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NOTES.

THE *New York Tribune*, in taking a survey of the work and progress of the last year among the various religious bodies, after noting the great advances all along the line and the activity apparent in all directions, closes by a very significant sentence: "It may be noted, in closing, that infidelity, as such, is making little headway in this country. The great foe of the Christian Church in this age is not organized infidelity, but rather a cynical indifference, which regards the claims of Christians and unbelievers alike as unworthy of serious consideration."

THE *DISTRIBUTION OF ANIMALS AND PLANTS*, by A. Russel Wallace and W. J. Thiselton Dyer. J. Fitzgerald, publisher, New York. "This work forms No. 64 of the 'Library of Science,' a serial publication in which are reproduced, at a minimum price, the best popular scientific works of the day, by such authors as Darwin, Tyndall, Huxley, Spencer, Proctor, etc. The authors of the present work treat of the Geographical Distribution of Living Organisms; the Geographical Distribution of Extinct Organisms, and the Geological Succession of the the Chief Forms of Life."

THE *Educational Weekly* has concluded, and with force and reason, that the prospects of English as a study are brightening; that it is destined to outstrip classics, and be rivalled only

by the sciences ; and that it will soon take its place as the most important study on our curricula. In concluding its remarks and advice to teachers it says : " If, then, we are right in this view, the subjects that should most engage the attention of young teachers—teachers who hope to be, say, twenty years from to-day, in first ranks of educational leaders—are those of the English language and literature, with all the interesting connecting links, without which English itself cannot be properly understood or taught."

FOREWARNED is forearmed, even in the case of lamp explosions ; an ounce of prevention is worth many pounds of cure in such accidents. A lamp full of oil will not explode, since the explosion occurs not in the liquid but in the gas. When there is any vacant space, whether in lamp, can, or tank, evaporation will fill the space with oil gas, which is a powerful explosive. In filling a lamp or pouring out oil the gas will be driven either from the lamp or the can, and if a flame be brought near an explosion will occur. In filling a lamp, in pouring out oil, in lighting a fire, precaution should be taken that all flame be extinguished or removed. A useful invention would be that of something to prevent the evaporation of the oil in a lamp or can. An equally useful invention, and one that should be practicable, would be a preventive of the escape of gas when not lighted. Here are two roads to fame and wealth.

MEDICAL science is making progress. The most valuable anæsthetic has just been discovered, which is local in its influence, rendering insensible only the parts of application. It is of special use in operations upon the eye. Next comes a surgical lance worked by delicate machinery, accomplishing its work so slowly and regularly as to inflict no more pain than a slight itching. Then electrified platinum wire becomes an instrument of mercy. We append an item for those interested in the *romance of surgery* : " A very thin platinum wire loop,

made incandescent by means of an electric current, is used, instead of the knife, for excisions and certain amputations. It sears as it cuts, prevents the loss of blood, and is absolutely painless. We are told that by this means a large tumor has been cut from a child without the use of an anæsthetic, and that the child, so far from experiencing any pain, was amused, and laughed while the operation was being performed."

DR. HODGINS certainly deserves the thanks of all our readers for directing our attention to the late utterances of Dr. Dallinger at Montreal. There are few more polished, more enthusiastic, and more accurate exponents of science and religion than this English scientist and divine. In this number will be found the conclusion of Bishop Warren's consideration of the Heavens. Works and articles that direct our attention through matter to mind, through creation to Creator, from nature up to nature's God, are more worthy of our careful consideration than the cold materialistic reasonings of many writers of the day. To this number we append the last section of Darwin's "Earthworms." We must apologize for the disjointed or articulated appearance of the subject. The articles are more articulated in press than in nature. The other subjects we leave to your careful consideration, with the promise that, from the appearance of our reserve supply, we will not allow the quality of material to deteriorate.

BEATON, the classical author, in one of his prefaces says:—
"Let men determine that Mount Olympus must serve as the physical example for mortals to follow. Its base was earth, but its head touched heaven. So should all men—if necessary it is to labour daily, keep shops, and write accurate accounts, for dear bread below—ascend by times to the higher life, and air their better natures in the gentle airs of celestial spring which blow upon the summits of classic height." The sight will appear all the more beautiful, and the breezes all the more refreshing, to the man who has stoutly trudged to the summit

through the help of grammar and lexicon. Less appreciated will be success to him who has too often lazily swung his tardy limbs astride that universal beast of burden, that classic horse, the pony. What enjoyment, then, is left for him who, as if by some magic power, known to classic gods and goddesses, is set down near the summit of the peak, and into whose being there flows the streams of classic thought and learning? Should there be any who desire to view some scenes of old Grecian life, to catch some strains from the minstrel harp of the blind Homer, or to lose the practical present in the mythical and poetic past, we would advise a course of reading such as that prescribed by the Chautauqua Circle for the present year. The Greek courses in English by Dr. W. C. Wilkinson are cheap, handsome, accurate and entrancing. To persons unable to master the Greek language these two works are treasures, while to the studies of the more fortunately situated they add interest and afford information obtainable in no other form.

RAILWAY enterprise has developed to a remarkable extent in Canada during the last few years; our provinces must be linked by steel bands, districts and counties connected with the frontier, and all the small but ambitious towns and villages must be strung together by the same sinuous iron thread. The interoceanic highway will soon be completed and direct connection established between Japan and England—the ambitious isles of Asia and Europe. An extension northward is to develop the Lake Nipissing and James Bay districts, rich in mineral and timber wealth. The Hudson Bay route is now under investigation, and, should the reports prove favorable, a closer connection will be established with England during the summer months. Another scheme is to connect Sault Ste. Marie with Brockville, and thereby establish the shortest and most direct route between the North-West and New York. The latest project, however, is to connect Quebec with some large harbor on the coast of Labrador by a railway 800 miles in length. The ocean voyage would thus be reduced to three

days. Attention will be directed to the exploration of the country to the north and north-east of Quebec during the coming year, and those already partially acquainted with these will tell us of lakes and rivers of marvellous size. Labrador may not be the dreary waste we have hitherto been led to believe. But for one obstacle it might prove a formidable rival of American seaside resorts. That one obstacle, however, is too great for the combined strength of Canadian and American enterprise; and until the polar current can be deflected we have little hopes for the rock-covered slopes and ice-strewn shores of this neglected and forsaken spot.

SCIENCE NOTES.

RAMDOHR computed the descendants of a single female daphnia at the end of sixty days to be 1,291,370,075.

PUGILISTIC SCIENCE.—Scene, New York; action, Sullivan *vs.* Ryan; time, one minute; receipts, \$11,000. Moral—"To the slugger belong the spoils."

SWALLOWS desert cholera-infected districts. Mattieu Williams gives as his reason that cholera is propagated by polluted water, which is death to gnat life in the water. As much of the gnat life is aquatic, the principal pond supply of the swallow is thus cut off, and they seek other feeding grounds and waters.

COMBINING human vision with the powers of the most powerful and perfect compound microscope, it is found that the limit of vision is reached when lines 146,528 to the inch are separated, and that the theoretical limit of the power to discern a single object is 1-180,000 of an inch. This limit has been nearly but not quite reached by most perfect instruments.

IF to-day you start life as one of a million, at the end of five years your companions will be reduced to 736,818. At the end

of 25 years there will be 684,054 of the million left. At the end of 35 years there will be 568,993 left, and of the women, two-thirds will be married. When 45 years have passed, 502,915 will remain. At 85, only 38,575 will survive. At 95, the million will be reduced to 2,153. The number who will cross the line of the century will be 223, and at 108 years you may be the only survivor and the last of the million. You will also then depart.

DR. RICHARDSON has constructed a most interesting and novel "Lethal Chamber," in which animals undergo painless death. Carbonic dioxide is the anæsthetic used by him. The animal is placed in a cage, on wheels, which, by a combination of machinery, lifts a door as it moves forward and closes behind the gate of separation. The gas in the chamber, or wooden tunnel, soon deprives the animal of all sensation, and death steals painlessly over the victim. Destitute dogs are thus destroyed at Battersea, England, and by some it is proposed in this way to allow criminals an easy and more humane egress from this world. Capital punishment would certainly be thus deprived of its horrors.

MAJOR POWELL read a paper before the British Association on the "Classification of American Languages." In this he stated that in North America there are about eighty different languages, comprising as many mythologies; that the classification of races and tribes must be according to speech and mythological belief rather than physical form. The study of comparative philology is one of deep interest, and to Canadians a new field of investigation is open in the Indian tongues. The Government should make some provision for the thorough investigation of the languages, religions, customs, etc., of our Indian tribes, and at once, as with the extinction of the race, or even his civilization, will disappear his primitive tongue and all records of his history.

MIND AND MATTER.

BEFORE we begin the direct discussion of our theme let us do some metaphysical underbrushing. There are but two things in the universe—mind and matter. None have ever asserted the existence of a third thing. These two forms of existence possess qualities which are not only different but opposite. Matter has extension; mind has none. Matter has weight; mind is weightless. Matter is inert; it cannot originate motion. But mind, by its power of determining to use forces which by the law of the conservation of energy are kept within its reach, can originate motion. Matter can only transmit motion. Ulrici says: "Will is the only germinant thing in the universe; all else is *flow*." Therefore, if we are to find the first cause of all things we must seek it in mind, not in matter.

Here we will take our stand upon a plot of ground, which is occupied in common by Agnosticism, Atheism, and even Materialism. All these schools agree when "they assert the existence of a First Cause, or absolute being." Spencer teaches that the existence of an absolute power, *i.e.*, a self-existent, self-sustaining power, is *the highest certainty of science*." We are dependent beings. We did not cause ourselves. Dependence without independence is an effect without a cause. There must be independent being. Backward, backward, far beyond the reach of the human intellect, stretches the receding links of the chain of second causes, and when we can trace it into the clouds no farther, of two things we are certain—it *hangs*, and it hangs on something. Dependence, with the kingly hand of need, lays claim to independence. Quoting Spencer again: "The existence of a non-relative is unavoidably asserted in every chain of reasoning by which relativity is proved." With some this non-relative being is merely a force. With others it is a power that makes for righteousness, and to their credit, be it said, they spell it with a capital P; and with others it is a Person, the intelligent source of the power that makes for righteousness. In the universe there are only persons and

things. Persons are greater than things. A power is a thing. Can the Cause of all things be a thing?

There are some who make mind the product of the brain cells as bile is the product of the liver. But mind originates motion, while matter is inert. If matter secretes mind it originates motion, and therefore it possesses and does not possess the property of inertia, which is impossible.

In the world around us we see adaptation of means to ends. In organic forms we everywhere find prophecy of the far-off and the fulfilment of the prophecy. There is collocation. There is planning. Planning implies thinking, and thinking a thinker. A thinker is more than a thing. He is a person.

Well has Kant said: "Give me matter and I will build a world, but give me matter only, and I cannot explain the existence of a caterpillar." The arms of matter can never stretch far enough to embrace the universe.

In inviting you to the consideration of what is to me a sacred theme, let me call to mind the lines of Wordsworth:

I have felt
The presence, that disturbs me with the joy
Of elevated thoughts. The sense sublime
Of something, more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean, and the living air,
And the blue sky, and in the mind of man;
The motion and the spirit, which impels
All thinking things, all objects of all thought,
And rolls through all things."

The great object of this paper will be to show that the true scientific view is this:

"Earth is crammed with heaven
And every common bush afire with God."

No phenomenon is explained until we have caught a glimpse of the *how*, which is behind it. We have seen that there can be no reasonable hope that matter will explain the world. Can mind, will, spirit, yield the golden secret?

To the scientific mind the most commanding reality in the natural world is "law." Its work is seen, its presence is felt everywhere. Its lines of light make the universe intelligible. It rules in the seen, and in the vaster realm of the unseen, physical universe. We cannot escape from its power, nor fly from its presence. While all else is in a state of constant flux, law remains steadfast and immutable. On the hypothesis of mind, can we throw any light upon this phenomenon?

Take a simple illustration. Simplest keys unlock nature's most important doors. Some scientists assert that the mind of man has power in certain nervous states to move physical objects without physical contact, as for instance, this piece of paper lying upon the table. It is possible, they say, for a man to so magnetize that paper by simple will power that it will move toward him. Whether this case be true or not does not matter for our purpose. It is perfectly allowable as an illustration, since something analagous takes place in every voluntary motion. Somewhere in the chain that runs from the motion of my hand and the mental act of willing, spirit-will acts, either mediately or immediately, upon the nerve arcs or brain cells, which, as even Maudsley admits, are inert. I hold in my hand this book. It weighs about one pound. I am conscious while I hold it of a *pull* exerted upon it. If I hold the paper in my hand while my friend exerts his will-power upon it, I am conscious of just such a pull. Is it will-power acting upon the book? But we find that all matter throughout all the distant gleaming spaces, where universe-diameters are the units of measurement, as far as we know, is subjected to just such a pull. Is it the pull of a will? Sir John Herschel thinks it is. So does Faraday, Hartmann, Joseph Cook, Dana, the Duke of Argyll, and scores of others. Not a grain of sand upon the shore of yonder lake but is held to every massive speck that glimmers faintly in the long, nebulous leagues of the Milky Way or far beyond. We are bound together in the sacred brotherhood of stars. We are one, for we rest alike in the bosom of one Father. His omnipresent will is the home-tie.

Again, let us look at the paper on the table. It is perfectly certain that if the paper be at rest it will move, or tend to move, *only so long as the person whose will moves it continues in the act of willing.* This "psychic force," as Prof. Wallace Crookes calls it, must be subject to this law. Therefore gravitation must be upheld by constant forth-puttings of the Divine will. New and startling vividness is given to the statement of an old book: "He upholds all things by the word of His power." Every moment we are resting on the everlasting arms. Should He cease to will, gravitation would not be.

Gravitation is the weakest of the natural forces, yet it is so strong that if, instead of this unseen force we had the machinery of iron wires one-quarter of an inch thick, each capable of sustaining a weight of 1,500 lbs., we are told that between earth and sun it would require so many that on the side of the earth next the sun there would not be room for a single mouse to crawl between. This, too, is the veriest fragment of the exhaustless force which undergirds the boundless worlds. Every time we stand in the presence of a falling body we stand in the presence of Almighty God. In that act we see the manifestation of that Infinite Power who tempers His force to the needs of our tiny universe, and who, through the feeble instrument, expresses some faint whispers of His glory and His power. When, rising upon our toes, we feel our own weight, we feel His touch.

"Closer He is than breathing, and nearer than hands or feet."

"Wherever natural law presses upon us we feel the touch of a personal God."* This conception rescues natural law from the degradation to which we have subjected it. The natural becomes supernatural. Is a thing done according to the natural law, it is done according to the will of God. In mind and the conscience there are laws which are higher manifestations of His will than those in the physical realm; but even these latter are His, and so are sacred. If we adopt this view in reference to

* Joseph Cook.

gravitation we must adopt it in reference to all the natural forces—adhesion, cohesion, chemical affinity, and the forces revealed in crystallization.

Here is my hand—I hold a piece of chalk—and there is a blackboard. He who is the supreme force in nature, and is present in every atom, is saying at this moment: “On certain conditions being fulfilled let the molecules of the chalk cling to the molecules of the blackboard.” I can fulfil these conditions. Gentlemen, you are about to see the operation of the Divine will. It will not fail. God keeps His word with us. I fulfil the conditions. I bring them together, and the rest is done for me. That mark is not all my work. In its production I was a co-worker with another. This method runs up into the loftiest realms of the spiritual life. As Bushnell has finely shown, all the power man uses is “borrowed power.”

He who has watched the formation of a crystal under the microscope, and has seen the atoms forming themselves with wonderful precision into rank and column, according to a predetermined order, must have felt, if he has gazed with becoming thoughtfulness, that these particles were *under command*, and intelligent command at that. Where there is motion there must be force, where there is force there must be will, where there is will there must be spirit, and where there is predetermined order there must be predetermining intelligence. Only a personal God can account for the formation of the simplest crystal.

The force of gravity depends on the Divine will and its law “directly as the mass and inversely as the square of the distance” depends upon the Divine intelligence. In the one case we think of will as a power, in the other of will as an intelligent choice. The natural laws, then, are methods among the motions, which result from the play of forces. Now we come to a law which is a method among the laws, and consequently a higher expression of the Divine will—the law of continuity. One form of this law implies that there has been a continuous succession of phenomena from the very first. Every state of the

universe has grown out of that which preceded it. It is only another form of the axiom, "Every change must have a cause." The universe *flows* from something to something. The other form of this law applies to the laws themselves. The laws are found to be continuous throughout space and time. Our earth is but a faint speck in the infinite heavens, but by this law it becomes resplendent with its boundless revelations. We find that that substance which we call stone is subject to the law of gravitation here. We are sure that, no matter where stone is found in all the infinity of space, it will be held in the grasp of that same law, and will attract every other material substance in the universe, directly as the mass and inversely as the square of the distance. On any habitable star that swings in space the statements and formulæ in Hamblin Smith's *Mechanics*, or Deschanel's *Natural Philosophy*, would be found useful. We are scientifically certain that if we have found out any of the laws by which the phenomenon of light is governed, wherever this swift traveller has sped it has nowhere outrun these laws. If but a faint ray of solar light reaches the pearly battlements of the New Jerusalem, a good spectroscope would be a treasure there. This law has been called the expression of "the Divine veracity in nature." It is an assurance that in the study of nature we will not be put to permanent intellectual confusion, and the faith of science becomes faith in a Person.

This law has exhaustless significance in theology. If we have found out any of the laws of intellect as such, we may be sure that they will hold good wherever intelligence is found, in angel, man, or demon. To us it is a necessary truth that every effect must have a cause. It is a truth to all the flaming hosts of the archangels. If any of the laws of conscience have been revealed to us, all consciences in heaven or hell will work according to these same laws. A conscience can no more outfly law than can a beam of light. We can apply these laws as unflinchingly as we apply our mathematical formulæ to any part of a circle, even though we begin with three points in an arc but a few feet apart, and run it through all the eternities

and infinities. "The laws do not cease where our eyes lose them," as Emerson has said. God keeps His word with us away into the unseen.

There is, then, but one plan in the universe, and therefore but one God; and, "as in all the changes of our thoughts, choices, and emotions, there is a personality which binds all these into unity, so in all the objects and events of the finite universe there is a personal God binding creation into unity." Said Dallinger: "The splendor of the universe is its stability," and its stability is the immutability of Him who is without shadow of turning. "The things which are seen are temporal, but the things which are not seen are eternal."

Another very important form in which the will on which all things rest, manifests itself is that called the law of the conservation of energy, a knowledge of which is transforming modern thought. We find amid all the play of energies, human and cosmic, that there is a power which boxes them in so that they are not lost. Behind the conservation there is a Conserver. The object of this form of the manifestation of His will is not to create, but to keep. The forces are constant. We may use them, but we can never use them up. They keep our energy stored up for us, and will give it back to us, but they never give themselves up. "God requireth the past." He loses nothing, and when we fall upon our record we fall into "the hands of the living God." This law is the highest expression of the Divine economy in nature.

Can we go any farther? Given the primary atoms with law, force, arrangement added, and all the properties of matter may be accounted for. Can the atom be accounted for? Force, law, arrangement, as we have seen, depend upon will and intellect. Does the atom itself depend for its existence upon the present action of a will?

Physical science teaches hypothetically that all bodies are divided into molecules, these into atoms, and atoms into ultimates, and that all ultimates are exactly similar. These ultimates are the raw material out of which the worlds have been built.

All our ideas of matter start from sensuous impressions. Following these impressions, among the ideas which come intuitively, and which underlie our ideas of the properties of matter, there is first of all, perhaps, the idea of body, in which three things are involved—externality, extension, and causation.

Let us return to the paper on the table. It is perfectly plain that if the "psychic force" moves the paper, then energy is exerted upon every part of that material substance. But a nerve is matter, hence an external will may exert force upon that and produce a sensuous impression, just as certainly as our own wills somehow and somewhere produce motion among the brain cells and nerve arcs by the exertion of power. Suppose the ultimates to be centres of "psychic force," points in which the constant will of Deity is exerted, and that this form of the manifestation of the Divine will, like all the others, be continuous throughout all space, *i.e.*, that all ultimates are alike, then it follows that these would have the power of making sensuous impressions; and if endowed with ordered motions, that is, of changing their relative positions in space according to law, and having definite relations with all their fellows throughout the universe, thus becoming essential parts of one whole reality. the sum of all that is, and the existence of the vortex atom and its phenomena, are thinkable. Groups of such centres, held together and endowed with inter-atomic forces, would give us the impression of such properties as externality, extension, and causation.

Further, underlying these phenomena of body we think of substance as the something in which they adhere. We cannot think of force being exerted without also thinking of something on which it acts, just as we cannot think of any change without a cause. But as in the one case in tracing, through an almost infinite series, the chain of cause and effect we come to the First Cause, independent, uncaused existence; so in the other, if we trace the substrata of phenomena from gross matter to the ether and through an almost infinite range of ultra-etherial substances, we come unavoidably to what Milton called "an

effluence of Deity," a stream of spiritual forces, which we have supposed to be exhibited in centres of psychic force, and which must find its source in the Divine will. "The idea of substance implies three things—existence or being, active power, and permanence. This holds good for mind or self as well as for matter."*

Now, the idea of being or existence which we have in connection with substance need not be different from that produced by a force like that of gravitation. To the scientist the firmest realities are the unseen laws and forces. They *are* and act. Upon this property the others are superimposed. The active property manifested by an atom, or ultimate, is vastly different from that of gravity; yet this may be more in mode of action than in kind. Then as to permanence, an atom of hydrogen has been the same from the beginning. It is not one thing now and then another. We can depend upon it as we can upon gravitation. If the source of permanence is a constant will, is it not logical to ascribe a like permanence in the atom to a like source? Is the permanence of the atom God keeping His word with us? J. S. Mill has said "that almost all philosophers who have narrowly examined the subject have decided that substance need only be postulated as a *support* for phenomena, or as a bond of connection, to hold a group or series of otherwise unconnected phenomena together. Let us *think away* the support and suppose the phenomena to remain and to be held together in the same groups and series by some agency, or without any agency, but an internal law, and every consequence follows without substance for the sake of which substance is assumed." But this being held together, the force which holds together, the internal law, and the force behind that—these yield us existence, active property, and permanence, which constitute substance. The support has not been "thought away." The supreme reality has been reached—

"The Living Will that shall endure
When all that seems shall suffer shock."

* McCosh.

This conception of matter brings us to a solid base. Without this matter is vapory, cloudlike. It is real, however, since it is spirit-based. In it an eternal power is immanent. It is His, but not He.

The Duke of Argyll writes: "The old speculations of philosophy, which cut the ground from materialism by showing how little we know of matter, are now being daily reinforced by the subtle analysis of the physiologist, the chemist, and the electrician. Under that analysis matter dissolves and disappears, surviving only as the phenomena of force; which again is seen converging along all its lines to some common centre, sloping through darkness up to God."* "The things which are seen are not made of things which do appear," says the writer of the Epistle to the Hebrews; and whether this imperfect outline be within the lines of fact or not, it is certain that the progress of science seems to be bringing us to such a goal.

W. W. ANDREWS.

MANITOBA.

THE FUTURE OF THE PRAIRIE PROVINCE.

PERHAPS this is the period in the history of Manitoba which is of the utmost importance. The strength, durability, symmetry, comprehensions and adaptability of a vast building are all more or less provided for in the foundation. As with buildings, so with provinces, countries and institutions. This may be called the *foundation period* in the history and life of Manitoba. Her citizens are intelligent, energetic, experienced, liberal, progressive and ambitious.

We are safe in saying that the past experience of Ontario is aiding the "prairie province" very materially. The sons and daughters of Ontario are found in every part of the province. They are among the leading farmers, mechanics, commercialists, doctors, lawyers, ministers, politicians and educators. No won-

* "Reign of Law," p. 116.

der that we in the "banner province" have a deep interest in the Garden of the West. It is quite evident that these two will soon form powerful rivals. But this very spirit of rivalry may be properly directed. In such an event the result will be a blessing to the whole Dominion.

The future of Manitoba is sure to be eminently prosperous and progressive in all that will aid in building up a great people. As near neighbors, we in Ontario shall always watch with deep anxiety the unfolding of all her latent resources and powers. Look at the wonderful fertility and depth of her birthful soil. There is a natural richness and endurance which will yet sustain many millions. The "prairie province" will soon be called the *agricultural province*.

To one travelling from east to west, and from north to south, over her broad and promising acres, the prospect is cheering. Not only along the Red River valley, from Emerson to Lake Winnipeg; along the Assiniboine, from Old Fort Garry to the stretch west of Portage la Prairie, but in *all* directions throughout the extent of the province there is promise of large returns to the farmer.

From the agricultural standpoint, Manitoba is surpassed on this continent by no equal extent of land. The carboniferous age made large provision for her future by laying down immense coal deposits within easy reach. Moreover, vegetation is wonderfully vigorous and luxuriant. Never yet has the writer witnessed in Ontario such a rapid and vigorous growth of grains, vegetables and native trees. The lakes, rivers and springs are simply inexhaustible and invaluable. True, the climate is cold in winter, but the air is dry and healthful. In every part of Manitoba have I conversed with people from Ontario, who told me they found the Manitoba winters bracing and pleasant, and quite as endurable as in Ontario. Without doubt this is true. Some say the people out there "die only of old age." Then from the standpoint of *nature* Manitoba is well provided for. A good climate, soil, water, vegetation and fuel are vouchsafed to her inhabitants. So far, so good.

But here we come to the most important part of our theme. There is the artificial or human side of the question. We have glanced at the provisions made by a kind and provident Father: we now turn to those who are to use and develop these natural gifts.

Let us first look at the material. This is very complex in its elementary nature, in its individual units. Indians, English and French-speaking half-breeds, Irish, Scotch, English, Icelanders, Germans, Menonites from Russia, Americans, and provincials from the other parts of Canada, are the material out of which the province is expected to develop the highest type of manhood. There is a sufficiency of quality and variety. From this ground of observation the prospects are favorable and satisfactory. Let this people blend, harmonize, and strongly unite on all best methods of action and thought, and unqualified success is, for Manitoba, an inevitable and speedy result

For a moment we shall look at her prospect from the standpoint of social, civil, and political life and manifestation. And at once we see social elements which are replete with power and purity; but by their side are other elements of weakness and corruption. We think, however, the good and useful largely preponderate. Civil strife is not all hidden. There are forces acting at cross purposes. But there are good and true men and women at work. Honest, noble-minded patriots are modifying the internal life, and directing the future of this beautiful Canadian garden. In the political arena may be seen some jarring, discord, bitterness of feeling, lack of patriotism and intense selfishness; but there is much, nay more, that is redeeming in its nature. There are grand, intelligent and devoted men, who sacrifice much private comfort for the best interests of their adopted home. Politically there is some danger, but many safeguards and a strong evidence of sure success and wise legislation are not wanting. From the religious side we have little to fear. Christians of all denominations are working side by side for the present and future welfare of the people. Although there are many sects represented, still there

is a mysterious unanimity in the practical nature of their work. The Churches are apparently in harmony with the nature of the times, and ready to yield the duties demanded of them. This augurs well for the future, and may be one of the principles which are working out the future union of all the Christian sects. So mote it be. Lastly, we look for a moment at her educational institutions and system. Here is much of a crude and unfinished nature. Yet there is a vast improvement on the past. In fact the thing is so great that it seems almost out of place even to suggest any such a thing as imperfection. A few years ago it was the writer's good fortune to visit the schools of Manitoba somewhat extensively, and witness their work and constitution. From that state to the present the change is great and pleasing. Some mistakes were made. Still wise and experienced men have been hard at work. Their numbers are increasing. Deep and comprehensive foundation work must be done, and done soon. Whether this foundation be laid by far-seeing men remains to be seen. Even if it be laid by men who can live *only* in the present, it must be laid at once. If well-founded the fabric will be one of beauty, symmetry and usefulness. If not, the future will be forced to patch and reconstruct, with little satisfaction, great labor, loss of *training time*, and vast outlays of money. Now is the time to build wisely. The ablest and most experienced men within reach should be secured for the work. Both the people and legislators should bear in mind they are pre-eminently working for the future rather than for the present.

Most truly Ontario is in hearty sympathy with the vastness and importance of Manitoba's present and pressing demands. May the highest success crown her efforts, and the God of peace bless her and her children. X.

January 10th, 1885.

THE mortality of the globe is as follows: Per minute, 67; per diem, 97,790, and per annum, 35,369,835; whereas the births are 36,792,000 per annum, 100,000 per diem, and 70 per minute.

MALE AND FEMALE

CARL DURING has lately published two articles under the heading, "On the Laws which Determine the Sex of the Embryo in Mankind, in Animals, and in Plants," and a brief synopsis of the same appears in the January number of the *Popular Science Monthly*, from the able pen of Prof. Brooks, of Johns Hopkins University, entitled, "Influences Determining Sex." During's papers comprehend "a remarkable combination of the two elements of scientific research, thorough observation and accumulation of evidence and reflection upon its hidden significance." Copious statistics have been collected from all sources, and from the facts he has drawn many interesting and important conclusions, some of which are here worthy of reference and repetition.

The ratio of the two sexes varies greatly in different countries, for different localities of the same country, nay, even in the same city, the increase of population will not be the same along the two lines, male and female. This difference of ratio, in During's opinion, is influenced by external conditions rather than by the working out of any inner law.

Some observers have noted that after a war the male population increases rapidly, to supply the draft resulting from the devastation in the army. The necessary ratio of males to females is also preserved in the practices of the bees and other insects. In fact, whenever there results a lack of individuals of one sex, there sets in at once a tendency to supply the deficiency and maintain a mean ratio as far as possible. The law is stated thus: "Each species has acquired, through natural selection, the useful property, in virtue of which any deviation from the average ratio between the sexes is corrected by an increased number of births of the deficient sex, or a decreased number of births of the sex which is in excess."

We have long been familiar with many of the effects of climate, scenery, and natural environment upon the human frame and mind; how the lines of power and intellect run

almost parallel with the isothermal lines; how the strong and sturdy highlander, as he towers above the shorter lowlander, more than typifies the towering hills that form his much-beloved home. The music of the waters, the solemnity of the grim mountains, the beauty of the quiet sylvan glades, all have their influence in developing the inner man, and in reproducing their counterpart in the mental texture.

But natural environment, according to these tables, has a remarkable influence upon the sex. "The birth-rate is higher in towns than in the country, and more boys are born for each hundred girls in the country than in the town." "Ploss was the first to point out that there is an excess of female births in times of prosperity, and he found that in Saxony the ratio of boy-births rose and fell with the price of food, and that the variation was most marked in the country." Domestic animals multiply faster than their wild ancestors, and most prolifically in the direction of females. Men and animals, when situated amid surroundings that are exacting and rigorous, decrease in birth-rate, but increase in male ratio to female. This law has been stated by Brooks as follows: "A favorable environment causes an excess of female births, and an unfavorable environment an excess of male births."

These two laws, viz., the tendency of nature to uniformity in numbers, and the effect of nature upon sex, are well worth careful study and application. If they be true, what conclusions can we draw from them? Does poverty decrease the birth-rate? Will improvement of environment increase the combined birth-rate, and also that of the female birth-rate? What will be the ultimate effect of this natural selection on the increase and general relationship of male and female? K.

THERE are forty-three million four hundred thousand dollars invested in colleges of the United States, together with their apparatus and grounds.

COLLEGE CRUMBS.

THERE are 32,000 college students, properly so called, in the United States.

THERE are twenty American girls studying at the University of Zurich. They are admitted upon equal terms with the male students.—*Ex.*

OF the 320 colleges and universities in the United States, only twenty-four have more than 200 students, and only 17 have more than 20 professors.

ACCORDING to the *Tech*, the following is the number of students this year in the principal colleges in the country: Harvard, 1,586; Columbia, 1,523; Oberlin, 1,314; University of Michigan, 1,271; Yale, 1,086; Massachusetts Institute of Technology, 706; Cornell, 539; Princeton, 505; Dartmouth, 402; University of Vermont, 346; Amherst, 334; Lehigh, 300; Johns Hopkins, 273; Williams, 253; Brown, 248.

ON Venice, in a narrow court,
Far from disturbing hands,
Most graceful carved of Parian stone,
With moss and ivies overgrown,
An ancient sun-dial stands.

A perfect thing in form and use
It seems; but in the stone,
Half hidden by the mosses dark,
One still may trace the words "I mark
The sunny hours alone."

In youth, in womanhood, in age,
Heaven grant thee, for thy part,
To have and hold as friends of thine
Those that bear not that fatal line
Half hidden in their heart.

—*Acta Columbiana.*

STUDENTS AND CURRENT SCIENTIFIC THOUGHT.

II.

RESUME a brief analysis of Rev. Dr. Dallinger's scientific addresses at Montreal.

As a preliminary remark I may say that his mode of pursuing scientific truth is both interesting and practical; and it cannot but be of use to students under similar circumstances. He says, by way of preliminary:—

“It is our highest vocation as Christians, from the very nature of Christian morality, to seek truth and to receive it, come from whence or lead to where it may. But in pursuing this quest, we must forever remember its nature. It is not a physical enquiry, nor a mathematical enquiry, nor a problem of numbers. The methods of science have no application to it, although the spirit of science has, profoundly. And if in a search for some visible and rational basis for the most ennobling beliefs of our lives we can make congruous and fair deductions from the deepest truths of science, it becomes our most elevated duty to do so. The theologian, as such, forfeits all right to the ear of science when he dares usurp dominion over its facts, its deductions, or even its hypotheses. But, on the other hand, science may faintly listen patiently when claiming a higher authority than nature for its highest truth. Theology yet takes the deepest facts of science, and, surrendering supremely to their truth, still deduces coincidence and support from them, with, and for, the highest beliefs held by our moral nature. It is this line I enter upon, and shall prosecute in my enquiry.”

In pursuing this enquiry Dr. Dallinger says:—

“Without question, the appearance of Christ in human history has proved itself the advent of a new moral power, a new formative factor for the higher spiritual development of man. . . . History is absolutely at fault in seeking to explain His appearance, the principles of His life and teaching, and the tremendous power, projected into every succeeding age, following upon His ignominious death. If the philosophy of history has no solution, is miracle—a great moral interposition for great moral ends—even conceivable?”

After discussing this question Dr. Dallinger presents in striking contrast the intelligence of man and that of the lower animals. He says:—

“The intelligence of man is the topmost wonder of all that we know; conscious, thinking man is in the midst of mysteries, himself the mystery that is deepest. . . . In [intellect] . . . man infinitely transcends the brute. The tender ripple of the ruddy dawn upon the margin of the eastern sky, and the opulent interchange of gorgeous hues that glorify the west as the great sun goes

down, awake no thrill—arouse no quiet joy—no suggestion of the infinite in the mental nature of the brute. . . . To the higher mind of man, the color and the form and the spatial relations image, as it were, the thought that lies behind creation, and kindle conceptions of sublimity and beauty.”

In reasoning on the existence of a great First Cause the lecturer uses the following striking and impressive language:—

“The profoundest mathematical knowledge and insight is required to interpret and express the related, but intensely complex, movements of the moon about the earth and the sun. . . . We stand amid the heather in a summer morning, and perceive without effort the prismatic beauty radiant in the dew-drop. That is an eminent act of mind. But to apply ourselves to the study of it until we see *why* the dew-drop binds and opens out the light, causing it to untwist its clustered radiance of hue; to invent means of doing all this without the dew-drop; to cause the sun to send his shafts of light through the cunningly-devised prism; to study the gorgeous spectrum that results, and by that means to mount transcendently above the facts of earthly chemistry and physics to the facts of the chemistry and physics of the sun and stars—that is surely one of the grandest acts of mind effected by man. . . . Can it be conceived that these [sublime relations of light to the physics and chemistry of the universe, etc.] could have been devised, brought about, and established in heaven without mind? without thought? without cause?” . . . It is impossible. . . .

After referring to certain opinions of Herbert Spencer, and to the views of Clark Maxwell, the lecturer proceeds:—

“The splendor of the universe is its stability. Who doubts the unchanging certainty of the laws of heaven and earth? The properties of matter *cannot* alter. The sublimity of the material universe, in its further extension and its nearest area, in its mightiest constellation and its minutest mote, is, that the power that produced it commanded and it stood fast. There can be no change. In living things there is generation, variation, destruction. But in ultimate atoms there is no generation. No new atom is ever produced, and no single atom can change, or perish, or disappear.”

In a second lecture delivered at Montreal Dr. Dallinger gives as a text of his subject a new reading of Ps. viii. 1-4 (part of which is . . . “Who has set Thy glory above the heavens”). The new reading is: “For Thy magnificence is exalted above the heavens.” The true idea of this is “that there is a glory in God too high for expression in matter—the essential sublimities of His nature are *above* the heavens. The heaven of heavens cannot *contain* Him.” Contrasting our insight into the great-

ness of nature with that of David, ours is immeasurably greater. He says:—

“The vastness, the beauty, the overwhelming majesty of creation opened to modern thought defies competent expression; in the direction of vastness alone how sublime is it? Unnumbered worlds in tireless motion, a motion so beautiful that it is purest music—not to the ear, but to the soul. Suns carrying their dependent orbs with awful swiftness through untravelled space; and isolated universes of suns steered together through uncharted solitudes. Firmament on firmament of sun-stars, and out on the fringe of the very infinite. Nebulae beyond nebulae curdling again into new orbs; on the dilating verge these are but the faintest outlines of but a portion of that unspoken greatness which arrests and kindles intellect to-day.”

These extracts, and many more which I might make, will give the student a clear insight into the character and scope of one of the most striking scientific, or rather religio-scientific, utterances of the day. The papers on these subjects, which appear so constantly in the Reviews of the day, are well worth the careful perusal of those students who desire to keep themselves advised of current scientific thought and opinion. An analysis, or *resumé*, such as I have attempted in these two papers, will, however, greatly aid the student in getting a comprehensive grasp of the subject presented by the writer.

J. GEORGE HODGINS.

TORONTO, February, 1885.

“IN WISDOM HAST THOU MADE THEM ALL.”

IN a recent beautifully written book on Christian experience, by Miss Warner, entitled “The Shoes of Peace,” I met with the following striking passage illustrative of the exquisite and perfect finish of all of God’s works in nature. In a chapter on “A Time for Everything,” the writer says:—

“Look at it. Half done work is a thing the Lord cannot away with: the finish of creation is as marvellous as its vastness. Fuller and fuller grows the world of life, the deeper in you go; but also more exquisite grows each detail. Finer and finer draws out the sting point of a wasp, under your wore and more powerful magnifiers; while the smallest needle man ever made, turns by degrees into a blunt crowbar! The unsuspected carvings on a fish scale are dainty

beyond description : the white chalk dust contains microscopic globes of spun silver, surpassing anything that the most cunning workmen see even in their dreams.

"The little *Mellicerta*—to the naked eye as large as a full stop—has a mould upon its chin, wherein it makes bricks from the muddy ditch water of its surroundings, and builds to itself thereof a round tower of habitation or defence. The minute creature has no hands; but deftly turning itself now this way, now that, adroitly and accurately dumps out the finished brick on whichever spot of its wall needs heightening or repair."

"O Lord, how manifold are Thy works! in wisdom hast Thou made them all : the earth is full of Thy riches."—Ps. civ. 24

J. G. H.

Toronto, *February, 1885.*

CONFEDERATION.

To the Alumni and Friends of Victoria :

THE university question has reached a stage of development far in advance of the expectations of many of its friends and promoters. The cause of this movement may be put in a few words: The need of funds for the further improvement of State institutions and the pressed demand for assistance: the potent resistance of rival authorities, springing in no small degree from sectional jealousy; the consciousness of Church dignitaries that sooner or later the demands will be conceded: the ambition to further widen the scope of State institutions: and the commendable desire of all to allay the hostility towards higher education and place all our seats of learning in such a position that Ontario will not fall behind the world in educational progress.

Conferences have been held and a scheme drafted for submission to the governing bodies of the various institutions. It is a peculiar scheme, by the way, having no recognized foster-parent, no authorized sanction, no decided champion—it came from somewhere, it "grew." Its rejection will bring defeat upon no one—Minister of Education, president, or divine. If it should die, its funeral dirge will bring no doleful sounds to anyone. Truly, those concerned endeavored to prepare soft pillows upon

which they might fall should it be necessary to come down. In whose interests most especially it was framed, may be judged from the mode of acceptance. University College accepts *in toto*; Victoria accepts with serious provisos; Trinity accepts with still more serious provisos: while Queen's firmly and determinedly rejects the proffered invitation.

The positions of Queen's and Victoria were very much alike. The Presbyterians have established Queen's at Kingston and Knox at Toronto; the Methodists have established Victoria at Cobourg and Wesleyan Theological College at Montreal. Queen's and Victoria owe much to the past contributions of Kingston and Cobourg, and both have been bound to these two places. The debt to Kingston is certainly larger than that to Cobourg, for there has been returned to Cobourg ten times over the amount invested. Again, Queen's is more favorably situated, and her prospects for further financial help are brighter. However, Queen's consults her graduates first, then replies; Victoria replies, or her authorities take a position for her, and then await the opinion of the graduates. The effect of this action will be felt ere long in the movement, we are certain. Trinity demands terms that her few graduates will be glad to accept. University College needs not to consult her friends about the terms.

What is to be the result? Queen's may be counted out. She is bold, confident and far-sighted. With no competition between Montreal and Toronto, she would draw students from a larger area than at present; she would, by emulation, spur on her faculty to even better work; she would rouse a greater loyalty among her alumni; and, confident in the liberality of her people, the devotion of her professors and the earnestness of her students, she feels herself a worthy rival of the more cumbrous university. Time will tell whether Queen's has over-rated her powers. Two of the reasons advanced by Queen's are strong and convincing; first, we must have rivalry and emulation—it is the only thing that has kept our colleges alive during the past twenty years, and cannot be dispensed with in the future; second, we must bring education as near to the homes

of the youth as possible. To the last one answer may be given, and it is this: further develop and improve the collegiate institutes of the province; make them more *collegiate* in their scope and aim, and thereby greatly increase the advantages for a higher education. If the collegiate spirit be more thoroughly inspired in this manner it matters little whether the university be located at Toronto or Kingston or Cobourg. But the most important necessity is that of wholesome rivalry; absorption will certainly kill the institution so unfortunate as to voraciously encompass the others.

The results of confederation, should the scheme be consummated, will be the creation of a new student-life (in residence), the end of co-education by the establishment of a ladies' college, then, first and foremost, the foundation of a true national university. Should Victoria enter the confederation, the result will be the cutting off completely, the extinction, of her scientific department, which would be merged in the new professoriate. She would thereby cut off not the least of the attractions which has brought to her students during the past ten years. She would need at least three new professors and assistants. To attract and keep the Methodist students, we think that even further additions would be necessary.

The arguments advanced for remaining in Cobourg are quickly stated. She would there maintain her independence. Cobourg presents fewer temptations to a young student than Toronto. Victoria is bound by agreement to remain. The unsettled condition of affairs is detrimental, and the location should be fixed definitely. Great progress has been made during the past few years, and there is good hope of further financial assistance.

We are also told that confederation means absorption, ultimately. It certainly does, if the Methodist students can be attracted from Victoria's halls. The only sure and certain preventive of this would be the raising of an endowment, and the equipment of the institution, equal to that of any other college. If Victoria confederates she must make sure of the money as well as the hearty co-operation and support of all alumni and

friends. Endow Victoria nobly and she will maintain her individuality ; but let her enter cramped and fettered, and in a few years she will survive only as a theological seminary.

Victoria must not sell herself to the State for a remuneration. It would be far better to enter unshackled by Government help ; but if she must accept it, then the only form in which it should be received is that of an endowment loan, the principal being redeemable whenever the terms of confederation may be broken. If she receive a grant she virtually will thereby become a State institution.

We have had the arguments for confederation placed before us from so many sources that it is just as well to calmly consider both sides, for there are two, and to look at all the arguments and the position in which we are placed. The country needs universities, two or three, and we have to decide whether by remaining independent we can hope to see Victoria one of these, or whether we shall throw in our influence towards building up one great university in Toronto. The first step has been taken towards committing us to the scheme, but we sincerely hope that no further step will be taken until the alumni, the people of Cobourg, and the Methodists as a body, have been publicly consulted and their opinions obtained. We must confess that the whole question stands in such a peculiar position that we are perfectly certain of the leanings of only one body, the students, who prefer confederation to the present state of affairs. Let us now have the free opinions of all concerned. What think the alumni ? What is the desire of the Church ? What is the attitude of Cobourg ? And of Toronto ? What *practical* advice can our moneyed men give towards settling the whole question ? Two rich Methodists, by putting their hands into their capacious pockets, could settle the whole question one way or the other, and could determine the destiny of Victoria. We wait for advice and advances.

A. A. A.

NOVA VICTORIA.

DEAR SIR,—I am convinced we need a new Victoria. To take and maintain the position we ought to occupy as an educating power in this Dominion, we must forget the toils and self-sacrifices, the failures and successes of the past, and, at any cost, put Victoria in such a position as will enable her to command the fullest confidence, and thereby attract a fair proportion of the best students, and, at the same time, secure the sympathy and hearty support of our Church as a whole. I do not mean by this that, up to the present, Victoria has failed. Far from it. She has done noble work for both the Church and the Dominion. But our times demand an advance, and advance we must, or Victoria will sink into a second-rate institution. I am fully convinced that it would be much better to bolt the doors of Old Vic. and Faraday Hall, and let our young men, and young women, too, seek an education at an efficient university, wherever it may be found, than continue to teach unless we can make Victoria all she ought to be. More than that, Methodism will do it, as soon as she is thoroughly aroused to feel the pressing need there is for such a step. But what do we need? Some say we need to go to Toronto, to take refuge under the wings of the State, to give up the science department, the metaphysical department, and pure mathematics, and then perhaps we could *live*. *What a life!* Much better death than such a life as that. Let us be *honest*, and if we must die, let us die and say so, and not try to have ourselves and others believe we are going to glory, when an ounce of common sense would reveal the fact that we are rushing towards oblivion. Can Methodism afford practically to step down and out of the position she holds as an educating power? Surely not. She has duties toward God, toward the brave and noble young men and women who are proud to bear her name, and the common weal, which she cannot with impunity refuse to perform. I think I risk nothing in stating that she has under her care more of the young men of Ontario than

any other Protestant Church. Will she refuse to place before those young men a ladder on which they may rise to the greatest degree of influence, and thus prove a benediction to both Church and State? It cannot so be thought. She will do her utmost for the youth growing up under her care. That is her plain duty. To step back from that is to prove untrue to herself. It is to weaken her very heart. Now, as I see it, should she fail to maintain a university in Ontario, or should she maintain her university in a state of inefficiency, she will do anything but the best for all concerned. Her ministers will not be as likely to graduate. As it is, there is no very strong pressure brought to bear on the student for the ministry in favor of the *Arts* course. Indeed, I have heard students declare that, when they arrived at Victoria, they were advised to take theology in preference, and that they deeply regretted acting according to such advice. Men are men; and we can expect it no better, but rather worse, when the student wishing to take the *Arts* course will have to go to the State college for the heart of it. Theology will be taught in Victoria Divinity School, and, unless in exceptional cases, the result will be that the student for the ministry will study but theology and some special subjects. The result will be that Methodist ministers will not keep pace with the intellectual development of our times, and this will react on the youth of Methodism. A thoroughly educated ministry give an intellectual inspiration which a half educated ministry cannot. The fact that we have a university doing fair work is an inspiration to our Methodist youth. If we had one doing work second to none on the continent of America, it would transform the rising generation of Methodists. But if we give up what we have, and sink to the position of a Divinity School, it cannot do otherwise than cast a chill over Methodism. Our youth will have less confidence in Methodism, and Methodism will have less confidence in herself.

I would like to mention in this connection that even the advocates of the movement do not say that *per se* it is the best thing for Methodism. They tell us it is best in existing cir-

cumstances, or that the best must be made of the situation: but I have never heard an advocate of the scheme say that it is the best for "Methodism in earnest." This is instructive. It means that, if Methodism would but make Victoria all she should be, then she should maintain her university intact; but inasmuch as she is not likely to do that, it is better to go into confederation. I think I put the case fairly. I believe that if those who advocate confederation were sure that Methodism would efficiently sustain Victoria, they would advocate a policy differing widely from the one which now lies so near their hearts. They really at heart believe it that it would be in the interest of Methodism to continue her university work if she would but do it efficiently.

Now, I hold that they do Methodism great wrong. Why did they not first show Methodism her interest and ask her—yes, urge, beg, beseech her—to do her duty? But Victoria's need has never yet been clearly placed before the Methodist people of this Dominion. The Methodists who do not know what Victoria needs to make her thoroughly efficient, or, indeed, whether she needs anything or not, may be counted by the thousand. There are many who have studied in her halls, who have very little knowledge of her financial condition. They have heard she needs money, but what amount she needs, for what she needs it, and what she is doing with what she receives, these are matters concerning which little is known by the Methodist public. Let our people know what is needed to make Victoria efficient, and let them know that Victoria is a blessing to Methodism, and they will give the money. They never fail. Surely a Church which raises two hundred thousand dollars annually for missionary purposes will not fail to sustain her university. It may be said that she is eminently a missionary Church. So she is. But even in Japan she has now established a university, showing conclusively that she regards herself as a teaching Church no less than a preaching Church. It would be very strange, indeed, if at the very time she established a university in Japan, she should practically give up her

university in Ontario. But I have hope that Methodism will do no such thing. She has not been heard from yet. And it is strange that the leaders in the confederation movement should have accepted the basis even with some amendments. It seems so precipitous action. Queen's wisely decided not to give a final reply till her benefactors and graduates could be heard from. Why could not Victoria have done likewise? Victoria boasts of fourteen hundred graduates, in whose hearts she truly lives; now why did she not withhold her decision in so important a matter, until her graduates could be heard from? Would they not thus feel deeper sympathy in our university whatever might be its destiny? Would it not have been well to have waited till after the Conferences of the Methodist Church should have met? In a matter of such importance, would it not have been well to have withheld decision till after the next General Conference? All these bodies will likely discuss the question yet. Is it right to put the Church in such a position that, even should she know that it is in her interest, she will find difficulty in opposing the scheme? The fact that there is no hope of Queen's entering the confederation, and very little, if any, of Trinity, ought to act as a warning to Victoria. If the scheme were the best thing for all concerned, others would not fail to see it. But what does Victoria need? Does she need change of scenery? I think not. All this talk about city privileges, etc., is so much moonshine. Students have four months every year in which, if they will, they may acquaint themselves with practical life. And these very months are the months in which they can hear public lecturers if they are so disposed; but in the eight months in which they attend college lectures they have emphatically no time for anything else. The best students seldom go to hear a lecturer unless he is exceptionally good, even when such lecturer visits Cobourg. The best students do not attend the theatre. It makes very little difference to the really good student where the university is. It is of vastly greater importance *what it is*. Let Victoria be made better than the best university in the Dominion, and

the fact that she is situated in a quiet country town will score one in her favor. What does she need? Money? Yes, as a means to an end. What Victoria needs above all things is men. She needs a man who can and will teach Honor Metaphysics, a man in Honor Mathematics, and a man in Honor Classics. These need to be thorough men—men who can and will teach, who will literally live for the students. We have some such, but need more. Give Victoria a thorough staff of picked men and she will live and flourish anywhere. Give her the wealth of Croesus and place her in Toronto, and unless she has thorough men in every department she cannot maintain a vigorous life. It is in the interest of Methodism in this Dominion, at any cost, to secure the very best instructors for her sons. If they cannot be found in the Dominion by all means let her import them. Her right to live depends on the work she does: the work she does depends in no small degree on her teaching staff. I need not say that, in their selection, she should exercise the greatest care. But in order to secure the very best instructors money is needed, for thoroughly efficient men are rare. How can we get the money? The answer is not far to seek. It was said of the first Methodists that the cause of their success was to be found in the fact that "they were all at it, and always at it;" let Methodism be so inspired with the paramount importance of maintaining our university that the people will have a mind to work, and it will be done. But in order to organize and supervise the work a thorough man is needed—a man who is strictly loyal to our educational institutions, who will sacrifice his time, and, in a word, will live but for the intellectual advancement of Methodism. Let such a man be entrusted with the oversight and direction of our whole educational work; let our loyal graduates, our self-denying ministers, and the whole body of our generous laymen aid him as one man, and there is a future before Victoria and before Methodism in this Dominion the brightness, the grandeur, and the potentiality for good of which it would be difficult to portray. A crisis is upon us. Shall we turn our back on the

majority of our graduates, on the benefactors of the university who gave liberally out of their poverty? Shall we prove untrue to the youth who have grown up among us? Surely not. I am persuaded of better things from Methodism. She is always equal to her duty, and will not fail in this emergency.

Thanking you for your space, and hoping that Nova Victoria may become the pride of Methodism, I subscribe myself

JACOB.

THE HEAVENS ILLUSTRATING THE ATTRIBUTES OF GOD.

BY BISHOP WARREN.

(*Third Paper.*)

WE have considered minuteness, vastness, speed, time, and power, as declaring in their own imperious language the attributes of God. Now, lest terror be proportioned to a perception of such terrible power, look at the heavens as significant of God's attributes of beauty, goodness, wisdom, and love.

Beauty is everywhere. Little shells, no larger than grains of sand on the surf-beaten shore, are beautiful in form, color, and arrangement; tiniest seeds of hardly observed grasses, blown about and trodden under foot of men, when seen under the microscope, are surpassingly beautiful, and each seed has its own peculiar beauty of color and form. What can be appreciatively said of the flowers that break out of the spiny cactus and make the dreary desert gorgeous as the sunset? of those that follow the retreating foot of the glacier and ice field far up the Alps, and wait not a day for snow and death to be replaced by blossoms and life? what of myriads of them where the eye of man never gazed, and that bloomed ages before the foot of man ever trod the world? Of course, all fruits could have been grown without a single flower—apples with no vast bouquet of fragrance impregnating the delighted air, peaches with no more blush of blossoms than has an acorn; but those creative processes for purposes of fruit and ornament declare that the Creator has love of beauty as well as attributes of power.

From before the window where I write, in defiance of sanitary science for eyes, but in obedience to conditions of rapture for soul, stretches first a plot of tens of thousands of roses of different varieties, and other flowers. Under them lies a carpet of fallen petals. Among them plays a family of my summer friends, the humming-birds, gorgeous with burnished gold and blue, alive with the very poetry of motion, now hanging perfectly still on invisible pinion before some newly discovered beauty of a flower, now darting perpendicularly upward a hundred feet on songful wing, now hurling themselves downward, now sipping a dewdrop sweetened with honey of the flower in whose bosom it had lain all night. They are the very ideals of every possible beauty of color, form, and motion—flowers cut loose from the stem, and thrilled with a little more life. Beyond these flowers, alive and more alive, lies a landscape of groves and trees, beautiful with vast variety of leaves, blush apples, purpling grapes, mellowing figs, ripening almonds, luscious peaches, and glowing lemons. Then comes a middle ground of the sea, with breakers of light leaping over the reefs; and beyond lie the clear hills of another shore, twenty miles away, and beyond that the freshly created glory of a summer sky. Man never made any of this, from rose-leaf, humming wing, and sunrise color to the grand mountains and sea. But He who did make it must have had a perception and love of beauty and a power to create it. There is so much beauty in flowers that they as conclusively teach God's attributes as do the worlds.

“Not worlds on worlds in phalanx deep
Need we to show that God is here;
The daisy, fresh from winter's sleep,
Tells of His hand in lines as clear.”

This part of the heavens is in no sense unique in its manifestation of God's beauty. Every other planet has sunrises and sunsets; the very suns are colored in brilliant variety, till every observer may feel like the Peri,

“The stars themselves have flowers for me.”

Easily can he stand upon this pedestal of actual fact and say :

“Glories upon glories
Hath our God prepared,
By the souls that love Him
One day to be shared.”

“Eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love Him.” No wonder the Psalmist, desiring the work of His hand to be made permanent, prays as a means to that end, “Let the beauty of the Lord our God be upon us.” Instances of the wisdom of God, as seen in the heavens, have constituted a large part of man’s discoveries therein. Indeed, every discovery man has made is but a finite fragment of the infinite wisdom God has always had. Reference to an eminent example or two was designed, but this paper would thereby be too extended. After six thousand years of study, and finding that every discovery only opened doors to greater and greater wisdom, man is obliged to continually say, with Isaiah, “Who hath directed the Spirit of the Lord, or, being His counsellor, hath taught Him? There is no searching of His understanding.” His thoughts are higher than our thoughts, “as the heavens are higher than the earth.” And with the Psalmist, “Great is our Lord and of great power; His understanding is infinite.” While God insists that the invisible things of Him, even His eternal power and Godhead, are so clearly seen by the things that are made that the heathen are without excuse, He also holds that the universe also adumbrates His love. Of course, a theme so high could only be clearly revealed by a loving Christ, crushed under the world’s woes and dying under the weight of its sins.

If the world had been made for an end, as a thing pleasing to God, or for the admiration of angels, it would have been put at its best by creative fiat. But obviously it was made as a means of developing man. Animals cannot bring out its capabilities. They cannot turn soil into fruit, coal into heat, water into steam, ore into steel and gold. But man is to be developed by

developing the earth. He is to become kingly by doing a king's work, by exercising dominion, by handling lightning, and in everything evoking perfection. It is the best possible world love could give man, as He is to make him what he may become. In it has been put food, beauty, strength, steel, steam, lightning, no one of them in a condition for a babe to appreciate, but every one in a condition to develop a babe into a man, and make him the king of an empire as broad and as rich as he is willing to create. This is just what true love would do. Then the heavens about him are shining stairs up which his soul may climb, and hang his mental trapeze between Acturus and the Polar Star, and swing himself clear out of this system of suns to where gravitation stops and turns the other way to systems yet unknown. All is planned in love to make the most of the infant man.

If a boy were told that his absent father had made the famous Strasburg clock, and left it to signify to the son his skill, wisdom, and affection, how eagerly would he study its curious mechanism! Suppose he had no help in studying this manifestation of his father but the clock itself, as man has the universe. Very likely, in his earlier days, he would find nothing so interesting as the shrill crow of the wing-flapping cock. Next he would observe the chiming of the quarters and hours: then he would discover that at some hours the bells were struck more times than at others, and at certain ascertainable times some figures came out and went through deferential obeisances to another figure. But how far the boy of twenty is from understanding the secrets of these movements and sounds—how pinion fits into rack, how exceedingly slow movements are speeded into velocities!—how far from understanding the use of bevelled pallets for escapement, compensation balance, mercurial or gridiron pendulum! and how much farther from understanding the processes by which steel and brass are brought from ores into fitness to embody the thought of his father! All the while there are certain dials, with strange figures, “with cycles and epicycles scribbled o'er”—there are

movements so slow that they have not been discovered by him yet. How little does he know that they mean lunar changes, secular irregularities, positions of planets, and precession of equinoxes, and how infinitely less does he know of the celestial entities that these pieces of graven brass signify! When the boy becomes a man, if still unhelped by other men, he has scarcely begun to know the attributes of his father; and if helped by a thousand men in mechanism, literature, astronomy, and all sciences, he has perhaps comprehended the wisdom and equalled the skill of his father. At all events he has learned that his father's love is best shown, not by hidden deposits of gold for buying food or luxury, but by the incentives and means of making him a man to whom all food and favor would naturally flow because of his large thought and kingly soul.

The universe, as an object-lesson of the attributes of man's Heavenly Father, is as much more difficult to master as God is greater than man. Man first finds fruits and other foods, ascribing the getting to himself. One by one he discovers perfect time, most delicate mechanism, power of life in seed, grandeur worthy of a God. He infers infinite painstaking, carefulness, strength, wisdom, goodness, and love; and, knowing that nothing short of immortal life and best possibilities of expanding mind and heart can be fit objects of such attributes, he becomes able to have faith that they are all exercised for him—comes at length to the incredible faith that infinite love might love him enough to die for desire of him, and thenceforth walks in fearless and immortal hope, saying :

“O, little heart of mine,
Can pain or sorrow make thee moan
When all this 'God is all for thee,
A Father all thine own?”

SILENCE never shows itself to so great an advantage as when it is made the reply to calumny and defamation.—*Addison*.

PEDANTRY crams our ears with learned lumber, and takes our brains out to make room for it.—*Colton*.

DARWIN ON EARTH-WORMS.

(Continued from page 336.)

BUT to turn to the particular volume before us, the reader will find in it a condensed display of all these characteristic qualities. Perhaps, indeed, part of its excellence is due to a legitimate exercise of the very quality, which in another respect Mr. Darwin seems to us to have unduly indulged. Notwithstanding what we have said above in depreciation of the mental habit which Bacon stigmatized as "anticipation," it must be admitted that Mr. Darwin has abundantly justified the employment, in its due place, of what Prof. Tyndall has described as the function of the imagination in science. A more conspicuous exercise of the scientific imagination than that which gave rise to this book cannot easily be conceived. It appears from it that at the very commencement of his scientific career, fifty years ago, some casual observations suggested to Mr. Darwin the idea that worms were possibly among the most considerable forces in nature, and that they had played a very large part in the natural history of the world. To how few persons could such a conception have occurred! It would be one thing if, as the result of years of laborious enquiry, the conviction had been slowly forced on a naturalist, that worms had played this part in nature; but it is another thing that Mr. Darwin divined it from a few facts and proceeded to work out the evidence for it. He acknowledges, indeed, with his usual justice, that he received the first suggestion of the idea from Mr. Wedgwood, of Maer Hall, in Staffordshire. But Mr. Wedgwood seems to have applied it only to the explanation of the sinking beneath the earth of bodies lying on its surface, while Mr. Darwin appears at once to have sprung to the imagination "that all the vegetable mould over the whole country has passed many times through, and will again pass many times through, the intestinal canals of worms," so that the term "animal mould" would be in some respects more

appropriate than that of "vegetable mould." Mr. Darwin must have been already deeply imbued with the cardinal idea of his subsequent investigations to have entertained such a conception. Not merely to unscientific but to scientific men the earth-worm had hitherto appeared one of the most insignificant of all creatures. As we have already noticed, distinguished French naturalists almost scorned Mr. Darwin's suggestion when it was first propounded. Even as late as 1869, Mr. Darwin tells us, Mr. Fish, in the *Gardeners' Chronicle*, rejected his conclusions with respect to the part which worms have played in the formation of vegetable mould, merely on account of their assumed incapacity to do so much work. "Considering," said Mr. Fish, "their weakness and their size, the work they are represented to have accomplished is stupendous." Mr. Darwin's observation on this objection is characteristic and instructive, and indicates the connection of his study of this subject with the main work of his life. "Here," he says, "we have an instance of that inability to sum up the effects of a continually recurrent cause, which has often retarded the progress of science, as formerly in the case of geology, and more recently in that of the principle of evolution." But if it was rash to doubt in 1869 a theory supported by Mr. Darwin's authority, and confirmed by the striking proofs he had already adduced of the immense effect produced in nature by the accumulated effect of small causes, it was none the less one of the boldest strokes of the imaginative faculty—unless we should call it an extraordinary exercise of the scientific instinct—to discern in the burrows and the castings of worms the instruments of some of the most important of all the changes which the surface of the earth undergoes. It may be doubted whether anything in Mr. Darwin's work exceeds in brilliancy this faithful conception; and it is only equalled in merit by the patience with which, through all the subsequent years, he has gradually accumulated the evidence, and at length, in his old age, presented to the world in this fascinating volume. Bacon has somewhere said that "God hangs the heaviest weights on

the finest wires," but we know of no such illustration of the truth as is afforded by the facts here established.

Mr. Darwin commences with an account of the habits of the humble creatures whose feats he is to describe. They seem to flourish wherever there is any moisture in the soil. A layer, though a thin one, of fine earth, Mr. Darwin believes to be necessary for their existence; and he also thinks the mere compression of the soil in some degree favorable to them. They must be considered terrestrial animals, but they are in one sense semi-aquatic. Exposure to the dry air of a room for only a single night has been found fatal to them, whereas several large worms have been kept alive for nearly four months completely submerged in water. When the ground is dry in summer, or when it is frozen in winter, they penetrate to a considerable depth, and cease to work. They crawl about chiefly at night, though usually with their tails still inserted in their burrows. Their bodies are armed with short bristles, slightly reflexed; and with the aid of these bristles and an expansion of their tails they hold so fast, that they can seldom be dragged out of the ground without being torn to pieces. Mr. Darwin confirms, however, the observation of White, of Selborne, that they do completely leave their burrows by night in certain circumstances. In the morning, after heavy rain, the film of mud, or of fine sand, over gravel walks is often plainly marked with their tracks. Mr. Darwin has noticed this from August to May, and he thinks it probably occurs during the remaining two months of the year when they are wet. He doubts, from what he has observed of their organs of sense, whether a worm could find its way back to its burrow after having once left it; and he thinks that they leave their burrows, as it were, on a voyage of discovery, and thus find new homes. They have one habit to which they are greatly addicted, and which seems a curious exception to the law of the development of habits with a view to self-preservation. They will lie for hours almost motionless close beneath the mouths of their burrows. Mr. Darwin does not think they

do this for the sake of breathing fresh air, since, as we have seen, they can live a long time under water; and he believes they lie near the surface for the sake of warmth, especially in the morning. But the result is that they present themselves in the most convenient position to the birds which feed on them. "This habit," says Mr. Darwin, "of lying near the surface leads to their destruction to an immense extent. Every morning, during certain seasons of the year, the thrushes and blackbirds on all the lawns throughout the country draw out of their holes an astonishing number of worms;" and this could not be done unless they lay close to the surface. We cannot but observe, in passing, that if this be so, it would seem that we have an instance of a tendency which is unaffected by "the struggle for existence." The battle between worms and birds has not led, as might have been expected on the principles of Natural Selection, to the development of a race of worms which do not lie near the mouths of their burrows. They continue to present themselves as food for their foes; and they multiply in sufficient numbers to render the devastation thus wrought among them insignificant. It may well be surmised that their productive power of species is in many other instances similarly sufficient to render unnecessary, and even to supersede altogether, the development of special characteristics for the purpose of maintaining the "struggle for existence." In such species there is practically no struggle for existence. No matter how many individuals may be destroyed, there are abundantly sufficient remaining to perpetuate the race without any modifications. We should imagine, for instance, that nothing would be more superfluous than for herrings, as a species, to disturb themselves about the struggle for existence. They solve the problem by an unlimited capacity for breeding.

Of all the senses of worms, that of touch seems the most highly developed; and Mr. Darwin seems inclined to believe that, by moving about the anterior extremity of its body as an organ of touch, a worm is enabled to gain a general notion of the form of an object. Their sense of smell is feeble, but they

seem to be able to discover by means of it strong-smelling foods, of which they are fond, such as onions and decayed cabbage-leaves. In respect of food, however, they are omnivorous. Their importance in the economy of nature depends mainly on the fact that they swallow an extraordinary quantity of earth, extracting from it any digestible matter which it may contain. They also consume a large quantity of half-decayed leaves of all kinds, and fresh leaves also. They will eat sugar and liquorice, dry starch, raw and roasted meat, and, above all, raw fat. They are, moreover, cannibals, for Mr. Darwin found that two halves of a dead worm, placed in their pots, were dragged into their burrows and gnawed. However, they live chiefly on half-decayed leaves, which they moisten before devouring with a fluid which they secrete; the effect is to disintegrate the leaves, and thus partially to digest them; and Mr. Darwin knows no other instance of partial digestion outside the stomach.

Such are the creatures whose agency in modifying the surface of the earth it is Mr. Darwin's object to elucidate in this work. They are found in all parts of the world, and some of the genera have an enormous range. Their agency is therefore practically universal, and the facts Mr. Darwin establishes have a proportionately wide application. The question is, to what it practically amounts; and to determine this by indisputable evidence was Mr. Darwin's main design. The interesting details we have sketched respecting the habits of worms are merely incidental and introductory, the main point at issue between Mr. Darwin and his previous critics being whether, as a matter of fact, worms perform the immense amount of work with which he was disposed to credit them.

As a summary of several experiments, Mr. Darwin states that the thickness of the mould accumulated over objects left on the surface in the course of ten years was in one case 2.2 inches, in another nearly 1.9 inches, in another 2.1 inches, in another 2.2 inches, and in a fourth, where the soil had for some years been in a condition unfavorable to worms, .83 inch. It will be seen that in all these cases, except the last, the amount

of earth brought to the surface during the ten years is somewhat greater than would be estimated from the castings actually weighed: but this may be partly accounted for by the loss which the weighed castings had undergone, and partly by the consideration that earth is brought to the surface by other agencies besides worms, such as burrowing insects, ants, and moles; while in some places even the wind, by carrying dust from one place to another, appreciably adds to the surface mould. On the whole, the results obtained by these two independent methods are sufficiently in agreement, and leave no doubt whatever of the large amount of earth which the worms are perpetually bringing up to the surface. It may appear at first surprising that their work should be so uniform as to bury objects in such horizontal layers; but, not to dwell on the action of wind and rain, this seems in great measure accounted for when we learn the extraordinary number of worms which live within a given space. Mr. Darwin quotes a German authority for an estimate that 53,767 worms exist in an acre of land. But this estimate was founded on the number found in gardens, and the same authority believes that about half as many live in cornfields. In short, there seems good evidence that on each acre of land adapted for the work of worms a weight of more than ten tons of earth annually passes through their bodies and is brought to the surface. In England and Scotland the land which is cultivated and is well fitted for these animals has been estimated at 32,000,000 acres. The astonishing but inevitable conclusion is, that in Great Britain alone no less an amount of earth than 320,000,000 tons is annually brought by worms from underground to the surface of the earth. Well may Mr. Darwin lay stress on such an illustration of the enormous effects which may be produced by continually recurrent cases, however small.

With these facts before us there can be no difficulty in realizing the part which worms have played in the burial of ancient buildings. They have thus, as Mr. Darwin observes, been among the best friends of archæologists. Coins, gold orna-

ments, stone implements, and similar objects, dropped on the surface of the ground, are infallibly buried by their castings in the course of a few years, and are thus safely preserved

Among the most careful of the experiments recorded in this volume are some which were designed to estimate the result of the removal of worm-castings. It was found that on a surface with a mean inclination of about ten degrees, 240 cubic inches of earth ejected by worms would cross in the course of a year a horizontal line one hundred yards in length, an amount which would weigh in a damp state nearly twelve pounds. A considerable amount of earth is thus continually moving down each side of every valley, and in time reaches its bed and is carried by the river flowing through it into the ocean. It is known from the amount of sediment annually discharged into the sea by the Mississippi, that its enormous drainage area is being steadily lowered by .00263 of an inch each year—a rate which would suffice in four and a half million years to lower the whole area to the level of the seashore. So that, if a small fraction of the layer of fine earth which is annually brought to the surface by worms is carried away, “a great result cannot fail to be produced within a period which no geologist considers extremely long.”

Not less interesting and useful, however, though on a less stupendous scale, is the work performed by worms in preparing the ground for cultivation. By periodically exposing the mould to the air, by sifting it so that no stones larger than the particles which they can swallow are left in it, and by mingling the whole intimately together, they do the very work which a gardener would prescribe in preparing fine soil for his choicest plants. “The bones of dead animals, the harder parts of insects, the shells of land molluscs, leaves and twigs, are before long all buried beneath the accumulated castings of worms, and are thus brought in a more or less decayed state within reach of the roots of plants.” The leaves worms drag into their burrows are torn into the finest shreds, partially digested, saturated with their secretions, and then commingled with earth; and it

is this earth which forms the so-called vegetable mould. Add to this, that worm-burrows very probably aid materially in the drainage of the soil, allow the air to penetrate deeply into the ground, and facilitate the downward passage of roots. Seeds, moreover, often owe their germination to having been covered by castings, and others are buried until they are accidentally uncovered at some future time, and then germinate. Not the least striking passage in the book is the following paragraph, with which Mr. Darwin concludes it :

“When we behold a wide, turf-covered expanse, we should remember that its smoothness, on which so much of its beauty depends, is mainly due to all the inequalities having been slowly levelled by worms. It is a marvellous reflection that the whole of the superficial mould over any such expanse has passed, and will again pass, every few years through the bodies of worms. The plough is one of the most ancient and most valuable of man's inventions ; but long before he existed the land was in fact regularly ploughed, and still continues to be ploughed, by earth-worms. It may be doubted whether there are many other animals which have played so important a part in the history of the world as have these lowly organized creatures. Some other animals, however, still more lowly organized—namely, corals—have done far more conspicuous work in having constructed innumerable reefs and islands in the great oceans : but these are almost confined to the tropical zones.”

Such are the main results of this mature and masterly contribution to Natural History. It will be seen that its excellence and its value consist not merely in the sagacity and genius with which a most unexpected and, as some thought, far-fetched idea has been worked out, but in the patience and persistency with which the idea has been verified by incontestable experiments and observations. Mr. Darwin is here on the strongest ground of his genius. He tells us not merely, as in some other of his writings, what he can conceive may be done by forces of which he can partially follow the operation, but what, beyond question, actually is done. There can no longer be any doubt that the insignificant creatures, which have been proverbially quoted as types of worthlessness and degradation, have rendered, and are still rendering, incalculable services to the human race, and to the development of the surface of the earth and of the history of the world. The perpetual emblem of mortality

and destruction—"The worm is spread under thee and the worms cover thee" (Is. xiv. 11)—is found to be also a regenerative power in nature. We cannot but conclude with one suggestion, which seems naturally to arise out of such a wonderful narrative. Is the accomplishment of such enormous results by an agency so insignificant, but at the same time so exactly adapted to the work to be done, explicable on any other supposition than that of positive design? It is observable that in this book we do not find any suggestion of the influences by which so singular an agency can have been evolved by natural selection. These infinitely numerous little ploughs seem to be expressly provided to prepare the earth for the sustentation of plants and of other animal life, and for no other purpose whatever. We can remember no more vivid illustration of the old argument which infers, from the perfect adaptation of means to ends, the action throughout nature of a Divine wisdom and will.

THE attendance at the various German universities during the summer semester of last year was: Vienna, 4,706; Berlin, 4,145; Leipzig, 3,230; Munich, 2,511; Prague, 2,000; Halle, 1,716; Tübingen, 1,500; Breslau, 1,481; Bonn, 1,241; Würzburg, 1,232; Göttingen, 1,100; Heidelberg, 989; Königsberg, 925; Freiburg, 924; Jena, 636.

THE entire object of true education is to make people not merely *do* the right things but *enjoy* the right things; not merely industrious, but to love industry; not merely learned, but to love knowledge; not merely pure, but to love purity; not merely just, but to hunger and thirst after justice.—*John Ruskin*.

WHEN we know how to appreciate a merit, we have the germ of it within ourselves.—*Goethe*.