren. All are working for the best interests of the human race, and in the end all will be found to have worked for the glory of the Highest. And yet, if in any of these departments a man should dare to break away from authority, there is danger, to say the least, that he would not receive much inspiration from those who had not yet reached his point of view. The language of a rugged, but strictly honest, English writer, has much truth in it: "If any man will in any thing be the one man, he will be it to his hurt."

Truth is, by many brave spirits, fearlessly sought. Should it be thus sought by all? Should every man, laying aside all

prejudice, fearlessly seek the truth? Certainly. I know there are some who think otherwise, who fear that, should the human mind untrammelled continue its investigation, it may find that the knowledge of the ultimately real is a curse, or it may be destined to wander forever in darkness that may be felt. Either position is that of a man who, to say the least, has very little faith in a Supreme Being who is infinitely wise and good. If God is and reigns, then the most searching investigation can reveal nothing other than this, and the more thorough the investigation, the more likely is this great truth to be established. Seek not to know what is, might be in place on the lips of an atheist, but such language is anything but becoming when used by a man who professes faith in God.

It is worthy of note that, up to the present, investigation has not discovered a single *truth* which does not tend to elevate humanity. The man who studies matter or mind studies God in His works. "God exists, and, so far forth as He exists He thinks; and His thoughts are truths reflected in the laws of the universe. He who studies these laws thinks God's thoughts after Him." I notice, further, that the human mind, in its normal state, loves the truth. It is a fact that cannot be disproved, that when the reason discovers truth the soul attaches itself to the truth, and loves it and lives in harmony with it; or, should the soul fail to live in harmony with it, she will feel that the truth is lovable and good, and that she should be governed by it. Perhaps I cannot better close this paper than in the words of another: "Especially seek and love truth, and refer it to the Immortal Being who is its source. The more you know of truth the more you know of God. The sciences, so far from leading us away from religion, conduct us to it. Physics with their laws, mathematics with their sublime ideas, especially philosophy, which cannot take a single step without encountering universal and necessary principles, are so many stages on the way to Deity, and, thus to speak, so many temples in which homage is perpetually paid to Him."

TUCK.

EXTRACT FROM AN ESSAY ON THE STUDY OF
MATHEMATICS.

WE come now to speak upon the subject of mathematical idealism. At first thought it might be asked, can there be any ideality in mathematics? Figures, figures, nothing but figures and lines, where is that element which we would dignify as being ideal? Cousin, the greatest philosopher of France, says: "there is an intimate alliance between mathematics and idealism." Benjamin Pierce says, "ideality is pre-eminently the foundation of mathematics." We can conceive of a deluded miser spending a precious God-given existence in accumulation of gold; but that any man with a soul in his body should devote himself to the accumulation of useless figures is a martyrdom beneath man's lowest folly. It has been shown that mathematics contribute to material subsistence. This is one object of their pursuit, but as we follow the footprints of the mathematician we find the by-paths alone lead to this goal. There is another, a well-beaten path, in which the honest truth-seekers journey. They journey in quest of a new and sublime realm—an addition to the mind's empire, which in prospect how good, how fair, answering to its great ideal. This is the goal of the mathematician. His object is the appropriating of ideal knowledge, and it is in the consideration of this that we discover the mathematician's elysium.

Already we have considered the method upon which mathematics proceed. They hold up before the mind a high type of proof—an ideal type of proof. But not only is the method ideal, but they are pre-eminently ideal in their results.

From the facts of observation, induction rises to law; but deduction through the application of the pure logic of mathematics descends from laws to facts. Now, are the laws founded on the facts of observation correct, or but approximations to truth, or may they not be as phantoms and day-dreams? With an unrestricted play of fancy, individuals have turned trees into walking spectres. All laws founded on the facts of obser-

vation must partake of the inaccuracies and uncertainties of the senses. What of the facts deduced by the pure logic of mathematics? Do they partake of the inaccuracies and uncertainties of the senses? Are they the offspring of sensation, or are they spiritual children? We claim they are the latter. They are of legitimate birth from the human mind, and are loyally submissive to the inflexible laws which control it. With these our sensations have nothing to do. Their fixed seat in the soul is not disturbed by the blindness of the body. They are freed from the laws of physical causation. They possess an ideal of potentiality which includes the actual. There need be no ever-widening of the avenues of sensation for the perfection of such knowledge. "In the studio of the painter, the sculptor, and the poet, ideal art is prone to conceal its natural figure under the garb of reality. But in the frozen cave of geometry the thoughts which may trickle in from the actual world are crystallized into glittering, passionless, unsympathizing stalactites, and the mathematical sage cares not whence they came, whether they fell as the dew from the quiet sky or as rain from the clouds driven by the wind; whatever be their origin they are ideal truth." Though the speculation of the geometer may be tedious, it has a lofty aspiration. It provides spiritual nourishment; hence it is life itself, and is the worthy occupation of an immortal soul.

You cannot escape from this ideal element if you would. It is inseparably connected with the facts of the science though additional to them. It permeates and illumines the whole domain. There is no obscurity which it does not penetrate. This is that which allures the student of mathematics on and causes him to devote life-long labors to the subject. This spirit of ideality makes the night to shine as the day and leads the mathematician to its very throne. Does the study of mathematics tend towards materialism or scepticism? Whether this be answered in the affirmative or negative we stay not to enquire. He who would follow truth must be brave. He may be led over rough and thorny paths, but he must follow. Truth,

“whose home is the bosom of God and whose voice is the harmony of nature,” will surely lead to the clearer and fuller light. Now, there can be nothing in the habits of thought which would induce into the mind materialism or scepticism. The mind, dealing with the eternal truths of pure mathematics and exploring a boundless world of the pure ideal, becomes conscious of its own personality and creative power; thus the tendency must be the exaltation of mind and the subordination of matter. The same is true in applied mathematics. Here the mind invades nature's domain, capturing her treasures and revealing her secrets. A superficial survey of the heavens would predispose the mind to conclude that all was chaos. It would appear shrouded in obscurity and marked with imperfections. To the mathematical observer it appears as the work of Infinite intelligence. What can show to the mind more magnificent operations of the Creator? What can raise the mind to sublimer views of the Deity? The mind discovers in the heavens evidence of great power. It is taken away from the contemplation of the weakness of mortality and led to the contemplation of the strength of Divinity. Whilst pure mathematics occupy the mind in contemplating eternal and ideal truths, applied mathematics draw aside the veil which hides the glories of the universe as the embodied thoughts of the Infinite mind. They unveil it and it points to a God.

In conclusion: The science of mathematics is highly progressive. The researches of mathematicians throughout successive ages have been especially transcendental in that they have passed the bounds of contemporaneous physical enquiry, and it has always been pleasing to see the speculations and prophecies of the mathematician justified by observation, and find their actual workings in nature. The once puzzling imaginary square root of algebra has become “the simplest reality of quaternions” which is the true algebra of space, and clearly enlightens several of the darkest intricacies of mechanical and physical philosophy. The force of instrumental imagination

has projected geometry forward and backward into the free regions of ideality.

Since the science of mathematics has made such sure progress and attained such a degree of certain perfection, may not the metaphysician look forward with hope that in this field of labor certain victory may be won. Both sciences are founded on *a priori* truths, but metaphysics has never attained that degree of certainty which distinguishes mathematics. As we look towards the arena of metaphysics, what an unending warfare of systems is being carried on. Permanent victory has not as yet perched on the banner of any. Well might we despair of a true science of the mind did we not look to the splendid success of mathematics.

G. S. BEAN.

AN EASTERN PROPHET.

“COMING events cast their shadows before.” So it is said, and there is some truth in the statement. The Old World is full of turmoil and upheaval.

France appears full of vigor and thirst for conquest. She has been robbed of some of her fairest provinces in Europe, but dare not attempt to regain them at present.

Her plan is to increase her military glory abroad, the staff of experienced generals and veteran soldiers. To this end she has her troops in Asia, Madagascar, and Northern Africa. She is trying to forestall future movements of other nations.

In Egypt she perceives future fields for conflict. In Western Africa she smells the war afar off, and is quite obstreperous at the Berlin Congress. As England appears to be her great foreign rival, she is quite willing to join hands with her late conqueror and despoiler, Germany.

Madagascar has been a military carnival centre for her brutalizing troops. It is quite time that France was ordered from the shores of Madagascar about her business.

Tunis and the Barbary States in general are made the most

wretched excuses for an active standing army, with which France expects some day to recover Alsace and Lorraine, and terrify Europe as of old. The fading ancient martial splendor must return, even if it costs her very life to procure it. And now the Frenchman is struggling with the Chinaman in Tonquin. This is an animalistic contest between the devourer of snakes and the polished frog-eater. The German eagle and the British lion are complacently measuring the vain show of decaying strength, and are preparing for a glorious repast.

Surely France is playing a tremendous game of hazard. But this is not strange. Her whole life for the last three hundred years or more has been a series of wild, fierce, foolish, and barbarous games of chance. Many times she has staked her reputation and national life upon the "throw." She has always lost the one and been crippled in the other. Her action during the reign of Catharine de Medicis and the Guises was begotten in the breasts of beings less noble than the worst of pandemonium imps. The blood of tens of thousands of murdered men, women, and children is still crying for vengeance; and it will come.

France has been poisoned, corrupted, and cursed for centuries by the papacy. At times in her madness, and for the very desire of change, she relegates the gods to limbo, and sets up a flickering, flashing, and imbecile rule of reason reason, the only divine thing on earth, maiming and dwarfing itself by denying its godly nature.

Hollow, fickle, vain, and dishonest, the people of old Galatia must pass under the rod.

The Roman Empire made great strides and had outward signs of power, but the corruption and iniquity of her people snuffed her out of existence. Spain in the time of Philip II. was corrupt and depraved from centre to circumference. Her King and Court were a murderous band. The glory of her past was still dazzling and attractive. She appeared to be strong, but, filled with all loathsome social diseases, she sank irrevocably into debasement.

So with Greece, Macedon, Persia, Babylon, and old Egypt. Thus it will soon be with the godless Gaul. As truly as the Indian must melt away before the white man, so surely must the irrepressible, shallow Frank yield to his superior, the Saxon. The twin sisters, Germany and England, will not only cripple France, but, in the end, blot her out of existence.

Observing millions are watching the course of events in Europe, Asia, and Africa to-day. The great issues of national life are forcing themselves into noonday light. God is weighing the nations of antiquity and of later birth. Some of them will not be spared, but must pass away. The games of diplomacy, with the hidden strokes of fiend-begotten by-plays are now revealing an approaching crisis, which, when passed, will leave only a few nations with any signs of actual existence.

Look away to the territory of Tonquin. In the present contest in Asia, only a small part of a by-play is going forward. China knows it well and is not filled with terror. Russia knows it and tries a move or two on the other part of the international dice-board of military diplomacy.

The dying Turk sees not only his own near and speedy annihilation, but that of France. Austria knows well that in the coming change she will form a part of the German empire, as well as Denmark, Holland, Belgium and Switzerland. With the engulfment of the French will be seen the disappearance of the Italian, Spaniard, and Portuguese.

Three nations only will remain—England, Germany, and Russia. The former will hold the sway on the seas, and command all the strong posts of the world. Germany will be *all* Central and most of Southern Europe, while Russia will be strengthened by Sweden, Norway, and some minor points.

Then for a time will be a warm-blooded, keenly-contested, and terrific game of *cut-throat*. Any two of the three could easily humble the third.

The Russian, however, is thoroughly dishonest, will never believe his own word, much less that of Germany and England, and will be divided by the only two honest nations in exist-

ence. No reference is made here to the United States or Canada, as they will exist under the general name of England.

After Russia has been crushed, humbled, and utterly swept from the face of the earth, England and Germany will be two world-wide and rival powers. As the former has all the latter can claim that is good, and a grandly Christian character in addition, Germany will be forced to change her entire moral and religious nature, or yield to the godly-souled England.

In case she do not adopt the former—give up her mystic, transcendental, rationalistic, and pompous philosophy, and become eminently Christian—she will pass away. But the German is wise, practical outside of frothy speculation, and at heart grandly humane. He will magnify the Saviour of the world, who has been the source of England's glory, throw aside his barbarous language and letters, learn the only-to-be-spoken language of the world, the English, in a modified, purified, and improved form.

Thus we read an outline of future events, some of them near at hand and others to be witnessed by coming generations.

X. Y. Z.

THE UNIVERSITY PROBLEM.

THE subject of University Confederation has passed from the sphere of possibilities into that of probabilities. The present Minister of Education has, evidently, determined to render his term of office memorable for the accomplishment of the exceedingly difficult task of founding a Provincial University. How far the recent efforts towards an amicable adjustment of contending claims have been successful, can only be guessed; but the fact that it has been found possible to bring together representatives of the various colleges with the avowed purpose of framing a scheme of confederation, is pregnant with importance. It is with some diffidence that I venture to write anything on such a complicated problem. As a Methodist, and graduate of both Toronto and Victoria Universities, I have a

strong interest in the result of the present negotiations. In addressing this communication to the V. P. JOURNAL, I am well aware that I am placing my thoughts before a tribunal almost wholly Methodist, and strongly attached to Victoria University. It is quite natural that graduates of Victoria should feel a strong disinclination to listen to any proposals having for their object the extinction of their *alma mater*. Yet, despite this deep affection, it is possible to find graduates who hearken with willingness to schemes of consolidation. Methodist sentiment is divided on this question—a strong section of the Methodist body is favorable to the abandonment of the Arts course in Victoria. Matters have reached such a stage with the denominational university that immediate and decided action is demanded. The present condition of things cannot continue much longer. A Methodist university must either cease to exist, or be vigorously supported. Judging from the statements of the authorities of Victoria, the result of the appeal to the benevolence and generosity of wealthy Methodist laymen can scarcely be deemed satisfactory. President Nelles has annually to lament the inadequacy of the means placed at his disposal to the work to be accomplished. The diligence, vigor, and skill displayed by the professors of Victoria University are well known. Yet what miserable pittance do they receive for their exhausting labor! Not only are the funds available utterly disproportionate to the work exacted, but no resources are forthcoming for the employment of additional and much-needed professors. This condition of impecuniosity is aggravated by the hopes raised of the foundation of some scheme which will render the sustenance of a Methodist university no longer necessary. As long as the eyes of a large number of the Methodist laity are turned towards Toronto University and State-supported education, so long will subscriptions and donations flow tardily into the denominational exchequer. I do not mean to assert that the supporters of a denominational university are on the wrong track; I simply wish to point out the necessary effect of the present agitation.

I am well aware that many graduates of Toronto University think that an easy and effective remedy is at hand for the cure of our university evils. I do not so regard the matter. Like others, I am quite conscious of the incompleteness and inefficiency of our university system; but it is easier to point out the defects than to propose a practicable remedy. The great majority of those who have given serious consideration to the subject will admit that we have too low a standard for graduation, and too many degrees of very different values. The impression, and to me it is a correct one, is, that we have too many degree-conferring bodies; and that Provincial education would be benefited by having a uniform standard (and that a high one) for graduation. I do not see the necessity for more than *one university*. To advocate the having of only one university is, however, quite different from supporting the policy of having but *one college*. After much and careful consideration, I must confess that I don't feel convinced that the interests of education would be promoted by abolishing all our Arts colleges except University College. My objections to the *one-college* scheme are not based upon any belief in the moral and religious advantages enjoyed by the students of denominational institutions over those of the so-called "godless college." Experience and observation have convinced me that the morals and religious tone of the students at denominational colleges are in no respect better and more elevated than those of undergraduates at University College. I believe all reasoning in favor of the retention of denominational colleges, based upon the importance of securing a religious and moral education for our youth, has a very sandy foundation. The bulk of the Methodist laity can no longer be prejudiced by any such religious cry; we feel that the religious interests of our young people do not demand the support of a denominational Arts college. Some of the objections to entrusting the task of teaching all anxious for university education to our State-supported institution are as follows:—

(1) The Provincial College, unless much enlarged, is quite incapable of accommodating all desirous of a university course.

(2) The present staff of University College is much too small for the work that would be demanded of it. As a matter of fact, the staff cannot now perform satisfactorily what is expected of it.

(3) The funds at the disposal of University College are not sufficient to meet the present demands; much less would they meet the requirements of a greatly increased attendance.

(4) The establishment and maintenance of but one college would lead inevitably to mental sluggishness and want of zeal on the part of the college professors. The spur of emulation would be removed, to the great injury of education. I place more stress on this objection than on all the others combined. It is possible that Parliament might vote sums sufficient for the enlargement and endowment of University College; but nothing could supply the generous rivalry existing between the different colleges of one university. The competition between the various educating bodies in Ontario is almost wholly beneficial. Your space will not permit me to enlarge upon this idea, but I cannot refrain from pointing out that the admission of women to the lectures of University College was rendered inevitable by the action of the authorities of Victoria, Queen's and McGill.

We live in an age of continuous encroachments by the State on the liberties of the people. This tendency to contract the sphere of individual action is painfully visible in our educational system. Voluntaryism in educational matters is just as important as voluntaryism in religion. It is a question, then, with me whether colleges supported by the voluntary contributions of generous and patriotic men are not a necessity in our educational system. It is open to doubt whether University College and Toronto University do not suffer from their too close connection with the State.

To sum up, I see no reason why we should not have one university for Ontario; but I see formidable objections to having but one college. The difficulty experienced is how the different denominational colleges are to be supported when brought into rivalry with a State-endowed institution. It has

been proposed to leave junior and pass work to the denominational colleges, giving the honor and post-graduate work to the State college. I can hardly conceive any college, Victoria for instance, consenting to such terms, involving as they do academical degradation. Theoretically, the different colleges should be placed on the same financial footing, so far as their Arts course is concerned, in order that competition for university distinctions might be conducted on equal terms. Then the rivalry of the different colleges would necessarily lead to increased effort and brilliant educational results. But it is quite possible that public opinion would not sanction the endowment of the denominational colleges. Failing that, I cannot see anything before us except the continuation of the present system, until the friends of the smaller universities either grow weary in their support and allow them to die, or else, spurred to action and effort by their urgent necessities, place them on a strong and satisfactory and enduring foundation.

W. J. ROBERTSON.

STUDENTS AND CURRENT SCIENTIFIC THOUGHT.

AS quite within the lines laid down for the conduct of the V. P. JOURNAL, I should like to say a few words on a matter of interest to students—especially to the younger ones—on the character and tendency of some recent scientific utterances.

Those to which I shall first refer are contained in two recent addresses by the Rev. Dr. Dallinger, at Montreal. They have, I believe, been kindly circulated by that nestor amongst his fellow-Christians in Montreal, Hon. Senator Ferrier. In that, he has done the students of "Old Vic." real service; for these addresses are most admirable of their kind. They contain an eloquent plea for freedom of discussion on scientific subjects by scientific men, without the fear of being charged by pious, yet uninformed, persons with seeking to make such discussions in their results conflict with God's revealed Word.

Before further referring to Dr. Dallinger's utterances, it is gratifying to be able to express the pleasure—shared in by many devout and educated Christian men—which some of the recent books and articles on religio-scientific subjects have given to the thoughtful reader. It is a hopeful sign of the times that these works are characterized by a deep feeling of reverence, and permeated by a profound conviction that truth alone is the object of earnest scientific research.

While I say this, I cannot be unmindful of the fact that some of the articles on this subject which appear in a few of the *Reviews* are sadly destitute of this spirit, and are flippant and irreverent in their tone. Nor am I unaware of the indiscreet zeal of many sincere defenders of religious truth. An instance of this occurred at the recent Church of England Congress in this city. A paper was read there by a Church dignitary from Montreal, which, although in many respects a clever production, yet by its evident injustice to some of the great English scientists weakened the effect of the whole paper as a candid criticism on the utterances of these men. What gives the more point to this remark is the fact that the critic was a mere "layman" in the matter of scientific research, while the men criticised had devoted their whole lives to the patient pursuit of scientific truth for itself alone, and had given to the world the result of their investigations, with a modesty of utterance which is worthy of all praise and emulation. The protest and counsel of Dr. Dallinger on this point are worthy of the Montreal critic's attention.

I know, from past experience of collegiate under-graduate life, how interested a considerable number of students are in the discussion of current topics of the day, entirely outside of the domain of party politics. (Witness the existence of the college societies.) To such, a brief reference to these topics, and a summary of what is said in regard to them, will, I trust, be acceptable. That this may be so is assumed from the fact that students' time is precious; and that, unless they can get a somewhat comprehensive glimpse of these important subjects,

they will have to pass them over without notice, or at best with a most superficial glance at them.

And yet I know of nothing which will more effectually aid in the development of a student's mental powers than immediate personal contact with contemporary thought, as expressed by able living writers.

A word here on the average student: The mind of the average freshman student is a psychological study. His intellectual thoughts usually run in a single mental groove, and that groove somewhat of the conventional type. He comes to college somewhat in the condition of a mentally-awakened school youth. He has been "under tutors and governors" so long that he has scarcely ventured yet to give expression to a single independent thought of his own—I mean literary or intellectual. He comes to college, too, with a twinge of the pain of home-sickness, knowing, or fearing, that many a bitter draught awaits him there, which he will have to swallow with the dignified composure of a youthful Socrates. He is in pursuit of knowledge. He knows that the royal road to learning is as yet undiscovered. He has no hopes of being the pioneer in such a discovery. He is, therefore, prepared to sit down to hard study, or to plod through weary hours in his ascent of the hill of science. At such a time he sighs for relief; and yet he knows not from what quarter to obtain it. His experience up to this time—at the high school or collegiate institute—has been derived entirely from contact literally with the "dead" languages—be it of classics, or mathematics, or literature, or science. That is, the writers on these subjects in his text books have been, indeed, *dead* to him; and in his heart he often wishes "they had never been born!"

Mentally constituted as the average student is, this contact with the writers of text books excites no special interest in him beyond that which the coming examination may stir up within him.

But suppose you take such a student out of this mental groove. Show him that the living world of thought and of the

great thinkers which lies outside of him and his text books had its birthplace in such a school for intellectual training as his university; that it is the outcome, or result, of just such training as he is receiving there; that in the application of the very knowledge which he is in process of acquiring, these writers and these masters of thought are but discussing, in an elaborate and precise form, many of the very social and other problems which have (almost unconsciously to himself) passed through his own mind, in a very inchoate, it is true, and very imperfect form; show him all this, and it at once gives a practical turn to his thoughts. He will thenceforward be disposed, in consequence, to look at his work with a newly-awakened interest, and address himself to it with a zeal and alacrity of which he hitherto did not think himself capable.

Thus much by way of claiming the students' attention; for I well know their difficulties and discouragements.

Dr. Dallinger, in his "Sermon and Lecture," has clearly demonstrated that the pursuit of Scriptural truth and of scientific truth involves no conflict, no contradiction, no rivalry, no harm to either. He rather proves that the knowledge of the great first cause—that elemental fact in natural theology—is arrived at by following the lines of scientific research; while at the same time he as clearly shows us that science can reveal nothing of the being and moral attributes of God. He says:—

"I speak from no cursory knowledge when I say, that foremost amongst the noblest truth-seekers on this earth are the leaders in the work and thought of science to-day. And can there be any nobler work? . . . Should any man under heaven believe in the grandeur of truth more than they who constitute the Christian Church? . . . Then, as truth-seekers, let us ask what are the lessons to be derived from modern science? . . . But says an anxious on-looker: . . . 'What does your splendid array of facts tell us of God? . . . Can He—will He—care for us? . . . What can science tell us it has found concerning the character of God?' The answer is as calm as it is fearless—'Nothing.' . . . Indeed, to

our method He is non-existent. Such is the answer of the latest searchers; and need I say it is an answer which has shocked and roused to scorn the theological thought of the world. And yet it is profoundly true. It is the testimony of science to the unalterable power of the ancient question: 'Canst thou by searching find out God; canst thou find out the Almighty to perfection?' *No.* The physical method is incompetent for so sublime a work, and the masters of research avow it."

I must stop here for the present. J. GEORGE HODGINS.

Toronto, November, 1884.

MENTAL INERTIA.*

BY C. H. KOYL.

Members of the Association, Ladies and Gentlemen:—

THE October number of *Acta Victoriana*, our oldest college journal, has given me a text for to-night. On the front page of its cover appears the College crest, and with it the College motto: "Abeunt Studia in Mores." Freely translated, this means that our mental pursuits have much to do with the formation of our habits and with the tone of our morals; and in view of the subject of our lecture for this evening—"The Claims of Scientific Education"—I wish to bring before your notice a mental characteristic which the author of that Latin motto evidently had in view. Faraday, whose honored name adorns the Hall we occupy to-night, once called it "Mental Inertia."

If, in nature, a body is at rest, it tends to remain at rest, and force is required to give it motion. If a body is in motion it tends to remain so, and an opposing force is required to bring it to rest. This negative property of matter, which of itself tends neither to rest nor motion, but always to retain a body in its present state, is called "Inertia," and a moment's consideration

* Chairman's introduction to Mr. T. H. Follick's Inaugural Address upon "The Claims of Scientific Education."

will suffice to show the exact applicability of the term to a property of our minds. What are habits but the result of this tendency to run in one direction? What are old prejudices but the effect of having worn a groove so deep that we cannot see beyond its walls?

Please notice that inertia is not alone the tendency to remain at rest; it is as much the tendency to remain in motion; it is "the tendency a body has to retain the condition impressed upon it." So in mind, inertia is the apathy which produces unvarying inaction in one man, and the activity productive of continuous industry in another. We enter the world with apathy or with activity impressed upon our minds by inheritance, and we are also capable afterward of personally exerting forces which tend to oppose or to aid those already existing. In some cases, it is true, the power of heredity is so strong that one's utmost endeavors seem of no avail in opposition or in aid: but, in general, continued effort to impress upon our minds pleasurable conditions of activity, or the opposite, are not without effect; and if we grant that, by training them, our minds may be made to take pleasure either in habitual idleness or in continuous activity, there will not be two opinions among us upon the course to be pursued. If it were always a pleasure to be idle and a task to be at work, two opinions might exist, but they cannot if it may be ever a joy to be a-doing.

Let us allow, then, that we have decided so to train our minds that they shall be ever on the alert, and that their greatest pleasure shall be in action. We are thus about to impress upon them a condition of habitual activity—a condition of motion. Now, I may throw a stone rapidly or slowly, in this direction or in that; and any moving body has, by virtue of its motion, the two characteristics of velocity and direction. Let us dismiss for the present the subject of velocity, and ask what *direction* our mental activity shall take. The objects to be gained are, the exercise and improvement of our minds, and the benefit of the world. These results may be attained in greater or less degree by following any one of several paths open to us. We

may adopt the method of theological and metaphysical debate, in which I well remember having been very much exercised, and I have heard some people say they have been improved. We may follow the lead of others, and confine our thoughts to the everyday business—the practical things—of life which reward the worker with well-known gifts; or we may spend our mental strength investigating the hitherto mysteries of the universe of nature. This latter we call the scientific path, and the preparation for it a scientific education. There are several other paths also, but in discussing them as possible openings for our mental activity we must remember that all people are in reality utilitarians, that is, they prefer the useful to the useless, what has value to what has none, and we must consider the relative utilities of these various paths. But it requires a keen judgment and clear foresight to detect which among the useless things of to-day will be the useful of to-morrow, and which will, in the future, repay the labor of the present. It is this difficulty of choice which makes it necessary to bring argument and the results of experience to bear upon the question, and which, in the case of scientific investigation, kept so long in the background what was the worthiest and should have been the foremost of human pursuits—the study of man and the world around him. When Franklin had proved to his satisfaction the identity of the electricities of the lecture-room and of the storm-cloud, he was asked one day by a lady the “use” of his discovery. “What, madam, is the ‘use’ of your babe?” And to her reply, “He will grow to be a man,” Franklin answered: “And my discovery will be a giant.” The babe has not since been heard of; the discovery is of world-wide fame—each probably renowned in proportion to its usefulness.

To proceed to give you at length the reasons for believing that it is wisest and best to give your minds a scientific bent would be to encroach upon the province of the essayist, but I have no doubt that at this stage of progress, and to such an audience, he will be able to demonstrate that the preparation for a life of scientific thought will bring joys unequalled to

those who follow it. I emphasize this time, for there was a time when few could have been so convinced. There was a time when men had been so long without an adequate subject of thought that, like those who have sat long in one position, their mental limbs had become cramped, and motion was almost impossible. They had no desire for the intellectual chase, for the very idea of moving was painful to them. There was a time, too, when men believed the upholding of their preconceived opinions to be of more value than the establishment of truth; a time when, to prove that the earth was round, was a felony, and to demonstrate its motion brought on imprisonment; a time when, to show that coal was laid down by natural causes, left no doubt of a man's being possessed of a devil; and to prove that the world was not made in six days was to be doomed to eternal and physical fire. But these days are past, and these things are so no longer. Now our most orthodox and representative men accept scientific truths as of equal force with the doctrines of the Christian religion, and they study them as fearlessly and faithfully. Truth commands respect, whether its origin be revelation or the study of nature. This general enlightenment is gradually spreading itself over the earth; people are getting both wiser and better, and, with Tennyson:

The minds of men are widened
By the process of the suns.

THE CLAIMS OF SCIENTIFIC EDUCATION.

An Inaugural Address, delivered in Faraway Hall, Nov. 7th, 1884, by T. H. Follick.

IN the fourth century before Christ Greece was in a very depressed condition. That suicidal conflict, the Peloponnesian War, had just closed, leaving the State prostrate in the dust, her best generals slain, her coffers empty, and her leading men corrupt, selfish and avaricious. Yet the memories of Marathon and Salamis, Plataea and Mycale, were still fresh, and the Greeks had an irresistible temptation to plunder the rich provinces of

the Persians, whom they had so often vanquished. All their attempts in this direction, however, ended in failure, chiefly from want of unanimity, until Philip of Macedon had himself elected Captain-General of all Greece. Assassinated when about to start on his expedition of war, he was succeeded in the command of the troops by his son, Alexander the Great. Alexander at once began to unfold his grand design of subduing the Persian dominions, and assuming the government of them himself. He crossed the Hellespont, overthrew the Persians at the Granicus, and among the defiles at Issus, reduced the cities of Tyre and Gaza, and received the voluntary homage of Jerusalem. He then turned towards Egypt, and visited the temple of Jupiter Ammon. Here the people not only submitted to him without any resistance, but ascribed to him divine honors. All things being thus secured in the rear, he returned to Syria with an army of fifty thousand, crossed the Euphrates at Thapsacus, and encountered at Arbela the Persian army of one million one hundred thousand trained soldiers. Here he won a decisive victory, which laid the whole Persian empire at his feet. The result of these operations was that the great Macedonian empire was established, and young Alexander became ruler of a kingdom stretching from the Danube to the Ganges, and comprising the whole of the then civilized world.

Such brilliant campaigns as these could not fail to have their effect on the Greek mind. There were men who had marched with Alexander from the Danube to the Nile, from the Nile to the Ganges. They had felt the northern blasts of the countries beyond the Black Sea, the simoons and sand-tempests of the Egyptian deserts. They had seen the Pyramids which had already stood for twenty centuries, the hieroglyph-covered obelisks of Luxor, avenues of silent and mysterious sphinxes, colossi of monarchs who reigned in the morning of the world. The observatory was still standing where the weird Chaldean astronomers held nocturnal communion with the stars. The walls, temples, and hanging gardens of Babylon had not lost all their former splendor. Chaldea, Assyria, and Babylon had

bequeathed to Persia their stupendous and venerable antiquities, reaching far back into the night of time. The soldiers of Alexander at every march encountered unexpected and picturesque scenery. Here were interminable sandy plains; there, mountains whose peaks were lost above the clouds. They were in the land of amber-colored date-palms and cypresses, green myrtles and oleanders. For the first time to their wondering eyes appeared the primitive forms of the microscope and sundial. What a spectacle for the conquering Greeks, who up to this time had neither experimented nor observed.

The stimulus thus given to Greek intellectual activity soon began to bear fruit. In his expedition to the temple of Jupiter Ammon the Macedonian conqueror had founded the city of Alexandria. On the division of the empire at the death of Alexander, Ptolemy Soter received Egypt, made Alexandria his capital, and by his benign government attracted multitudes of Greeks to his dominions. Alexandria became not only the most beautiful city of its time, but also the intellectual metropolis of the world. The most glorious monument which the Macedonian kings of Egypt left behind them was the Alexandrian Museum, which was commenced by Ptolemy Soter, and completed by his son Ptolemy Philadelphus. Its chief objects were the perpetuation, increase, and diffusion of knowledge. Connected with it were chemical laboratories and botanical and zoological gardens: but its chief glory was its magnificent library of seven hundred thousand volumes, collected from all parts of the world, regardless of difficulty or expense. Here Euclid and Hero, Hipparchus and Apollonius, Ptolemy and Archimedes resided, studied, and taught, and under them the institution became the birth-place of modern science. It has left its impress on all subsequent thought, and its influences will last when even the Pyramids have passed away.

At a time when intellectual education consisted only of a few myths and legends, and proficiency in the art of war was considered the highest accomplishment attainable, the Greeks saw the benefits, both intellectual and physical, which science could

bestow upon its votaries. With them its effects did not end in mere administration. From being a subject simply of meditation and useless speculation, science was transformed by them into a living reality. If the study of science received such attention in those days, is it not now loudly demanding from us a foremost position among the subjects of modern culture? Look at the world to-day. The civilization which we enjoy rests upon physical science. The whole of modern thought is steeped in it. It has found its way into the works of our best poets. Even the man of letters who affects to ignore and despise science is unconsciously impregnated with her spirit, and indebted to her methods for his best productions.

It was well known six hundred years before Christ that a piece of amber when rubbed would attract and then repel light bodies. Now, under the name of electricity, this phenomenon has become one of the greatest powers at the disposal of man, and in the hands of the careful investigator is a universal spirit in nature. It permits men to communicate instantaneously with each other across continents and under oceans, while the sparkling of its light puts to shame the feeble glimmer of our gas jets.

A very simple form of the steam engine was invented by Hero, in the Alexandrian Museum, but not till the middle of the eighteenth century after Christ did the powers of steam become manifest. To-day it performs the work of millions of men, while he who formerly labored now may think. It has created vast manufacturing establishments, and supplied clothing for the world. It enables man to travel across continents and oceans with more certainty and speed than if he had been endowed with the velocity of the race horse, or provided with the pinions of the eagle.

Since the invention of printing the world has been flooded with literature, and individual thought has received a great impetus. The health of the people has been wonderfully preserved by the discoveries of medical science. Hospitals for invalids, and asylums for the insane have been established, not

only to administer comfort, but in many cases to effect permanent cures. The system of sewerage has been introduced, and by its means disease and death have been avoided. The labor of the peasant has been lightened by the invention of the different kinds of agricultural implements. Commerce has been improved by the opening of canals. Our houses are adorned with frescoes, our drawing-rooms with paintings, our lawns with fountains and statuary. With the thermometer we measure the intensity of the heat; with the barometer we ascertain the pressure of the atmosphere; with the spectroscope we study those magnificent rainbow colors which are the components of a ray of white light. Benjamin Franklin, by identifying lightning with electricity, has deprived Jupiter of his thunderbolt. The microscope has placed before us the world of the infinitesimally small; the telescope has enabled us to penetrate immensity, and has revealed to us the majestic grandeur of the universe.

It would be very imprudent for me to attempt to enumerate the vast advantages we enjoy from the hand of science. A little reflection on your part will remind you that in its various forms science surrounds us on every hand. It has given birth to new and lucrative professions. Whatever we purpose to do, it helps us. No human pursuits *make any material progress* until science is brought to bear upon them. Many of our forms of industry slumbered for centuries, but as soon as science touched them with her magic wand, they sprang forward and took strides which amazed and almost overawed the beholder.

In view of all these things, is there any difficulty in answering the question, "What kind of culture should the growing mind of the nation receive?" If a man spend all his time in obtaining a theoretical education, and omitting the practical, life to him will be an utter failure. It is unsafe to depend upon the dictates of nature and instinct for guidance in physical matters. For instance, we have a keener sense of hunger and thirst than of the sufficiency and fitness of our foods. The child grasps at

the flame of the candle only to be punished by nature for breaking her law. The trembling hand and blood-shot eyes of the drunkard warn us of the danger of following the cravings of our natural appetites. A nation which rejects science and whose people depend on their instinct for support, soon declines into barbarism. We must have thorough practical education. In our institutions of learning the youth of our land must be brought face to face with living facts, if they are to have anything to do with them in after life. When we wish a girl to become a musician we do not place her before the piano with pencils and brushes in her hands. We do not expect proficiency in the practice of medicine to result from a careful study of law books. Why should members of parliament be ignorant of the subjects concerning which they are called upon to legislate? Why should the senator be left at the mercy of interested disputants when a scientific question is discussed, until he deems the nap a blessing which rescues him from the bewilderments of the committee room? Not only the leaders of the people should enjoy this practical education, but all classes, from the highest to the lowest. The multitude of technical operations which are conducted to-day demand not only an acquaintance, but also a familiarity, with the laws of natural science. There are agencies at work in a locomotive of which the maker of it perhaps never dreamed, but which, nevertheless, may be sufficient to convert it into an engine of death. When we reflect on the intellectual condition of the people at work in our coal mines, those terrific explosions which occur from time to time need not astonish us. Did these workmen possess sufficient physical knowledge, such calamities would in almost every case be avoided.

Who can say what intellectual Samsons are toiling with closed eyes in the mills and forges of our land? Grant these Samsons sight; give them some knowledge of the sciences, and you multiply the chances of discovery and the prospects of national advancement.

The advocate of intellectual culture must not scorn as sordid

and degrading the reasons I have just advanced for the study of science. A mathematician cannot satisfy his hunger by solving an algebraic problem, nor can a classical student assuage his thirst by conjugating a Greek word. They must descend from their lofty explorations to partake of the plain bread and butter of the ignorant rustic, and to protect themselves by physical means against the extremes of heat and cold. But after these wants have been supplied, they may then proceed with their favorite pursuits. When man has quieted the demands of his material nature, then, and not till then, will he feel the urgent claims of his intellect. T. H. FOLLIICK.

(Concluded in next issue.)

STYLE.

STYLE is that in the written thought which corresponds to the personality of the writer, and is the outcome of that personality. Two narratives may, as you are well aware, affect the reader very differently, although the framework of fact in each case may be the same. The difference in effect cannot result from the matter; it arises from the manner, or style; and that, in turn, comes from the attitude of the writer towards the facts, an attitude which he reproduces in his reader. As that attitude may be analyzed into two elements, the permanent element of character and the transient element of mood, so style, reflecting the varying mood of the writer, is pathetic or humorous or indignant; and yet, behind all these, there is a constant element of individual characteristics, which serves to distinguish one author from another, and to which we refer in speaking of the style of Demosthenes or of Virgil, of Burke or of Milton; and that constant element is to persons of literary capacity and training a revelation of the man; as Buffon says, "*Le style, c' est l' homme.*" Of the truth of that adage we have recently had a striking example. We have seen how the loftiness, the impassioned energy, the ruggedness and obscurity of a

style with which we have long been familiar, find their counterpart in the merits and defects of the man Carlyle. Through style, then, we come in contact with that which is greatest in man's character; for the character of a man is the resultant of the whole being, moral and intellectual. Those who have been fortunate enough to encounter in life a great and noble personality, know that it is the most inspiring and marvellous of spiritual forces. As the chord in one instrument responds to the vibrations of its fellow in another, so the emotions of the human soul vibrate under the influence of a great and ardent character. But in the limitations of time and space and circumstances by which our lives are bound, such encounters must needs be rare, and happy it is that through literature we are able to feel the kindling spiritual presence of the mighty dead. True it is that only few can thus transmit themselves through the ages, but these few are among the greatest spirits of our race, for the power of style in a high degree is the prerogative of genius alone. Nor need that surprise us, when we reflect on what a marvellous power it is. Style does not tell us how the writer felt, but communicates his feeling to us; not how he saw, but makes us see as he did; not what manner of man he was, but dominates us with his presence. In the sphere of studies there is nothing comparable to this. History and biography tell us about men—we see them imaged in a more or less imperfect medium; but here we feel the thrill of their emotions, the power of their presence. So that, not only does literature bring us into contact with ideas, but the higher literature brings into contact with men the choice and master spirit of all ages. Here is a society ever open to us, the best and most desirable we can conceive; the truest aristocracy of the human race in their happiest mood, with their wisest and deepest thoughts on their lips. It is in no figurative sense, but in sober truth, that I call this "society." From what has been said of style, it is manifest that the influence of a great work, on a competent literary capacity, does not in kind differ from the influence of personal contact. If something is lost in vividness, many of the limitations of per-

sonal converse are absent. But if in the best literature we find, in no merely hyperbolic sense, society, like all good society *it is difficult of access*. Not much of worth in this world but is the prize of merit, of toil, of patience. The gardens of the Hesperides stood ever open, but to fetch the golden apples was the labor of a Hercules. The books are waiting on the shelves, but he is far astray indeed who thinks to win the secret of Goethe, of Shakespeare, of him

“Who saw life steadily and saw it whole,
The mellow glory of the Attic stage,”

in the same easy fashion in which he skims through the last popular novel or an ephemeral essay of the periodical press. To experience the power of literature, to appreciate style in its fulness, to feel not merely the main emotion but the whole complex of emotions with which a writer regards his subject, is the outcome only of constant and careful study, combined with a large innate susceptibility to literary art. And though the capacity of the highest literary appreciation is not common, in most a measure of innate capability is dormant; and to rouse this dormant capability, to guide it aright when roused, to teach the proper spirit in which to approach the masterpieces of literature, and to keep the mind in contact with them—this should form a main part of every course in literature; and I claim that, excluding the other benefits of college work, it would be no inadequate return should the student gain this alone, the appreciation of what is noblest and best in books and a love for the society of that august company of whom we have spoken.—*Extract from Dr. Alexander's Inaugural Address at Dalhousie College, Halifax.*

THE tendency everywhere among all first-class institutions of liberal education is to eliminate as much as possible all personal conflict and unhealthy rivalry from among the students. A great change in this direction has been made at Oxford, and it was only a week ago that the old grading system in Princeton was abolished by the trustees.—*Varsity.*

THE HEAVENS ILLUSTRATING THE ATTRIBUTES OF THE
CREATOR.

BY BISHOP WARREN.

IF a child were asked concerning the beginning of a table, he would perhaps say, "Man made it." That is as far as his wisdom can know. He takes no cognizance of the century's work of growing the trees, none of the vital processes that changed soil and sunshine into compacted wood, nor of the origin of that wondrous vitality; none of the wonderful machinery that man has been a thousand years perfecting; none of the man himself, none of the origin of the man. The child sees backward only one stage. So, ask the materialist what of the origin of the world, and he answers, "In the beginning world-stuff," that leaves him with chaos and old night, with no law, power, intelligence, or possible cosmos. That is the vision of the child not long from its birth. Ask the potentialist, and he says, "In the beginning power," and he sees the potency of every present and possible outcome in the fiery star-dust of a cloud.

But mere power lacks design and intelligence, and while it could give thunder and earthquakes and catastrophic eras, it could bring no order, no harmonious results. It is the vision of a boy still callow and veally; about as far-reaching as the wisdom of the chickens I see before my window drinking the drippings of the hydrant with no comprehension of the reservoir in the distant hills, or of the laws of the rain that fills it, or the fiery origin of the iron pipe that brings the water, or of the brass stop-cock that holds back the pent-up floods of power from annihilating every chicken of them.

Rise to a higher plane, to broader wisdom, and hear the Bible say, "In the beginning, God." That is the wisdom of the infinite, beyond what words can tell, and which the universe is set to symbol. Man's language is of human origin; it was invented to express the low range of human ideas. God cannot use it till He has raised it many degrees by comparison, figure, and type, intensified it by national object-lessons, and

even then it utterly breaks down as a vehicle for conveying God's thoughts that are as much higher than man's as the immeasurable heavens are higher than the earth. Tennyson has crystallized into words the vision of Monte Rosa hung in the air as seen from Milan. Another has caught the significance of the picture.

“ In the perishing symbols of breath,
 All forgotten e'er learned by the race,
 The Creator wrote not His name
 On yon mountain's glorious face.
 But the larch forest, vocal with life,
 The slow glacier's years beyond count,
 The swift avalanche's thundering fall,
 The far seas turned to cloud on the mount,
 To pavilion the great white throne
 Where the rock's heaved immensities tower.
 These all symbol His glory and life,
 His eternal Godhead and power.”

But the broader heavens are God's own language—His own expression of eternal power and Godhead. What are the heavens telling? Consider, first, that part of them we are most intimately connected with—the earth. Wherever God has left the impress of His finger-touch there is more of complexity, of structure and wisdom of adaptation, than all men ever understand. Whoever approximated an understanding of the structure or creative functions of a rose leaf? Myriads of men could not make one spire of grass, or comprehend one when a summer day has made a myriad.

Man has not yet defined or measured the size of one of the units of the material of which the earth's vast bulk is made. He knows the standard size of the units of which a brick house is made— $8 \times 4 \times 2$ in.—but he knows nothing of the size of the units of which the world is builded. He undertakes to measure the atom by ruling 112,000 lines to an inch on a glass plate. Man's utmost fineness of vision, aided by every known power of magnification, can see nothing finer than these lines. But are the ridges between them rows of single atoms, leaving each atom 1-224,000th of an inch in diameter? No, indeed. These

ridges are ranges of Alps and Appenines compared with rows of single atoms. We give up the microscopic hunt. We shall never see the standard brick. But reason is firmer than its instrument. It measures more exactly without eyes than with. Gold can be beaten till its sheets are only 1-340,000th of an inch in thickness. Are the layers of separate atoms? No, for it can be drawn as the coating of a wire a thousand times thinner, or to the 1-340,000,000th of an inch, and yet so perfectly coat the wire that the sharp tooth of an acid cannot find a place between the plates of the coat of mail to bite the wire within. It is yet atoms upon atoms. We might continue the search further by solutions of pigments in great quantities of solvents without missing the tint when it had been divided, to us, infinitesimally.

But turn from dead matter to that which is wielded by life and built into living organisms. Alonzo Gray says "that millions of infusorial animals would not equal in bulk a grain of sand. Yet each of them performs the functions of respiration, circulation, digestion, and locomotion. Some of our blood-vessels are not a millionth of our size. What must be the size of the ultimate particles that freely move about to nourish an animal whose totality is too small to estimate? A grain of musk gives off atoms enough to scent the air of a room. You detect it above, below, on every side. Let the zephyrs of summer and the blasts of winter sweep through that room for forty years, bearing out into the wide world miles on miles of air, all perfumed from the atoms of that grain of musk, and at the end of the forty years the weight of that original grain has not especially diminished, though uncountable myriads on myriads have gone." No, we shall never reason finely enough to measure the ultimate atom. There must be finer intelligence than we can perceive; nay, its embodiments in matter are finer than our clumsy mental fingers can handle.

Even the hairs of your head are all numbered, and all the steps of a good man are ordered of the Lord.

Man is proud of his skill in mechanism. He fits pivots to sockets to the minute fraction of a hair's breadth. He is very

proud of a watch that will not vary two seconds in a month. But man can scarcely measure the minuteness of a creature that has more parts than a watch, and besides, is made alive. A rag-wheel compares with man's finest workmanship as well as his finest workmanship compares with that which is all about him.

One of the Creator's attributes must be an ability to make and work with the infinitesimally minute. After this we shall cease to doubt His particular providence, or His statement, "Not a sparrow falleth to the ground without your Father's notice."

The Divine attributes are no less past finding out when we look at the opposite of the minute. Man has some idea of size; of his house, be it flesh or stone; of his town, state, the United States. He may have journeyed round the world, by swift steamer and train, till he has some idea of its immensity. But Jupiter, gleaming in the evening sky, is 1,400 times larger. It would take 1,245,000 of our earths to make the volume of the sun—no human mind ever comprehended a million—and there are suns thousands of times larger than our sun. But even these are only dots in the immensity of space. To measure this, man uses units of measurement incomprehensibly long, and increases them by unimaginable multiples, and utterly breaks down in trying to comprehend God's thoughts of magnitude.

There must be One whose attributes enable Him to make and handle these immense bodies as easily as man manages air enough for a single inspiration. Here we catch a little more of the uncomprehended meaning of the words of Holy Writ, speaking of God's greatness—"Who hath measured the waters in the hollow of His hand, and meted out the heaven with a span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales and the hills in a balance." Neither poetry nor imagination ever ventures on such startling figures as these. But God gives them as matters of fact. Nature teaches that there is One who cares for the hugest conceivable worlds as if they were atoms, and for any particular atom or least creature of His love as if there were not another in the universe demanding His care.

DARWIN ON EARTH-WORMS.

(Continued from page 144.)

NOT to mention his monographs on particular subjects, such as "The Cirripedia," his volumes on "The Variations of Animals and Plants under Domestication;" on "The Various Contrivances by which British and Foreign Orchids are Fertilized by Insects;" on "Insectivorous Plants;" on "The Movements and Habits of Climbing Plants;" on "The Effects of Cross and Self-fertilization in the Vegetable Kingdom;" on "The Different Forms of Flowers in Plants of the same Species;" and on "The Power of Movement in Plants," all combine to illustrate, among other things, two central points: the incessant and infinite interaction of the various parts of nature upon each other, and the manner in which the most conspicuous and most comprehensive results are produced by the gradual accumulation of the slightest influences. It has been justly said that any one of his books, however apparently special its subject, would give an intelligent reader a conception of the main principles which he has developed into the doctrine of Evolution. There are some of his works, besides "The Origin of Species," in which this doctrine is carried out to the full, and definitely applied to solve the problem of the origin and descent of man. These volumes, on "The Descent of Man" and "Selection in Relation to Sex," and on the "Expression of the Emotions in Man and Animals," while among the most interesting of his works, from the wonderful mass of minute and skilled observation which they contain, are not, as we venture to think, those in which his judgment appears to the best advantage. They seem to us to afford some of the most conspicuous examples in our time of that method of reasoning on natural subjects which Bacon condemned under the name "anticipatio." His hope for the progress of science ("Nov. Org." i. 104) depended on men being content to ascend, as it were, by a ladder, and by continuous steps, without intermissions or gaps, from particulars to the lower axioms, and from these to the middle ones, in due succes-

sion, "and last of all to the most general ones"—*et postremo demum ad generalissima*. But Mr. Darwin has unfortunately in this class of his works forgotten this last caution; and, notwithstanding the admitted fact that there are numerous steps *intermissi aut hiluci* in the ladder of his observations, he has sprung at one bound to the widest generalization conceivable, and has proclaimed the discovery of the ultimate law of natural development. But his vast collection of observations, and very many of his intermediate conclusions, retain all their value and interest: and no such rich storehouse of facts respecting the natural history of vegetable, animal, and even human life, has perhaps ever been accumulated by a single man.

Connected, perhaps, with this continuity of thought in Mr. Darwin's writings is another characteristic not less remarkable—the continuity of the observations themselves. Each work is the result of years and tens of years of patient labor; the clue has never been dropped; and, however tortuous and obscure may be the labyrinth through which Mr. Darwin is wandering, he is at length able to trace back for us every step of the process. What is more remarkable, he will hold two or three clues in his hands at the same time, and track out simultaneously different paths through the one great labyrinth of nature. The present work on Earth-worms, for instance, has been slowly growing for nearly half a century. As long ago as 1837 Mr. Darwin read a paper before the Geological Society of London on "The Formation of Mould," in which he stated the main elements of his present conclusions. It attracted but little regard at the time, being treated, for instance, by a French naturalist as no more than a "singular theory." But he has been patiently working at it ever since, and gradually accumulating from all quarters facts which illustrate and confirm his views. It is this which, after all, gives such unique value to his works. Sufficient honor, perhaps, is rarely done to the faculty of patient observation, nor is it realized to what an enormous extent human life and human science are built upon it. Astronomy, for instance, has now, in a great measure,

reached the stage of a deductive science. For a very wide range of celestial phenomena we possess the primary law, and we can announce what is, from our knowledge of what ought to be, the fact. But it is seldom remembered that this scientific knowledge reposes upon an enormous mass of observations, which were accumulated through long generations of mankind. From the ancient Babylonians and Egyptians the heritage of these facts descended through tens of centuries to Greece and Rome; and fifteen centuries more of the Christian Era had to pass before they were sufficiently sifted, arranged, and tested, for a scientific conclusion to be drawn from them. Looking out upon the heavens on some starlight night, there seems something even more wonderful than the triumphs of modern astronomy in the fact that patient watching of those innumerable and apparently confused orbs should have enabled men to disentangle them, to discover a fixed order in their movements, and eventually to know them so well as to be able to predict those movements with more unerring certainty than we can feel with respect to any other occurrences. Mr. Darwin's observations have not yet, as we think, placed us in a position to form a trustworthy scientific theory respecting the natural history of species, similar to the law of gravitation respecting the heavenly bodies. But he has, perhaps—and that in great measure by his own herculean labors—placed us in much the same position as that to which astronomy was brought when Kepler had shown, by the laborious observations to which his genius inspired him, that the planets moved in ellipses. We now know, as it were, in what orbits species have moved, and we know, within certain limits, the methods of their variation. To this extent it may be said that we know the fact of evolution. But what are its causes, what is the law which impels the variation of species in known directions—whether it is by an inherent principle of development, like that which determines the growth of an individual, or by the pressure of external circumstances, or by both combined, that the observed results are produced—this, as it seems to us, is as unknown as was the law of gravitation before Newton divined it. But it is

Mr. Darwin's achievement to have finally established the facts, and also to have shown that a vast number of them can be accounted for by natural causes now in operation. There remain many, especially in relation to man, which have not thus been explained; and it is rash and unscientific to assume, without direct evidence, that they can be so. This, as we think, is Mr. Darwin's error. His strength is exhibited in the wonderful grasp with which he has brought all the facts in question together, with which he has arranged and organized them, and has revealed to us, with a clearness which had never before been approached, if not the causes which determine the order of natural history, at least that order itself. What he has done, to recur to the illustration first offered, may be said to be, that he has abolished the kind of Ptolemaic theory of natural history which previously prevailed, and has established a Copernical theory, substituting for an ingenious artificial account of the order of nature one which corresponds to the actual facts. But it is another thing to make the further step which was made by Newton, in the discovery of a universal law, and it is this which, as we believe, has not yet been done.

(To be continued.)

RUSKIN says: "Man is not a child of nature like a hare. That nature is worse to man than a stepmother, persecuting him to the death if he does not return to the realm of art where he belongs." The gallery of art runs back through the ages of the world's life, and has gathered the finest conceptions of the finite mind. Within the golden gates of this temple the canvas and the stone are full of vitality and intense with expression. Along the polished walls of this temple are hung the masterpieces of the great artists. Along its lengthened corridors architecture has inscribed her name and lent her loveliness for its pillar and canopy. In her gorgeous aisles the sculptured marble stands radiant with grace and beauty, and from the canvas and the stone the mind catches the divine outline, the fair ideal of a perfect life.—*Kansas City Review of Science.*