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REPORT OF COUNCIL.

Your council takes pleasure in submitting its report for the season of 1897-98.

During the session now closing there have been held four meetings of the council and nine of the general association, six regular and three special.

At eight of these meetings papers were read and discussed, as follows:

NOVEMBER 11TH, 1897—"Inaugural Address,"—President A. Alexander, F. S. Sc.

FEBRUARY 10TH, 1898—"Nerve Cells in Rest and Fatigue, and in Decay,"—Prof. A. B. Macallum.

FEBRUARY 24TH, 1898—"The Scriptures of the Sky,"—John A. Paterson, Esq.

MARCH 24TH, 1898—"Biological Notes,"—Wm. Yates, Esq.

MARCH 24TH, 1898—"The Field of History,"—Rev. H. S. Beavis, D. D.

APRIL 7TH, 1898—"Field Notes,"—Wm. Yates, Esq.

APRIL 21ST, 1898—"Chemistry in its Application to Trade,"—F. J. Smale, Ph. D.

MAY 5TH, 1898—"Imagination in Literature,"—J. A. McLellan, M. A., LL. D.

MAY 5TH, 1898—"Field Notes,"—Wm. Yates, Esq.

JULY 13TH, 1898—"Chaucer, His Life, Times and Work,"—H. B. Witton, Sr.

During the year one honorary and twelve ordinary members have been elected, one member has resigned and one has been removed by death.

T. W. Burgess, M. D., who so ably represented us at the last meeting of the Royal Society of Canada, has kindly consented again to act for us at the coming meeting of that society.

All of which is respectfully submitted,

A. ALEXANDER,
President.

S. A. MORGAN,
Secretary.

THE SCRIPTURES OF THE SKY.

Read before the Hamilton Association, February 24th, 1898.

BY JOHN A. PATERSON, ESQ.

Out of the vast plenitude of worlds that fill space, our attention is more immediately centred in that family of worlds that lie grouped around the sun. These worlds are called planets and the family is called the solar system. Like a fleet of many boats rocked in the ocean of the heavens, the earth and her sisters float in the bosom of space bound to the central sun by that mysterious cable known as the force of gravity. This is the same force which guides the linnet's feather as it flutters earthward, and at the same time reins in the mighty Sirius as he rushes through the abysmal depths of space. The earth is 8000 miles in diameter. Her distance from the sun is, according to the most recent results, 92,790,000 miles. She moves in her orbit at a rate of 18 miles every second of time, and so gently, not a jar to waken the tiny fledgling in the nest that swings upon the twig, and not a tremor to empty the chalice of the hare-bell of its beads of dew.

The diameter of the solar system, at the present known as far as Neptune faintly shines, is 5,578 million of miles. Across this vast space a beam of light travelling at a rate of nearly 200,000 miles a second would take 8 hours and 19 minutes to pass. But vast as this diameter really is compared with the size of our earth, it dwindles into insignificance when compared with the distance of even the nearest fixed star, from which light takes over 4 years to reach us. The most reliable measurements place Alpha Centauri, the nearest of the fixed stars, at a distance of 275,000 times the distance of the earth from the sun. Let us consider for a moment how we should appear or more exactly not appear could we get off our world and scan it

from without. If distance could thus reduce for us the scale upon which the universe is fashioned to one we could take in, on such a one the earth would be represented by a good sized pea, the moon by a grain of sand, circling around it at a distance of 7 inches, the sun, by a globe 2 feet in diameter, 215 feet away. Mars, a much smaller pea, would circle around the 2 foot globe 325 feet from its surface; Jupiter, an orange, at a distance one-fifth of a mile; Saturn, a small orange, at two-fifths of a mile, and Uranus and Neptune, good sized plums, ¾ mile and 1¼ miles away respectively. On the same scale the nearest star would lie 8,000 miles off, and an average 3rd magnitude star at about the present distance of our moon. That is, on a scale upon which the moon would be but 7 inches off, the average star would be still as far from us as the moon is now, or 240,000 miles away. Alpha Centauri is very near us, comparatively most of the stars are at least ten times as far away and many of them thousands of times farther off. Polaris, which we all know as the North Star, is 36 light years, the light by which we see it to-night left it in 1862, and the light which leaves it at this moment will not reach us until babes now born have grown to man's estate. To describe in miles the scale upon which the universe is built would be useless, the mind would merely feebly struggle with bewildering groups of figures and at the best grope in the gloom of a multiplying and ever multiplying jargon of statistics. Even when we take as our foot-rule the sun's distance from us of 93,000,000 miles it does not help us when we take as our unit of measurement the distance light travels in a year or a light year as it is called, even then we are bewildered in a whirl of darkness and difficulty. Were we to-night, on some viewless courser of the air, to wing our way to any of the bright stars which clip us round about, sweeping away from our own system until earth vanishes and planets melt away, and finally the sun wanes into a mere star and alight upon some new world that circles round the mighty Sirius, that monarch of suns, which measures 7000 of our suns in volume. Let us pause and look out then upon the heavens. We have crossed a gulf of 60 trillions of miles across which a

beam of light would take 9 years and 10 months to leap. We have reached a new earth; we would expect to reach a new heaven. We lift up our eyes, and there yet we see the old familiar constellations The Pleiades, "like a swarm of fireflies tangled in a silver braid," shine down on us yet. Orion blazes there with his gorgeous belt, the pale daughter of Andromeda, still as here displays her trembling jewels. Acturus, still from his sentinel out-look, watches the Great Bear which there, as here, points out our earth's Polaris. All is unchanged and the abysmal distance we have crossed is only a fraction of the entire diameter of the stellar system and yet the change wrought by this mighty journey in the appearance of the heavens is no greater than would be produced in the relative position of the persons, comparing this audience to a person near its centre who shall change his seat with his immediate neighbor. The leaves of many trees in the vast African forests are preyed upon by minute insects and each of these has its own little retinue of parasites. If one of these monads were destroyed the forest would still flourish as gloriously as ever, its strength would be as unabated, its beauty as undimmed, and its vastness as undiminished—the little monad's destruction, important no doubt to itself, would be as nothing in the forest. And this is only a faint, a very faint comparison to what would be the apparent result in case the besom of the Almighty's wrath were to sweep from the universe our earthly dwelling place—it would be naught but the disappearance of a little speck from the field of created things which the hand of His omnipotence has so profusely thrown around Him. Is then space infinite? Is space a circle whose centre is everywhere and whose circumference is nowhere? And yet God magnified himself in the flesh for the salvation of so paltry a world. And yet the Son of God put on the form of our species and sojourned amongst us and shared in all our infirmities and crowned the whole scene of humiliation by the disgrace and the agonies of a cruel martyrdom. When I look through a telescope into the depths of space I feel overwhelmed with awe, for I know God has written His word here in these scriptures of the sky, and gazing into that

abyss is akin to entering into a vast cathedral and reading in some far away crypt a new manuscript traced by God's own finger in brilliant letters to reveal to the travelling sons of men the methods of His creative power and to exhibit fresh proofs of His most holy and lofty attributes.

To an expert mathematician the investigation of astronomical worlds is a very paradise. To a popular audience a mathematical treatment of this subject would be most forbidding; but if we consider the subject, not so much in its profound and recondite details as in the results to which it attains, the magnitude and importance of the subjects it treats of, and the beauty and grandeur of the phenomena it investigates, we shall have to acknowledge that some time or other in the ponderous times of astronomical science there must lie buried embodiments of interest which need no enchantress to arouse them to life, and which, having burst their cerements, became clothed with beauty and glow with life. The science which projects itself through the illimitable fields of space seizes with its wonderful analysis a system of revolving worlds mutually operating on each other, measures their magnitudes, weighs their masses, declares their distances, calculates their motions and tabulates their positions at the close of a thousand revolutions yet to come; the science which grasps the orb by the beam of light which left it ten thousand years ago and traces its movement; the science which with reverent eye gazes into the very counsels of the eternal and with devout finger writes down His creative methods; such a science cannot fail to interest, to enchant, to arouse. Do we want poetry? It is here written on the sable skirts of the night in letters that have never faded since "the beginning" and will form an eternal blazon till time shall be no more. Do we want architecture? We have it, but it is the column and the architrave bound together with the adamantine grasp of gravitation and crowned with starry clusters. Do we want eloquence? We have it, but it is the heavens that declare the glory of God —day unto day uttereth speech and the resistless sweep of their praise ceaseth not. Do we want music? We have it, but it is the chorus of morning stars that sing together. Do we want

religion? The orbs around us declare that the government rests upon His mighty shoulders. He sitteth in the circle of the heavens and the reins of the universe are in His hand.

The question of the plurality of worlds is one that strangely fascinates the trembling hearts of the sons of men. It is good for man, this spiritual atom inhabiting a material atom, to have penetrated into the mysteries of creation, but if the universe remains only a great material mechanism moved by physical forces, if nature is at the best in his eyes but a gigantic laboratory, if this matchless, magnificent science of the heavens confines the efforts of the human mind eternally to the geometry of the orbs around us, if the universe is merely an assemblage of inert bodies floating in space and only to be investigated by formulae and diagrams, then, indeed, this science will not attain its end. Can we not go farther; can we not stretch forth the hand and feel under dead matter the throb of life? Bishop Warren says "the universe is God writ large." His empire is one of life and not of death. Are these planets, that with our earth were cradled in the fiery sun and sparkle on the garments of the night, merely splendid sepulchres "cast as rubbish to the void," while this little earth of ours is the only one that pulsates with the waves of life? And is life to be centred here and death there? The voice of reason says no! Analogy proclaims it as an absurdity.

> "Who can believe that the Great Architect
> With all these fires the heavenly arches decked
> Only for show."

The unaided vision shows this earth of ours to be teeming with life, mountain and plain, river and ocean, yea, even the deserts filled with life, and when we turn the microscope to the invisible world below us we see the leaves of plants become prairies for swarms of living molecules who are giants compared to a yet lower order of creatures who feed like parasites upon the larger living atoms. The network of universal life stretches everywhere in this earth. Life here on this little planet is so thronged that it struggles and pants for even a foothold; life

is so exuberant that it pours over as from an over-flowing cup and the slop of life is all around us. It is from this double consideration, the insignificance of this earth in creation, and the abundance the crush of life on its surface, that we rise to the first principles on which the proof of the universal habitation of the heavenly bodies must be fixed. The old idea of plurality of life possessing worlds has risen to a philosophic doctrine. Investigation looks for the easiest and the nearest, and so we turn to the moon. But nothing encourages us here. A dead ruined wreck it seems floating like some abandoned hulk in the vast Atlantic of space, a derelict in the universe, a burnt-out cinder, neither air nor water nor cloud (on the side next us at least), and so not capable of animal life—unless, indeed, the men and women on the moon are so constituted that they can live without air or water—but for all this obedient to the laws of her creation. And because she was so obedient a great discovery was made. It was discovered on the occasion of a certain eclipse that the moon's shadow was no less than 3 seconds behind time in touching the sun's disk. What connection this last should have with the inhabitability of the moon is not at first apparent, but it clears out of the way all the objections that have ever been started against the capability of the moon supporting animal life at its surface. A gap of 3 seconds between observation and calculation could not rest without explanation. A fast express train on an hour's run of 40 miles could be granted at least 2 or 3 minutes grace, but not even 3 seconds could be allowed the moon on a 27 days' run of nearly a million miles.

All the astronomers of the world were soon busy seeking the explanation. After an elaborate analysis a German astronomer, Professor Hansen, found that the moon was not balanced accurately, that the side nearest us and which is always the same side was lighter than the other, the centre of gravity was not the centre of the figure, but 35 miles beyond that and farther from us. Now air and water being free fluids will always flow to the lowest level and therefore they would run round to the other side of the moon and there congregate—this farther

side is never turned towards us, and therefore it is that the conditions of the other side of the moon may be habitable. As to the planets, why we may ask have they received years and seasons and movements and material just like our mother earth? Why do the snows of Mars melt each spring and descend to fertilize its continents? Why exist the clouds of Jupiter which spread freshness and shade over its immense plains? For what purpose is the atmosphere of Venus which spreads like a garment over its valleys and mountains? Dr. Whewell argued that the excessive heat of Mercury and Venus rendered them as unfit for habitation, as the excessive cold would Jupiter and Saturn, and so he drew dismal pictures of icy sterility and giant masses of snow and ice and perpetual fog. But Tyndall has since taught us that heat and cold do not depend so much on distance from the sun as on the atmospheric envelope which folds the planet. Thus the inhabitants of Venus, Mercury and even Neptune may enjoy a climate as kindly as that of our own earth. We know more of Mars than of any of our sister worlds. The conditions of Mars and the earth are analogous.

Vapor has been proved to float in Mars' atmosphere, so water must exist in Mars. Clouds covering extensive regions have been observed to melt away with the progress of the martial day exactly as morning mists fly by the advancing heat of our own summer days. If Mars be uninhabited, then, indeed, it exhibits to us physical relations, fulfilling no purpose that human reason can conceive, lamps lighting nothing, waters quenching nothing, clouds screening nothing, breezes fanning nothing, and everything, mountain and valley, hill and dale, continent and ocean, all meaning nothing. The Creator wastes nothing.

Nature is exuberant, but yet full of economy. These millions of blazing worlds do not roll and shine only for all mortals to gape and wonder at and for a few, a very few, of us to study. God's Son said, speaking to His disciples: "Other sheep I have which are not of this fold." Where are the other folds? Do they float in the liquid blue around us, far, far beyond the lazy-pacing clouds? Is this world the single lost one

that God sent His Son to save and gather into his bosom? And where are the other ninety and nine who never strayed but remained within the fold? Are all the other worlds that blaze upon the brow of night true not only to those material physical forces of the universe that bind our own earth in its orbit, but true also to those spiritual forces that reach out from the great white Throne and from which this earth broke loose? To bring it back there came a day when a life was taken that caused all nature to rock with horror and cast a veil over the sun while heaven echoed with angelic hymns. Sir Robert Ball finds time to discuss this question most scientifically in our Fortnightly Review, and we have that brilliant Frenchman, Camille Flammarin, writing a clever conceit under the heading "Can organic life exist in the solar system anywhere but in the planet Mars?" being a letter from a citizen of Mars, found in a meteorite, wherein it is most conclusively proved that only in Mars can there be life; that the most elementary common sense teaches that the other planets are either too near or too far from the sun, and that our own is alone at the golden mean. A voice comes from Westminster Abbey from the now silent but ever eloquent Laureate, of whose words death cannot rob humanity:

"Venus near her! smiling downward at this earthlier earth of ours,
Closer on the sun perhaps a world of never-fading flowers;
Hesper whom the poet call'd the bringer home of all good things,
All good things may move in Hesper, perfect people's perfect kings.
Hesper—Venus—were we native to that splendor or in Mars
We should see the globe we groan in fairest of their evening stars.
Could we dream of wars and carnage, craft and madness, lust and spite,
Roaring London, raving Paris in that point of peaceful light?
Might we not in glancing heavenward on a star so silver fair
Yearn and clasp the hands and murmur
Would to God that we were there?"

When the law of relative distances was first formulated neither the asteroids nor Neptune had been discovered; these formed blanks in the series two strings were wanting from the lyre. Astronomers at once bent themselves to the task of

searching for a planet to fill the blank. They were sure there was one and so they mapped out that part of the heavens that lay between Mars and Jupiter. Soon Piazzi discovered a star behaving like a planet in the constellation of Taurus, and the astronomers gave out that their work was done and the law had been satisfied the blank had been filled, but other planets were soon discovered at about the same distance from the sun and now about 425 are laid down in the star maps and just where Bode's Law said they ought to be. Some are as small as 20 miles in diameter, the whole together would make a globe about 400 miles in diameter. Once it was thought they were fragments of an exploded planet, but that they had been exploded into more pieces than the asteroids. The masses of the planets are very different and therefore the effect of gravity in bodies at their surface is very unequal. Take for instance any of the mimic worlds among the asteroids. Here is a little pellet of a world 60 miles round, the force of gravity here is 400 times more than on Vesta, in other words, what would weigh 400 lbs. here would weigh only 1 lb. on Vesta. If men are constituted there as we are here then twenty tons would be an easy lift; boys could play at marbles with immense boulders; young ladies could play tennis with rackets as large as a wall and with balls as large as the dome of the Union Station, Toronto, and in fact it could not be done otherwise for an ordinary tennis ball struck on Vesta with moderate force would send it clear off the planet and send it circling round it as a satellite. As new asteroids are being discovered year by year, it may be that they are creating them up at Pallas or Vesta by playing base ball or tennis. If a man leaps up in the air in this earth he would continue to ascend forever were it not that the attraction of earth pulled him back. At Vesta leaping over a house would be an easy exploit; staircases might be abolished forever; a stout old lady could easily jump in a third story window; a summer zephyr would puff her over; a moderate breeze would lift her in its arms and carry her whirling down the street. To counterbalance this and to enable men to have sufficient gravitating power to stand and move they would need to be fifty

times as tall and broad in proportion. They would then have weight enough to live and move and have their being, but consider the results. Such size would bring proportionate strength like Milton's angels, they could tear up hills from their bases and hurl them at their foes and like Titans of old they could pile mountain on mountain. One of these giants could run around his world in a few minutes. The contrary effects would exist in Jupiter; his mass is equal to 1,400 earths; the force of gravitation there would crush us to death, our feet would be so firmly attracted we could not lift them. Jupiter would therefore need to be inhabited by a race of pigmies. Strange indeed it is that the larger the world the smaller its inhabitants must be, that we inhabitants of the earth being men those of Jupiter must be dwarfs and those of the asteroids giants.

Jupiter, the gigantic, is a most interesting object in our southern sky. His four moons have been known since Galileo's day, and in 1892 a fifth moon was discovered. Through a telescope Jupiter with his moons forms a beautiful object, a solar system in miniature. Galileo had difficulty with his contemporaries to persuade them of their existence, many absolutely refused to look through any such diabolical engine as a telescope and so of course they could not be convinced. One of these sceptics, Libri of Pisa, died during the heat of the controversy, and we find Galileo, in a letter to a friend, generously hoping that the way to heaven lay past the planet Jupiter and that Libri might be convinced at last. Saturn, the gloomy Saturn, pursues an immense orbit at a distance of 881,000,000 miles from the sun, turning on its axis in 10½ hours, and has a period round the sun of 29½ of our years. Unless it is a world in a vaporous condition, in merely a formative process, and if inhabited, its inhabitants must experience some strange conditions. The sun is to them no larger than a star, with a day of 10½ hours; the promissory note of a Saturnian inhabitant given say at 30 days will fall due very much sooner than in our commercial world—that circumstance itself must help to fix their character as gloomy or Saturnine. They have seven years continuous spring, seven years continuous summer, autumn

and winter. If there are young people there, they have seven years continuous skating and a lapse of 21 years before the season comes around again. If there are young men there then poets would surely not sing "in the spring a young man's fancy lightly turns to thoughts of love," for the springtimes are separated there by periods of 21 years. If there are young ladies there, it will be no compliment to speak in smooth and finished phrases of a maid of 16 summers, for lo! that would mean, in earth language nearly 480 years, and then most maids are past their bloom and well on to their prime. If we ever dwell in Saturn our poetry will need a revision or perhaps a complete eradication.

When I speak of Mars I do it with hesitancy, knowing how easily we turn from the firm ground of scientific investigation to the slippery path of romantic story. The Edinburgh Review of October, 1896, tells this story: A lady of the inanely inquisitive kind, having met an eminent astronomer, implored permission to ask him *one* question. "Certainly, madam," he replied, "if it is not about Mars." It was about Mars. The popular humor delights in philosophy decked with the charm of conjecture. Anything which is conceivable may be interesting, but science is founded upon the rock of evidence. Far better is it to have many observations and few theories than to have few observations and many theories. Such extraordinary conclusions have been enunciated that one is apt to treat Mars and his observers too lightly. But I bethink myself that Mars is the warrior of the skies, and if astrology be true he may resent any hilarity or even any undue familiarity with his august orb by casting over the life of the speaker or his audience a malefic shadow. And notwithstanding much has been written and spoken to gratify the popular humor, I know that most distinguished astronomers have recorded many things about Mars that lie on the very bed rock of truth. The first hint that the world had of the existence of the water channels, or so-called *Canalli*, in Mars was when an Italian astronomer named Schiaparelli, in 1877, announced this discovery. He affirmed he saw a series of dark straight lines crossing the disk of the

planet and in some cases appearing in couples. He used a glass of 8⅓ inches. The world, however, was anything but prepared for the revelation, and when he announced what he had seen promptly proceeded to disbelieve him. Even to this day the large 26 inch glass at Washington refuses to show these canals. Schiaparelli had the misfortune to be ahead of his time and the yet greater misfortune to remain so. For not only did no one else see the lines at that opposition, but no one else succeeded in doing so at subsequent ones. For many years fate allowed Schiaparelli to have them all to himself, a confidence he amply repaid. While others doubted, he went on from discovery to discovery. What he had seen in 1877 was not so very startling in view of what he afterwards saw. His first observations might well have been of simple estuaries, long natural creeks running up into the continents and ever cutting them in two. His later observations were too peculiar to be explained even by so improbable a configuration of the Martian surface. In 1879 the "*Canalli*," as he called them, showed straighter and narrower than they had in 1877, thus, not in consequence of any change in them, but from his own improved faculty of detection, for what the eye has once seen it can always see better a second time. As he gazed they appeared eight straighter and he made out more. Lastly, toward the end of the year, he observed one evening what struck even him as a startling phenomenon, the twining of one of the canals, two parallel canals suddenly showed where but a single one had showed before. The paralleling was so perfect that he suspected an optical illusion. He could, however, discover none by changing his telescopes or eye pieces. The phenomenon apparently was real. At the next opposition he looked to see if by chance he should mark a repetition of the strange event and then he saw twenty of them double. This capped the climax to his own wonderment and it is needless to add to other people's incredulity, for nobody else had yet succeeded in seeing the canals at all let alone seeing them double. And now we have a map of Mars, drawn as our earth maps are on Mercator's projection, showing regions, canals and oases, all regu-

larly planned and looking marvellously like a lady's silk handkerchief. Down to date we have accurate descriptions and names of 288 features of the areography of Mars. For nine years he labored alone, having his visions all to himself. It was not till 1886 that any one but he saw the canals. In April of that year Persotin, of Nice, first did so, when the great Nice telescope of 29 inch aperture was set up. But it was some time before, even with this large glass, they could be discovered. But suddenly Persotin discovered one of them called the Phison. His assistant, M. Thollon, saw it immediately afterwards. Afterwards they managed to make out several others, some single, some double, substantially as Schiaparelli had drawn them. Since then other observers have continued to detect them, the number increasing every opposition, but even now these fortunate observers are less in number than twenty, and the reason of this is that many of the observatories are not situated under the best atmospheric conditions. It seems to be altogether a question of a glass of moderate power and very clear, and what is most important of all, a very steady air.

To all this Mr. Lowell, of Flagstaff Observatory, in Arizona territory, has added very much. He records that in the early morning of the 7th of June, 1894, he saw two brilliant star points suddenly flash out from the Polarice cap on Mars and soon die away. Just as on earth, travelling in a road at sunset we may see a sunbeam flash back by reflection from a window in a house on some adjoining field. And so some stray sunbeam was flashed back from some crest of ice on the South Polar cap as the planet turned on its axis. Remember that flash came nearly 200,000,000 miles and took nine minutes to cross the gulf and it struck the eye of one solitary observer that happened to be watching from that observatory overlooking a deep canyon in Arizona on that early June morning. And remember, too, that though we see the south pole of Mars with its ice cap across a vast gulf of space, no human eye has ever seen our own south pole and that only a few hundred miles away. Mr. Lowell's explanation of the bright flashes is quite reasonable, but the enterprising and highly ingenious profession-

al newspaper paragrapher has drawn his trail across the path that leads to truth, and we have been gravely told that the Martian beings are flashing signals to their terrestrial cousins to arouse their attention and attract corresponding heliographs or electrographs. We have heard of a class of citizens in Toronto called "Acqueducters"; it is a small and privileged class, but in Mars every one is an "Acqueducter," and thus it seems they flash their bright signals to their less favored brethren on this earth and so glorify their work and jeer at the small success attending that of terrestrial toilers. Other brightly flashing points have no doubt been seen beyond the general line of the terminator, but they are occasioned by the sun's setting or dawning rays gilding a vast extent of cloud, floating at a great height in the Martian atmosphere, if such there be, or irradiating a mountain peak rising with steep slope from the surrounding plains. Recognizing these canals as the work of Martian engineers gives one so to speak, the "creeps." We feel in the presence of some weird-like midnight mystery. Jamie Soutar, of Drumtochty, would say, "its no canny." Crusoe, of our early days, started when he saw the foot prints of human beings pressed on the sands of his desert island; so we look with wonder at these canals and are filled with awe at the thought that mayhap here we see the product of human intelligence.

> "O'er all there comes a shadow and a fear,
> A sense of mystery the spirit daunted,
> That says as plain as whisper in the ear
> The place is haunted."

"That Mars seems to be inhabited," says Mr. Lowell, "is not the last but the first word on the subject." We must look at things now from a new standpoint and take a broad sweep, not take merely a local view. By a local view I mean a terrestrial view. The human race with all its proved attributes may after all be but a link in the chain. Man is merely earth's highest production up to date. But let us halt! Let me remember the warning that "the assertion which outstrips evidence is not only a blunder but a crime." Bæm truly said in his essay on "Truth," "the mixture of a lie doth ever add

pleasure," by which he meant not a lie in malice, but any bold statement that was fleeter of foot than evidence. Rigid demonstration is unpopular, but any astronomer of reputation and ready wit can fill a lecture hall if he proposes to discuss the attitude of the Martian inhabitants, or if he will tell us how to construct some mighty triangle or pentagon on the desert of Sahara, light it up with myriads of electric lights, then watch for results from our neighbor Mars.

This was exactly what happened with Mr. Lowell, of Flagstaff Observatory. Heintington Hall, at Boston, was filled, every seat and all the standing room, when he gave his four lectures on the planet Mars. He is a very famous astronomer and writes most charmingly in the Atlantic Monthly, and when he speaks he will be listened to eagerly, and what he writes will be read by the magazine-loving public from cottage to boudoir. The great and absorbing question with the Martian people it seems is the water question. There can be no party politics. The acqueduct question is the only question, and it is not a national question; it is more; it is planet wide. Worlds, like individuals, are not gifted with perpetual youth. They are born, spend a hot and feverish infancy, grow cooler with advancing years, attain an early youthful vigor, and are fitted for the abode of life. As they advance in years higher types of inhabitants are evolved; they then grow old and commence to droop with icy cold; soon they reach senility, and then comes decay and death after millions of revolving ages. Mars it seems is far advanced in its life, its mountains are all levelled, its water has nearly all evaporated, its inhabitants are driven to protect themselves by a gigantic international system of irrigation. They have dug a net-work of canals and so catch the annual meltings of the Polar ice cap, oases are formed at the junctions, and there the strong minded and mighty limbed Martians most do congregate and admire their ingenious hydrographic system. The silver thread of the actual acqueduct is not visible but what is seen is the broad strip of vegetation growing on the banks. It is proved by strict mathematical reasoning that on account of the small gravitating power of

Mars its men are giants and are fifty times as effective and can do fifty times as much work, so that the task of excavating these wonderful ditches is easy, one Martian is as good as fifty Italians. Life is moreover much further advanced, the arts and sciences are thousands of years older than here on earth, and the powers of nature being better understood more gigantic results can be produced. Steam and electrical machinery are long out of date and are kept in museums as relics of a by-gone civilization, and so the rein is given to the most fervid imagination, and the grandest results flow easily. Even good Schiaparelli is quoted, speaking on the idea that the "canals" are the work of intelligent beings, "I should carefully refrain," he says, "from combating this supposition which involves no improbability."

But Schiaparelli was a philosopher and was not lecturing to a Boston audience or writing for the Atlantic Monthly, or he would have put it positively and not negatively. The Lick Observatory authorities are singularly unappreciative; they exhibit little real enterprise, or the air at Mount Hamilton is not so exciting as that of Flagstaff. This is what Prof. Edward S. Holden coldly writes: "Something is seen no doubt, but I may say that nothing has been observed at Lick Observatory during 1888-1895, so far as I know, which goes to confirm the very positive and strange conclusions here described. It is a point to be noted that the conclusions reached by Mr. Lowell at the end of his work agree remarkably with the facts he set out to prove before his observatory was established at all." Conjecture, however, is often the pilot of discovery. Let us suspend our judgment until we hear from the Yerke's telescope at Lake Geneva, 40 inch, near Chicago, working under the best atmospheric conditions, next spring, or until the projected monster at Paris in 1900 verifies, if it will, Mr. Lowell's ingenious anticipations. We may add that to explain the mysterious gemination or doubling of the canals so far has defied the most labored efforts of the Flagstaff observers.

And so the years roll onwards and scientific discovery closes one volume to open another and yet another. We see at

the best in a glass darkly, and most things we cannot see and little that we do see can we truly interpret. Eclipses may be calculated, orbits of double stars may be measured and intellectual conquests of a very high order can be achieved, but when we consider the vast problems of physics and astronomy the masters of science are at the best but—

> "Children crying in the night,
> Children crying for the light,
> And with no language but a cry."

And if we students of astronomy are not lifted from nature up to nature's God, unless the book and volume of the firmament does not reveal to us much more than mere stellar points, then, indeed, we fail in our pursuit. A Swiss scientist, whose name I do not presently remember, heard a sermon in a French Cathedral from a Bishop who inveighed fiercely against science and scientific men. The poor man was troubled with the nebular hypothesis or with the six literal Genesis days or something of that kind, and with a repetition of that condemnating vigor that launched Galileo into prison he thundered away. At the close of the service the Swiss astronomer went to him and said: "Monseigneur as tu jamais vu Dieu?" "No," said the startled churchman, "I never did." "Then, Monseigneur, I have," was the reply. "I have seen Him in the great cathedral of the universe; I have felt Him in the movements of creation; I have witnessed His workings from nebula to star and from star to planet; I have read these scriptures of the sky which you have not; I have touched His robe and have known Him as a visible being." Our intellects were given us to use them to cope with lofty difficulties and to surmount them; let us as humble students use what mind and gift and opportunity we have.

> "God did annoint thee with his odorous oil
> To wrestle, not to reign."

It is the oil of the palæstra we have and not the chrism of a king. Let us wrestle here valiantly, earnestly, honestly and prayerfully, no matter whether successfully or not, and we shall reign there. It is strange, and to a humble Christian a sorrowful

thought, that rare scientific accomplishment is so often united to an uncertainty of Christian faith. We do not understand it, we are mute in the presence of it and we are distressed in the conviction of it. Just before closing I cannot in this connection forbear to speak of Thomas Henry Huxley, the great English apostle of evolution, with whom it grew late and dark in the year 1895. He was not an astronomer in the narrow sense, but a philosopher of the highest type as a physicist. Time forbids to speak of his greatness as a scholar, scientist and man of culture. He was moreover what scientific men are not always, yea, indeed, very seldom are—a master hand in the use of the English language, a forceful platform speaker, gifted with an elegant diction. His thoroughness as a student is illustrated by one of his maxims—"know a thing directly and do not assume that you know more of it by knowing around it." But a strange sadness oppresses one reflecting upon his death, not only because he died, but because he died as he did. Those who wrote his epitaph understood him best, or at least thought they did, and this is what they wrote:

"And if there be no meeting past the grave,
If all is darkness, silence, yet 'tis rest;
Be not afraid, ye waiting hearts that weep,
For God still giveth His beloved sleep,
And if an endless sleep He wills, so best."

"Sleep"—I recognize a christian metaphor—"And if an endless sleep,"—why "endless"? Is that the end of all evolutionary philosophy? Does the summit of human glory and scholarly renown, wide as the world, crash into such a pit of dark despair? I stand appalled. Let me turn from this sad, sad dirge to that glorious requiem sung by the last Laureate for himself:

"Sunset and evening star,
And one clear call for me,
And may there be no moaning of the bar
When I put out to sea.

"Twilight and evening bell,
And after that the dark,
And may there be no sadness of farewell
When I embark.

"For tho' from out this bourne of time and place
The flood may bear me far,
I hope to see my Pilot face to face
When I have crossed the bar."

And here is another noble yet clearer evangel:

"Life is real, life is earnest,
And the grave is not its goal;
Dust thou art, to dust returnest,
Was not spoken of the soul."

And yet the noblest of all follows:—I see a manacled prisoner in the Mamertine dungeon—a mail-clad soldier of the empire watches him. I see his noble Hebrew face sicklied o'er with the pallor of disease and captivity, and I see too the radiance of the heavenly glory now hovering near. Hear his triumphant death-chant, his glorious battle-song swelling with a great chorus of many such as he through the centuries since then—"I have fought a good fight; I have finished my course; I have kept the faith. Henceforth there is laid up for me a crown of righteousness which the Lord, the only righteous Judge, shall give me at that day, and not to me only, but unto all them that love His appearing."

But mayhap I judge wrongly, I may not understand the epitaph, or the script on his tomb may belie the man. From a scientific point of view it certainly is not evolution, for evolution is not "endless," but grows from more to more. Can it be that after all it was an eclipse of faith or an echo of that great soul cry that went forth centuries ago, "Though He slay me, yet will I trust in Him?" To read the book and volume of the sky more correctly and to see therein and on every page of it emblazoned the name of the Creator, yea, every letter of it a glistering sun is the lesson for every astronomer, whether amateur or professional, to learn. Lelande impiously said: "I have swept the heavens and searched the universe and found

no God." Let every man search his own heart; if it is rightly attuned it will respond to the thrilling chorus of the morning stars when they sang together and rejoiced. Nature never says one thing and wisdom another. The universe sings one universal psalm of praise, and the more we know of the universe the more clearly and more harmoniously that psalm strikes our dull ear:

"The sun and every vassal star,
All space beyond the soar of angel wings,
Wait on His word, and yet He stays His ear,
For every sigh a contrite suppliant brings."

THE FIELD OF HISTORY.

Read before the Hamilton Association, March 24th, 1898.

BY REV. HORATIO S. BEAVIS, D. D.

Having the fear of scientific gentlemen before mine eyes, I will not presume to enter upon the discussion of my subject without first presenting a definition To speak more accurately, I will *attempt* the said definition, for what seems almost childish in its simplicity has oft times floored the profound philosopher. The tyro's endeavor to find the appropriate phrase must result in unmistakable criticism, but when masters present their answers are we always satisfied? When the historian Freeman lays down the proposition, "History is past politics, and politics is present history," we first applaud, then turn to some searching analyst who sets the fine epigram in his crucible, and shows its fallibility Does history deal with politics alone? and is the present life of society concerned with state affairs alone? Besides, says our critic, he defines one thing by another thing which requires definition, and coolly walks off, leaving us to wrestle with a quandary. Dr. Arnold's "History is the biography of a society," strikes us more favorably, and Carlyle's "History is the essence of innumerable biographies," inspires one with the thought of the dignity of each human life. The remark of the Sage of Chelsea that "History is philosophy teaching by experience," seems to be a simple modification of the aphorism of Dionysius of Halicarnassus, quoted by Bolingbroke, "History is philosophy teaching by example." Yet these pithy utterances are fitter to express the value of historical study than to really define it. The great Humboldt contents himself with saying that history is the "narration of events." Unpardonably presumptuous as it may appear, I must dissent from a view of history which narrows it to events. I am sure that

great scholar would not rule out customs, conditions and ideas. Now any one who attemps an original definition of this term will be embarrassed by the reflection that it must include if possible, two elements: the narrative and the thing narrated. The fall of Wolfe in victory, and the organization of the Dominion of Canada, were events in Canadian history, but the writings which preserve to us the facts are also history, and we would like, in the interests of logic and consistency, to offer a definition combining the two. This is impossible, for now when we speak the word we mean the event, and again when we utter it we think of the writing. It is certain therefore that each one constructs his definition from his particular standpoint, as he emphasizes the thing done, or its record. With commendable humility, your essayist would remark, that to define history as literature it would be simple, scientific and comprehensive to term it the Record of Civilization.

The acceptance of such a definition must lead to the recognition of history as the widest of studies, the most comprehensive of sciences. It comprehends all human activities. We have parted company forever with the antique notion that history is simply a series of "drum and trumpet" stories, with glittering procession of dynasties and potentates, battles, sieges and armies, dyed in blood and suffocated in smoke. History must take note of these, even dwell upon them at times till the heart is sick with carnage and the head dizzy with tumult, but it does infinitely more. Religion, law, philosophy, science, art, these are revealed; the customs, institutions, industries, literatures of people must engage our attention, while heroes and heroines, nations and races pass in panoramic review before us. This is not to say that the student of history must be master of all this world of knowledge, but it is to take the noble study out of the narrow, superficial lines which it once occupied. Lotze, the great German philosopher, teaches us to view history through five phases of human development: the intellectual, showing the progress of truth and knowledge, the industrial, the æsthetic, the religious and the political. Goldwin Smith restricts the elements of human progress to three, viz., the

moral, the intellectual and the productive, and by them we deal with virtue, knowledge and industry. He would not have us to suppose that we study these separately, for each is closely connected, interwoven in fact with the others. To Macaulay particularly belongs the honor of directing attention to the practical subjects of history. He sees the value of lowly pursuits, and recognizes the importance of matters so apparently trivial that pretentious scribes would regard them as being beneath the dignity of historic record; and it is refreshing to hear Carlyle contrast the works of the conqueror who crossed the Alps and won the fields of Cannæ and Thrasymene, with that of the nameless boor who first hammered out for himself an iron spade.

Surely these considerations lead us to recognize the solidarity of history. All history is one, ancient and modern, ecclesiastical and military, social, religious, and that which is profanely called "profane." (There may have been a time when the use of the last term was admissible, but now it is simply unpardonable. The word carries with it the idea of sacrilege, and there is no sacrilegious history excepting as wicked men make it so. If the use of the name is persisted in, we should label it and say we do not mean what we say. Are not the terms "secular," or "general," sufficiently explicit?) A general hictory of Europe failing to treat of the Reformation would not be tolerated, and woe to the historian of Canada who omits the "Clergy Reserves." The annals of England and Scotland would be untruthful without treatment of Puritan and Covenanter, and Green's History of the English People carefully reviews the influence of John Wesley in the 18th century. Now these are emphatically topics of church history, yet the general historian is not turning aside from his task when devoting his pages to them.

Regarding history thus broadly our estimate of its value must be large. By it we are made the heirs of all past time, the acknowledged debtors to all mankind, having upon the historian's page the ledger showing the amount of our obligation. By its study we are, as Lord Bacon says, "made wise."

I do not underestimate the effect of other studies upon the judging and reasoning powers, but if our desire is to form the soundest judgment upon the movements of the present day, may we not rely upon a careful review of history for that work? Separate three boys for special study with the design of making them the best judges of human conduct, and reasoners upon the practical affairs of life. Give to one logic, to another mathematics, to the third an intelligent grasp of the general course of history, with elaboration in special epochs, and can there be any doubt as to the result? He who has been made conversant with the record and spirit of human progress, must have the clearest view of the movements and characters of societies and men. In spite of this, the noble study is often refused a place among the more serious tasks. It is too easy, forsooth, for intellectual gymnastics. A student of my acquaintance thought so until he was introduced to Guizot's History of Civilization; and another as he struggled with the profundities of Ueberweg's History of Philosophy, remarked that "even mathematics in all its glory was not arrayed like one of these."

Scepticism regarding its reliability, has led too many to ignore the importance of history. Because incidentals may be confusing, and evidence conflicting, doubt is thrown upon the entire historic record of a case. But why, when the main fact stands before you? Controversy has raged around the battle of Waterloo, for writers differ as to the movements of Grouchy and Blucher, and several stories of the combat are denied; yet every British boy is quite content to let incidentals go, and receives unquestionably the fact that Wellington there won a glorious victory over Napoleon. During his imprisonment in the tower, Sir Walter Raleigh, engaged in writing a history of the world, heard a great commotion in the prison court. Trying to gain a report of the affair, he was treated to so many conflicting accounts that he returned to his apartment in disgust. Here, said he, am I attempting to write history, but when I inquire into a common broil I can get no satisfactory relation. Because he failed in obtaining exact details he was discouraged, when the really important features of the event,—the general cause,

the combatants, the result,—could be fairly settled. Not alone do inaccuracies and discrepancies confuse, but we all know how history colored by the personality of the writer, interferes with our confidence in the record. It is possible for an author to so write his prejudices into his work as to seriously lessen its historic value. The history of Canada written by a robust Conservative or an ardent Liberal might be misleading; but neither Grit nor Tory dare be false to facts, and the intelligent reader soon learns to be on his guard against prejudicial influences.

The easy way in which some express a willingness to ignore history, or to give it scant attention under the impression that it can very readily be made up in later years, is after all rather serious. It was a college graduate who remarked to me "'Veni, vidi, vici,' as Napoleon said!" and he was not pleased when I remarked that he was giving Julius Cæsar a very modern position. A boy in Germantown, Pa., had undoubtedly been excused from close application to history, as the following "composition" on Henry VIII indicated:

"King Henry 8 was the grandest widower that ever lived. He was born at Annie Domino, in the year 1066. He had 510 wives besides children. The first was beheaded and afterwards executed, and the second was revoked. Henry 8 was succeeded to the throne by his great grandmother, the beautiful Mary Queen of Scots, sometimes called the Lady of the Lake, or the Lay of the Last Minstrel!"

That was bad enough, even for a boy, but what are we to think of a teacher who informed his pupils that "a King of England, one of the Henrys I believe, was so fond of horses that he died exclaiming, 'A horse! a horse! my kingdom for a horse!'"

A comprehensive outline of the great field of history is to be gained, not by plunging into a chronological wilderness, nor by the attempt to master voluminous works relating to certain epochs, but by the judicious selection of, and through acquaintance with, a few standard authors. Half a dozen works will sweep the field. Seeking the most from the least space let the

aspirant for historic knowledge cultivate Rawlinson for a sketch of ancient history; then seek the companionship of Gibbon for the centuries which span the fall of the Roman Empire and the capture of Constantinople; study Hallam for the middle ages, and let Fisher or Ridpath crown the whole. Ploetz's Epitome of Universal History is a marvel of condensation, and Blair's Chronology is worth more than its weight in gold for the framework it affords of ancient and modern history. By this time the field is open for the histories of nations and epochs.

As to the use of mnemonic methods, judgments differ. If one must undergo great labor in mastering the complicated machinery which these systems often involve, why not expend that force directly upon the task. Wide-awake, persistent effort will accomplish great things, while reliance upon artificial suggestions only serves to impose fresh burdens upon the memory. "In what year was the battle of Waterloo fought?" asked a highly accomplished pedagogue. "I don't know," was the intelligent response. To which the rejoinder: "It's simple enough if you only would learn how to cultivate artificial memory. Remember the twelve apostles. Add half that number to them. That's eighteen. Multiply that by one hundred. That's eighteen hundred. Take the twelve apostles again. Add a quarter of their number to them. That's fifteen. Add to what you've got. That's 1815. That's the date. Quite simple, you see, to remember dates if you will adopt my system!"

And yet the memory does find assistance in little tricks of association, one of the most natural being the simple grouping of events. It is not very nice to connect the first great American financial panic, and the Canadian Rebellion with the accession of Her Gracious Majesty to the throne, but most perversely the the year 1837 calls up those three events. It is natural to associate the discovery of America, the conquest of Granada and the expulsion of the Jews from Spain, with 1492. There is not much in the opening of the Greek war for independence to suggest the death of Napoleon, but they both mark the year 1821. The English Wellington and the American Webster died in 1852. The American Irving and the English Macaulay

closed their earthly careers in 1859. 1,000 B. C. and 1,000 A. D. call up Solomon and Otto III. of Germany. 490 B. C. and 490 A. D. present Marathon and the Ostrogoths, Miltiades and Theodoric. Initial or final letters are sometimes useful in fixing names and facts. It might aid one in remembering the Popes of the Reformation period to make the initials, L. A. C., stand for their names, Leo X, Adrian VI and Clement VII. It is not of extreme importance to remember the respective colors of the roses of York and Lancaster, but none need ever be in doubt so long as Lancaster ends with r, and r begins red. Dramatic arrangement may vividly impress historic characters upon the mind. Place great personages upon some stage and give them their parts to play. Those mighty heroes known as the "Nine Worthies" have a provoking habit of refusing to come when they are called. Of course it's childish, but it is effective to convert those gentlemen into a base ball nine. After selecting your favorite modern hero to take the bat, then summon King Arthur from the round table, to catch; Charlemagne, from the Royal Academy, to pitch; Godfrey of Bouillon, from the Crusades, to act as short-stop; Julius Cæsar, from the Eternal City, takes first base; Alexander the Great, from oriental conquests, takes second base; Hector, from the fields of Troy, takes third base; Judas Maccabeus, Patriot of Palestine, goes out to right field; King David from the throne of Israel, to center field; Gen. Joshua, from the conquest of Canaan, takes position on left field. All that is wanting now is some doughty warrior, fearless yet wary, and willing to be the observed of all observers, to act as umpire.

It is impossible to avoid the question, how far is *Chronology* important in the study of history? There is no shadow of a doubt that many are turned aside from the perusal of the historian's page by the bustling ranks of dates. These vexatious intruders spring up at all points, deploy as skirmishers, fire from their picket lines, mass themselves in solid columns, until the frightened and indignant reader withdraws from the field. What wonder if the hapless young victim whose task it is to make conquest of that field should solemnly aver that he

would not live alway, he asks not to stay, and wishes that the ruthless author of the book and of his misery had been gathered to his fathers before the completion of the task. When that reader grows up he will wax philosophical and say loftily that "dates are for children,"—for which the children will not thank him. Because the memory is not to be made a mere warehouse, full of chronological material, it by no means follows that dates are useless to the mature student of history. Dates are pivots on which swing human events, and without the establishment of such pivotal points, history loses much of its significance. It makes a serious difference where we place the Reformation and the French Revolution; the discovery of the St. Lawrence and the Confederation of Canada. Scores of Roman dates do not need particular attention, but it is not only interesting, it is important to place correctly the founding of the capital itself, the overthrow of the Monarchy, the Punic Wars, and the establishment of the Empire. If careless in this, we are liable to make Hannibal appear before Horatius has taken his Tiber bath. And if we play fast and loose with important dates in Grecian history we may get the Trojan War and the Argonautic expedition later than the battle of Marathon, or the administration of Solon. Such a misfit in the development of Greece would be not only mislocation, but dislocation. To make history a mere jumble of dates, to fancy that we are familiar with human affairs because we can repeat chronological tables, is to make a ludicrous mistake. To ignore chronology is to miss the point found in the relation of things, hence is unscientific, and unphilosophical.

Is it not noteworthy how large a part historical romance has played in literature? And much of it is better worth perusal than whole tomes of the dry-as-dust variety of chronicles. Sir Walter Scott's Ivanhoe may be very inaccurate historically, nevertheless it is of great value to the student of history. The same may be said of The Talisman, Anne of Geierstein, Kenilworth and other works. Not many volumes give better ideas of the French Revolution than Dickens' Tale of Two Cities, and Henty's book for boys, The Reign of Terror.

George Eber's The Princess, and Lew Wallace's Prince of India make ancient Egyptian and modern Turk live again. Your essayist admits that he has never obtained from any other source so vivid an impression of the struggles of the days of Charles II as from Sir Walter Besant's For Faith and Freedom. Historical romance is possible because history is itself romantic. It does not require very imaginative glasses to detect the romantic element in Petrarch and Laura, Paolo and Francesca, Charles VII of France and Anne of Sorel. Our own prosaic times are not without touches of the same interesting characteristic. The hand and heart of Britain's Queen was given, as all the world knows, to the handsome, cultivated, knightly Albert, of Saxe-Coburg-Gotha, but not before Christian IX of Denmark had sued for the same. Is there not a decided flavor of romance in the subsequent fact of the daughter of the Danish King becoming the wife and Princess of the son of the British Queen? Long centuries ago, even ages before the sensation caused in upper and lower circles by Antony and Cleopatra, other romances, far worthier, affected the history of the world. In the seventh century, B. C., that warlike Median, Cyaxares, attempted the conquest of the Assyrian capital, Nineveh. Nabopolassar was the wise and wily governor of Babylon, subject to Saracus, the Assyrian King. The Median solicited the assistance of the Babylonian, with the promise of independent royalty to the latter, and to make the bargain more binding, the Median Princess Amyitis became the wife of young Nebuchadnezzar, the Prince and future King of Babylon. Great Nineveh fell, and the allied Monarchs invaded the kingdom of Lydia. Alyattes the King lost no time in securing the alliance of Syennesius, King of Cilicia, and one bright day in the year 610 B. C., the decisive encounter was on. Suddenly the sun, as if angry and sorrowful over the strife, went into total darkness. This was the famous Battle of the Eclipse. The combatants were horrified at this evidence of the wrath of the gods. The two principals sent up their allies to arrange an armistice; and while the heavens curtained the belligerent hosts, Nabopolassar and Syennesius perpetrated an exquisite piece of match-

making. To secure a lasting peace they proposed, that is they decided that Astyages, son of Cyaxares, should propose, to the lovely Lydian Princess Aryenis. They did not wait for the insignificent formality of the maiden's acquiescence, but declared that the marriage should take place. Thus one of the bloodiest conflicts of ancient times was crowned with the garland of love. "All's well that ends well." This marriage of state was followed by an era of peace, very rare in any time. The daughter of Cyaxares was Princess of Babylon, the daughter of Alyattes was Princess of Media, with the Median at the apex, and the Lydian and the Babylonian at the base of the pyramid of empire. A triple alliance for war and peace.

The study of history, like charity, should begin at home, and like the sweet grace again, from that centre it should range throughout the world. It goes without saying that England's history should be familiar to Canadians. In fact every British subject, and every English-speaking nation and colony may well consider that the basis of all modern history. But Canadians have begun to play so important a part in the community of nations, and their history has combined so much of the romantic, the heroic and hard, matter-of-fact politics, that it must have an early place. It is both ideal and practical that history and geography have for their initial subjects the immediate vicinity—Burlington Heights, Stony Creek, Scotland Township, the Niagara District, Toronto, Ridgeway,—these have witnessed important movements in the War of 1812, the Rebellion of 1837 and the Fenian Raid of 1866. The location of every creek, and the memorizing of every petty incident are not necessary, but every deed and movement manifestly contributing to the preservation and development of the nation should become a mental possession, and every spot associated with such deeds be perpetual a memorial of national prowess. This for the cultivation of a manly patriotism. But society is outgrowing, none too soon, a narrow selfish sentiment, and adopting a larger, worthier principle, which, while loving and proud of its own, "would all mankind embrace" in the recognition of what is valuable. Why withhold from the United

States, for instance, due recognition of her substantial contributions to human progress? Will Englishman, Irishman, Scotchman or Canadian deny the justice of that cause which expressed itself in the Revolutionary War? or withold from the Fathers of the American Republic appreciation of their wisdom, courage and political righteousness? The time has gone by for children to be taught, and for adults to flatter themselves that a circle bounded by a square represents the geographical, moral and political world; that *we* are within the circle, while the rest of the world—outside barbarians—crouch in the corners. The student of history learns to be ashamed of the provincialism which thinks that his country holds a monoply of all that is wise, and good and great. The United States is a country of remarkable development, with men and institutions placing her in the front rank of nations, but all intelligent Americans know that every free institution flourishing under the Stars and Stripes had its birth under the Union Jack. Ages before the American Eagle was borne, the goddess of liberty inspired the manly sons of Britain to stand for certain "inalienable rights," such as "life, liberty, and the pursuit of happiness." Franklin and Jefferson, Hamilton, Patrick Henry and the illustrious Washington, will forever hold honored places in the phalanx of defenders of the rights of men; but six centuries before the American Revolution, stalwart English champions of freedom uttered their Declaration of Independence in the teeth of King John at Runnymede. That student will revere the heroes who in 1628 gained the signature to the Petition of Right from Charles I, and will honor the memory of those patriots who wrested the Habeas Corpus Act, that second Magna Charta of English liberty, from Charles II. And such recognition of obligation is forthcoming. Nobler tributes to England's Gracious Queen I have never read than those springing from the American press; and in the face of the fuss and furore of angry controversy, in the gleam of jingoistic pyrotechnics, strong hearts and balanced heads have given expression to language of honor and fraternity. This is an extract from an American editorial written during the "war scare" of two years ago:

WHAT THE U. S. OWES TO BRITAIN.

"Our liberties, our law, our literature, our learning, our enterprising spirit, the land we stand upon, were won for us by England. Wolfe won for us, on the Heights of Abraham, every foot of land between the Alleghanies and the Mississippi. But for that most decisive victory this would now be an appanage of France and we would not be here at all. Mexico, with its peculiar Spanish and Indian population, would now extend to Alaska. Do we hate England on account of Blackstone's commentaries, Skakespeare, Walter Scott, Robby Burns, Tennyson? or because she stuck to Napoleon, the butcher of Europe, sparing neither blood nor money till she stopped him? By the way, where would Germany be but for England? What made the difference between Jena and Waterloo? Emperor William hates England. Where would he be but for England?"

And this worthier type of patriotism, cultivated by the reading of history, will make every patriot honest—so honest that he will not shrink from the acknowledgement of the truth, however unpalatable that truth may be; will proudly assert that he can easily afford to make honorable admission of error on the part of a country with a great history. In truth, it should make a man very humble to read history, for the old adage about glass houses must be frequently in his mind. Will any Englishman have the hardihood to deny the mistakes of England? Does he dethrone Queen Elizabeth when he admits her vanity, duplicity and cold-hearted calculation where sentiments of religion and humanity should have borne sway? Thackeray, proud of his British blood, did not hesitate to characterize the royal Georges as they deserved, and that Englishman of Englishmen, Lord Macaulay, told the historic truth regarding the misgovernment of Ireland. Admirers of that uncrowned king of England and born leader of men, that fearless defender of liberty and conscience, Oliver Cromwell, do not stultify themselves when they admit that his conquest of Ireland showed the savage while it revealed the general. After every mitigating circumstance has been offered in extenuation of the expulsion of the Acadians in 1755, history will yet rank it as one of the cruel edicts of modern times. No member of our planetary system need shrink in shame because the sun has spots; and no Briton need admit

an error without the proud reflection that the empire which looks not on the setting sun has stood for justice, freedom and civilization, as for unconquerable force and courage; and may well challenge history to show a sovereign receiving such loving loyalty from millions of subjects, such honor and esteem from millions more in every quarter of the globe, as has for sixty years been presented in the character of Her Majesty, Queen Victoria.

And it will be incumbent upon the American also to calmly read the history of his country with a mind open to reproof, correction and instruction in righteousness. And this commendable spirit will lead him to admit that his beloved country, whose Declaration of Independence proclaimed all men to have been born free and equal, nursed for ages an institution, the crime of which was foul and smelled to Heaven. He will be obliged to confess that the country's policy toward the Indian has been a dishonor; that she has failed to keep faith with China. No future historian will justify her war with Mexico. The United States, of all civilized nations, refused to prohibit the liquor traffic with the Congo region. And with tears and blush of shame he will read of the treatment by a jingo Senate of a proposed Arbitration Treaty which was to give the United States with England the greatest opportunity in nineteen centuries to inaugurate peace on earth and good will to men. Thus honestly admitting every weakness and confessing every wrong, he may still hold his citizenship as dearly as ever Roman held his, and glory in that land whose history, development and power all great minds extol.

If history did no other service she may claim high honor for this alone: much which seems to be distinctively modern is shown to have most venerable antiquity, and by this service the wise student is freed from imposition. Many an ancient dame masquerades in 19th century attire. In nothing does history more strikingly repeat itself than in the schools of thought which now and again dominate society. The most ethereal system of idealism that scorns to recognize the actual being of matter, and leaves to "mortal mind" servitude to material

things, has its roots in millenniums past. None can doubt the fact of human progress, but it will sober us to reflect that some of the advanced philosophies are but elaborations of ancient schools of thought. If Socrates and Plato were the fathers of Greek thought, Anaximander and Heraclitus, Pythagoras, Parmenides and Anaxagoras were the grandfathers of modern ideas. The doctrine of evolution, theistic and atheistic, and the nebular hypothesis, antedate our day nearly twenty-five centuries.

No student dwells long on the annals of the race without consciously or unconsciously constructing a philosophy of history. Hegel points out three stages of historical development in the mind: the first dealing with mere incidents, the second treating of facts in broader relations, the third reasoning upon causes and effects, and viewing particular acts and facts as they are related to the whole process of development. The Canadian boy is easily interested in the capture of Quebec by Wolfe: the stealthy night passage before the French batteries; the red-coats clambering up the Heights of Abraham; the heroic fall of the two generals; the dying Wolfe cheered by the cry of victory. Later on the boy gives the battle its proper setting in the campaign, connecting it with the genius of Pitt, the struggle between British and French and the final triumph of the British cause. There will come a still later day when his view will be so enlarged that in the history of North America and the development of Europe, the fall of the Laurentian capital will be but an incident, important indeed, but very small. So will he learn to generalize. Grand combinations of historic movements enable him to form great conceptions concerning the progress of mankind. No pent up Utica confines his powers. He apprehends things as wholes, and the accredited power of Pythagoras will be his in reality; successive ages will be grasped by him. Here the philosophical student of history stands on a critical point—too critical to be comfortable. He sees how evidently the ages have produced and moulded men, and the operation of general laws appears as he takes still wider views. His tendency then is to so generalise upon all history as to completely elinimate the personal element.

Once he thought that grent personages made history. Alexander, Richard, Wolfe, Wellington, did not these mould the affairs of man? Now in the knowledge of wider vison he observes how time, custon, thought, the pressure of a thousand forces, have affected men, and he murmurs, "Ah, I see. Circumstances make men. With such antecedents and environment his personality is but a feather, and the freedom of the will a chimera!" He is ready now to plunge into sheer fatalism and regard man as a mere creature of circumstance, so weak and helpless as to be utterly irresponsible in the part which he thinks he plays. Tabulated statistics show him that so many murders, suicides and other crimes may be expected in a year, and is not that proof of a "reign of law" in history completely disposing of the force of personality? But further study leads him to observe that neither in public life nor private station are all men and women the puppets of circumstance. To judge from what we have seen does not prove that men were compelled to play the parts they did. Were all men as some men statisticians would have no crimes to tabulate. The science of history broadly considered, does not warrant us in concluding that one may know a given man's action under given circumstances, or in supposing that in the struggle between environment and the individual the force of the latter is reduced to zero. The student must see that even the force of heredity can be turned in an opposite direction, and that resolute souls have changed the character of history by laying conquering hands on circumstances. William, Prince of Orange, might easily have failed in the crisis which placed him on England's throne, and every great reform that has honored the English speaking race has been achieved by determined resistance to environment. It does not minister to the pride of the Anglo-Saxon race to reflect that against every effort to rescue children or Africans from slavery, has been arrayed the weight of position and wealth. Yet against these, brave men and gifted women have opposed undaunted courage and love of mankind, and have taught the world never to consider anything settled until it is settled right.

Circumstances do indeed make men, by affording ground

for the exercise of manhood. The self same soil produces the hero and the coward, the man of honor and the knave. Edward I and Edward III had no better opportunities than Edward the II, but *they* were men while *he* was a poltroon. Washington's character has made his name the synonym of nobility the world over; Benedict Arnold's perfidy made him despised by the British, and gained for him the contempt of posterity. George Brown and William Lyon Mackenzie were determined advocates of popular rights; the same soil produced an unbalanced rebel and a prince among men. Not alone in the larger events of history, but in every conflagration, every shipwreck and railway disaster do we find the same circumstances producing the finest heroism and the most pitiable cowardice, the sweetest devotion and the cruelest selfishness.

Thus history reveals man's dignity with his subordination, and in the acting of his part he recognizes dignity and subordination as one. His confidence in his own freedom is not disturbed by the conviction that history moves as an organized whole. Guizot profoundly says, "Man advances in the execution of a plan which he has not conceived and of which he is not even aware. He is the free and intelligent artificer in a work which is not his own. Conceive a great machine, the design of which is centered in a single mind, tho' its various parts are intrusted to various workmen, separated from and strangers to each other. No one of them understands the work as a whole, nor the general result which he concurs in producing, but every one executes with intelligence and freedom, by rational and voluntary acts, the particular task assigned to him."

And with him the Laureate-seer:

"I doubt not, thro the ages one increasing purpose runs,
And the thoughts of man are widened with the process of the suns."

Once I cherished a fond hope which inspired as often as it filled my mind. It is gone with a varied assortment of bright and interesting illusions. This particuliar hope was centered in the great Pyramid! Could I but climb where ancient bnilders stood, and view the landscape o'er, my soul would be filled with delight. One night half dreaming, half waking, I toiled to the

apex of that great wonder of the antique world. The mighty columns of humanity marched in stately review. There was an awful grandeur in their tread, despite every evidence of pain and wrong. The hosts of Egypt, Assyria and Judea appeared; Carthage, Babylonia and Persia next, with Macedonia, Greece and Rome on their trail. The Messiah's Advent was seen and soon the crash of falling Rome was heard. The settling of the Nations, the Reformation of Europe, the Crusades—a New World appeared. Britain's Glory, the French Revolution, the American Republic were seen. Far off raged the war for existence and supremacy, dark clouds rolling above the combatants, and I caught the sound of Byron's despairing wail:

> "There is the moral of all human tales;
> 'Tis but the same rehearsal of the past,
> First Freedom, and then Glory—when that fails,
> Wealth, vice, corruption—barbarism at last.
> And History with all her volumes vast,
> Hath but one page!"

Over the colossal panorama of fretful life and warlike confusion there cried the voice of Tennyson, pleading for peace and the brotherhood of man; for the time when the war drums should beat no longer,

> "And the battle-flags be furled
> In the parliament of man; the federation of the world."

I was not left to think that din and strife alone prevailed, for Richelieu spoke:

> "See! through plots and counterplots—
> Thro gain and loss—thro glory and disgrace—
> Along the plains where passionate discord rears
> Eternal Babel—still the holy stream
> Of human happiness glides on!"

But, terrified at the ruthless hand of power and the seeming triumph of Evil over Good, I trembled until Lowell spoke:

> "Careless seems the great Avenger; History's pages but record
> One long struggle in the darkness, twixt old systems and the word;
> Truth forever on the scaffold, Wrong forever on the throne;
> Yet that scaffold sways the future, and behind the dark unknown
> Standeth God within the shadow, keeping watch above His own!"

Then were lifted the dark threatening clouds, as if repelled by an Almighty Hand. The struggle for pitiless supremacy was changed to service for Mankind. I saw the outcome of strife, and suffering and toil to be the moral training of the race; and in the dawning of that nobler day I heard: "Arise, shine, for thy Light is come, and the glory of Jehovah is risen upon thee!"

CHAUCER: HIS TIMES, LIFE, AND WORK.

Read before the Hamilton Association, June 13th, 1898.

BY H. B. WITTON, SR.

Speght in his short life of Chaucer written in 1598 says: "Goeffrey Chaucer departed out of this world the 25th day of October, in the year of our Lord 1400, after he had lived about seventy-two years." The date given by Speght of Chaucer's death, is accepted as correct, but over the time of his birth there has been controversy, and the final word may be yet unspoken. Early biographers, accepting Speght's reckoning, took 1328 to be the year when Chaucer was born; but later Chaucerian writers fairly agree that evidence forthcoming in recent years, shows 1340 to be a more correct date than that in Speght's memorial. After this lapse of time, proof of Chaucer's exact birth-date may not be found; still should nothing more be learned, it is now certain that his birth was not before 1328, or much later than 1340.

The life of Chaucer fell almost entirely within the limits of the XIV century, an eventful period of history. It would baffle human ingenuity to trace minutely the doings of those days, though a glance at the chronicles and records of that time calls up at once historical pictures of profound interest. It was in that century the Tartar hosts under Tamerlane swept with the suddenness of a meteor through Central Asia, and Persia into India; and it was then that the Turk first turned his steps towards Europe. Disruption of the Roman Empire was nearly complete, and Christendom, torn with internal dissension, was unable to present serried ranks to the enemy. The last ray of hope for union between the Greek and Latin churches had faded away, and in the Western church there was bitter strife for nearly seventy years, to determine whether Rome or Avignon should be the seat of the papal court. The Percy Douglas

fray, of ballad fame, was but one of many border fights of that time between England and Scotland. In the fourth decade of that century, England and France began their "hundred years' war," of which the battles of Crecy, Poitiers, and Calais, and the sea fight at Sluys were incidents. Pestilence and riot did not fail in those days to follow, as is their wont, on the heels of war. The Black Death stalked without hindrance through the world, leaving its pathway heaped with victims. In France, with recklessness begotten of hunger and despair, the cottage made war on the castle. Froissart's chapter on the Jaquery, as the revolt of the peasants was called, shows the savagery of that encounter betwixt rich and poor, and the horror of his realistic word-picture haunts like a nightmare the memory of all who read it. Froissart also gives a graphic account of the similar revolt in England under Wat Tyler in 1381, nearly a quarter of a century after the outbreak in France.

Throughout Europe, the XIV century was a period of transition. New ideas took possession of men's minds, and awakening to a fuller life, society began to throw aside its swaddling clothes. Dante, Occam, and others, ventured to question the doctrine that the head of the church had supreme authority over things temporal as well as things spiritual. In the State, unwonted words of command were spoken which even kings had to obey. English rule in the middle ages was defined by the dictum: the Commons petition; the King enacts; the Lords sanction. Bnt the old order of things was changing. Parliament ceasing to be suppliant, took into its hands even right of succession to the throne; deposed Richard II and crowned Henry IV King of England.

The statute books of these days shew that the feudal system, which like some ubiquitous, strong man armed, had long controlled society by crude semi-barbarous methods, was losing strength, and would soon have to confront forces stronger than its own. Under the old order of things, the slave could be sold at his master's will; the serf bred on and attached to the glebe, could be sold only with the land itself; and the villein who could not be sold, but must plough and garner the harvest

yearly of certain of his lord's acres, and might not marry without his lord's will; he found life harassed by restrictions and obligations that made him in reality a serf. Although villeinage was common enough in England in the XIV century, slavery in its worst forms was nearly abolished; and in France the King issued an edict for all serfs to be free on payment of a petty ransom to the Crown. In the towns workmen were free; but the first English "Statute of Labourers," passed in 1349, ordained that under penalty, all workmen must work in their own districts, and for the rate of wages common three years before passage of that act.

Although in those days there was little divergence from the doctrines of the church, the State deemed it necessary to aid the spiritual power, and by force of law to prevent if possible error in matters of faith. To that end, in 1382 a law was passed in England to imprison heretics. It was the first piece of English legislation against heresy, and was soon repealed, though only to be replaced by the ghastly statute *de comburendis hæreticis*, under which law, heretics were burnt at the stake. Heresy was one of the professed reasons for suppression of the Knights Templars, the great military order organized to protect Crusaders on their way to Jerusalem. That act was one of the notable events of the XIV century, as the Templars could muster 15,000 members, and for more than a hundred years had been the richest and most powerful order in Christendom. Within its ranks were found distinguished men. It is on record that Pope Innocent III was a Templar, and that a King of France, Philip IV would have been one, but was rejected. Skilled, fearless, and fanatical in war, the Templars were "first to attack and last to leave" on many a hard fought field. Kings borrowed from their hoard, and made treasure houses of their temples. The overthrow of the Knights Templars is one of the strangest of the many strange stories to be met with in medieval history. Begging and preaching Friars were organized by the church in the XIII century to quicken the spiritual dullness of the people, and to arrest their growing prejudice against monasticism. Chief among these

mendicant brothers were: the Augustines, or Austin friars, the Franciscans, or Grey friars, the Dominicans, or Black friars, and the Carmelites, or White friars. These orders stood in close relation to the life of their time, and are said to have been strong factors in bringing about overthrow of the Templars. Speed says: nearly every householder in England for a long time paid a penny a quarter to each of these four orders. In Chaucer's day they were evidently a fair butt for shafts of satire and ridicule; still though their popularity might then be on the wane, the surviving nomenclature of their possessions in London alone attests their immense influence in medieval England.

For centuries Latin held pre-eminence over other European tongues, and was the language of religion, law, and learning. Lord Bacon, in the days of Elizabeth wrote some works in Latin and wished his English books to be translated into that tongue, fearing as he said: "these modern languages will at one time or another play the bankrupts with books, and since I have lost much time with this age, I would be glad as God shall give me leave to recover it with posterity." Montaigne had like premonition over his famous essays. Two hundred years after Chaucer's day he said: "I write my book for few people, and for a few years. Had it been a matter of duration, it would have been necessary to commit it to a more stable language." Milton wrote Latin state papers for the Commonwealth. Till less than two hundred years ago Latin was the language of diplomacy, and it was not until 1825 that Latin ceased to be the language of debate in the Legislature of Hungary. There can therefore be no surprise at finding Latin the chosen language of churchmen in the middle ages. The monastic writer of that time found Latin to be the language of the scriptures, hymns, missals and decretals of his Church, and the medium of communication between ecclesiastics, and he in turn committed to its sacred keeping whatever duty or pleasure impelled him to write: legends of his saints, records of his abbey, his chronicles of the world's history, so far as pilgrimages, converse with his fellows, and the manuscripts of his

scriptorium could make the doings of the world known to him; all these with rare exceptions he wrote in Latin.

Next to theological and ecclesiastical subjects, the favorite studies of the middle ages were those endless cycles of romance which surround the fall of Troy, King Arthur, Alexander the Great, and Charlemagne. Of such themes medieval writers never tired. But beyond the precincts of those cycles they seldom passed. Ulfilas indeed in the fourth century gave the Barbarian Goths, a version of the scriptures in their own tongue, and Eusebius, in the same age contributed a bold sketch of the prechristian world; but the time was then far distant when the inner life of that world could be revealed in its own literature. Ages passed, before the fossils of the rocks made known the myriad forms of life that have peopled the earth. But at length their story found listeners, and has in part been told. And now it is believed that the forgotten fragmentary signs and antiquities of primitive peoples, after their long silence in the dust of ages, have information to give concerning the nature and history of man.

By the year 1400, literary expression had ventured beyond the boundary of the Latin tongue, and had produced in seven of the vernacular languages of Europe works having inherent vitality to become nuclei of seven literatures. Of these France brought forth the greatest number; Italy, honoured at nearly the same time with her trio of immortals, Dante, Petrarch, and Boccaccio, gave proof of the brightest genius; and England with Wycliffe's bible translations, and Chaucer's narrative poetry, founded enduring corner stones for the stately fabric of her literature. Before the time of printing, there were however but few books in the tongue of the people. The library of Glastonbury Abbey, one of the best of that day, contained in 1248, but four books in "the vulgar tongue," and these were reported to be old and useless,—*vetusta et inutilia.* And at a later day, when Leland, by commission of Henry VIII, spent six years of research in the libraries and colleges of England, he found but a mere handful of books written in English. Such lack of native literature shews how little regard, so late

as the time of Henry VIII, there was for the vernacular tongue. Still, even in Chaucer's time the tide, though slow, began to turn. In 1388 parliament was opened with an English speech. In the law courts, cases might be carried on in English. Modern English prose, if traced to its immediate source, will be found to go back little further than to the books written at a time not far from that date. These are Wycliffe's scripture translations, Trevisas' translation of Higdon's Polychronicon, and the Mandeville travels. The oldest manuscript of Sir John's travels is indeed in French, and both his claim to be of English birth, and his personality have been called in question. He also garnishes his adventures with stories of snails having shells as big as cottages, and Ethiopians who have only one foot, which he says was strong enough for swift travelling and large enough to shelter its owner, when recumbent, from rain and sun, and other accounts which recall Lucian's satire on credulous tales of his day, and the conviction that Sir John's back deserves a stroke or two from the same rod. But for all this "The Voyage and Travayle of Syr John Maundeville Knight," in its English version, remains a delightful book to be prized with the choicest treasures of early English prose.

A life of Chaucer written with the care, fullness, and insight of Lockhardt's life of Scott, Masson's Milton, or Dowden's Shelley, would be an attractive book. At this distance, how interesting would be the story, could it be told, of Chaucer's education in the schoolroom, and in that life school of many masters where all are pupils; of the work he did and the men he met; of his attitude towards his fellows, and the spirit of his time; of the *motifs* of his poems, and the order of their production; how his life-work was hindered, tried, guided in the right way, and sometimes lured by false lights into wrong paths; and how his creative genius by degrees fashioned, in the dawn of English literature, works whose beauty and fidelity to nature will always be dear to lovers of the English tongue. But such a work could hardly have been written at the immediate close of his life, and cannot be written now. The letters, journals, and other documents essential to both

warp and woof of the biographer's web had no existence in Chaucer's time. They are the growth of a later social day. Experts, who have given to this subject years of study, say with accord: the demonstrable facts of Chaucer's life can be told in few words, and that biographies of the poet written before that by Sir N. H. Nicolas, in 1845, abound with erroneous misleading conjectures.[1] Thus it is, modern criticism compels earlier opinions we thought definitive, to be supplemented and amended. It is disconcerting to find the idol we thought golden in part clay, or that of a favourite picture, only the outline is from nature, the colouring and details being imaginary and unreal. But truth heedless of likes and dislikes often compels a hearing, and may not be silenced. In this case not a little that was deemed fact turns out to be fable, still if much is lopped away, enough is left unscathed to make Chaucer an attractive personality worthy of study.

Geoffrey Chaucer was the son of John Chaucer, Vintner, of Thames street, London, England. No record of his birth has been found, but it is likely he was born in London about 1340. By general acclaim he is honoured as "the poet of the dawn," first in time, and protagonist of English poets. Still he was a man of deeds as well as words. His closing days were passed in quiet, but till near the end of his life he was actively devoted to duties whose variety and importance shew the versatility and trustworthiness of his character. In youth he was page or servitor of some kind, in the train of Elizabeth de Burgh wife of Lionel third son of Edward III. And in manhood he was in turn: yeoman of the court, soldier, diplomatist, collector of customs for the port of London, member of parliament for Kent, clerk of public works, and withal the poet of his age.

The family name—in French *chaucier*—maker of shoes or hosen, indicates that some remote ancester was a disciple of St. Crispin, which were no cause for surprise, as poetry and the gentle craft are neither enemies nor strangers. Such a liason as this patronymic suggests had ceased—if it ever existed—before Chaucer's time, as his father and grandfather were both

vintners, and when his mother after his father's death in 1366 married another vintner, their son, Thomas Heyroun, was also a vintner.

Where Chaucer was educated is uncertain. The short life, written in Latin, by Leland more than a hundred years after Chaucer's death, is nearest of the biographies to the poet's lifetime. It says: Chaucer studied at Oxford; was taught mathematics by John Some, and Nicolas, friar of Lynn, and also studied in France about the last year of Richard II. On the other hand, Speght says: he studied at Cambridge; a view some think is favoured by touches of local colour in the first lines of the Reeve's tale:—

> "At Trumpington not far from Canterbrigge,
> There goeth a brook and over that a brigge."

The time for his studies in France is an error, as Chaucer died but a year after the King. And the poems abound in touches which in the most realistic way hit off numerous places mentioned, leaving no ground to infer the poet knew Cambridge better than Oxford. And though Leland stood nearer in time to Chaucer than his other biographers, he cites no evidence unknown to them, while later writers have found documents unknown to him, all of which are silent on this subject. Indeed, so far as records go, it is not shewn that he studied at any university. In olden times not all men of distinction had that advantage, and in our day Mill, and Beaconsfield, both noted for their acquirements, were not university men, though both had special advantages from their fathers' teaching.

If it be doubtful whether Chaucer attended these universities, it is certain he was a diligent student in what Carlyle calls the university of books. All his works bear witness to his fondness for, and use of these. In the opening stanzas of his "Legende of Good Women" he says: if books were gone, the key of remembrance were lost, and though he knows but little:

> "On bokes for to rede I me delyt,
> And to hem give I feyth and full credence,
> And in myn herte have hem in reverence.

Few men have used this key of remembrance more skillfully than Chaucer, or scattered the treasures gained by its agency to better purpose. That, all admit. Milton calls him: "our learned Chaucer," and in doing so points out the niche men of his own and of succeeding time deem appropriate for him. Modern scholarship has indeed mildly challenged this general verdict, by its reminder that the highest learning must work up vast treasures of exact knowledge into an organic whole, and that Chaucer's learning was both inexact and lacking in organic unity. Prof. Lounsbury, in his admirable studies in Chaucer, follows up this subject fully. But after all, though Chaucer did err, called styx the pit, not the river of hell; thought the name of Venus was taken from Mount Cithæron, and not from the Island of Cythera, and committed sundry other similar sins, the faults are but venial, judging him by the only fair test, the standard of learning in his own time. Moreover, modern scholarship is exacting, if not finical, and subjects everything to the test of such high magnifying powers that the field sometimes is accordingly small. Lord Sherbrooke said in irony: "an Oxford professor of Greek who could not pluck Æschylus with ease would be deemed dull and inefficient," and professor Rolfe said recently: "I have just spent six months of stimulating work most profitably in preparing, for the forthcoming Latin dictionary of Woelfflin, an article on the preposition *ab*." If cognizance be taken of the rarity and cost of books, and lack of opportunity for special studies in those times, it is no wonder that weighed in the balance of recent criticism Chaucer is found somewhat wanting. By State records, a written bible, or book of like bulk, cost at that time a sum equal to four hundred dollars of our money. Teubner's three hundred volumes of Greek and Latin authors, can now be bought for less than half that sum.

Ben Jonson said Shakespear knew little Latin and less Greek; still he managed to exploit some of the richest quarries of the old learning. In Latin Chaucer was more learned than his great successor, though like Shakespear he knew but little Greek. Few scholars in the XIV century did. They had but

the glimmering twilight of the renaissance; its noonday came after the Turk drove from Constantinople Greek scholars scattering them throughout Europe, and after Lascaris, Aldus, Politian and their friends kindled in the learned world a passion for Hellenic studies.

Chaucer refers to more than a score of Latin authors, some writers of poetry, others of prose. Ovid was his favorite poet; and for prose his favorite was Boethius, a writer of the late Latin period, whose work "Consolation of Philosophy," he translated, as Alfred the Great had previously done. He was also conversant with some of the patristic writings of Jerome, St. Augustine, Origen, and Tertullian. To the collection of popular stories called the *Gesta Romanorum*, and to that other singular collection called the Golden Legends, he often refers. From the Legends his account of St. Cecilia was taken. Innocent III before he was Pope wrote a work called "*De contemptu mundi*," which Chaucer often quotes; and he knew the somewhat credulous book written by Orosius, to shew that the troubles of the times were but a continuation of the war and misery inseparable from every period of history, and were in no way attributable to the early christians. Chaucer also refers to works on medicine, on mathematics, and on astrology which he designates "superstitious cursedness." Of the books he quotes, most have come down to these times, though a few are known only by name.

With the History of Troy, the most popular of the Medieval legends, Chaucer was familiar, and turned it to good account. The course that legend ran is interesting to all lovers of English literature. Benoit de Saint More took the account of Troy, current under the shadowy names of Dictes, and of Dares, and in the XIII century expanded it into a French poetical version of nearly thirty thousand lines. That was turned by Guida da Colunna into Latin prose without acknowledgment, and as until thirty years since the plagiarism was not detected, for six centuries Guido reaped in reputation where Benoit sowed. One episode of the legend is the story of Troilus son of Priam, and Cressida daughter of Calchas the Trojan priest. That story

inspired Boccaccio, and through him Chaucer, whence his "Troilus and Creisida." Moreover Lydgate's Troy book, and the Troy book Caxton translated from the French, which was the first book printed in English, are from the same source, as is also Shakespear's tragedy of that name.

Chaucer became a soldier, and went into France, with the English army of invasion, during the war, began in 1359. He was taken prisoner by the French, and on March 1st, 1360, King Edward III paid sixteen pounds sterling for his ransom. That was a small sum, but money was worth fifteen times as much then as now. In those days a cow sold for five shillings; wheat was two shillings a quarter; Judges of the High Court received forty pounds a year; and labourers and mechanics worked for wages averaging from a penny to threepence a day.

About 1366 Chaucer married one of the ladies in waiting to the Queen; and the same year he was granted an annual allowance of £13. 6s. 8d. The name Chaucer appears several times in records of that date, and in one or two instances has been held to refer to the poet's children; but there is trustworthy evidence of only one son, the boy for whom Chaucer wrote his "Treatise on the Astrolabe." The opening sentence of that lesson has the ring of genuine affection. It reads:

"Little Louis, my son, I aperceive well by certain evidences thine ability to learn sciences touching number and proportions."

Several writers speak of Chaucer's marriage as unhappy; and a record of some abduction, come of late to light, has been impressed into service of that opinion. Infelicitous wedlock is unfortunately confined to no class, it laughs at barriers, and merit is powerless to resist its insidious attack, as John Milton, and John Wesley can witness. In this instance we may "forbear to judge," for as Professor Lounsbury says:

"To interpret two or three passages in his writings to mean his life with his wife was unhappy would compel us to reverse our whole conception of the poet's character."

In 1360, Blanche, the wife of John of Gaunt died. To commemorate her worth, and the sorrow of the Prince, Chaucer wrote "The Death of Blanche the Duchess." His threnody,

though written after a French model, does not lack originality, and concludes in a strain of true pathos. It is one of the poet's earliest pieces, and serves as the surest chronological starting point of his works. After this, little trace of Chaucer is found until 1366, when his name appears on the list of esquires of the King. His relation to the Royal household, made known to Chaucer many celebrities of that day, as Philippa, the Queen, by the poets, minstrels, and notables she assembled in her train, added to the distinction of the Court. In the reign of Edward III, pestilence, war, and civil tumult, reduced the population of England to about four millions. But for all such a combination of horrors, national spirit was neither retrograde nor stationary. Socially there was an effort to improve the lot of the people, and to make devotion to truth, honour, freedom, and courtesy —the ideals of chivalry—something more than high sounding words. The arts too made advancement despite such difficulties. Mural paintings, richly coloured windows, and elaborate foliated ornamentation, became a fashion, and enhanced the beauty of public buildings, whose stateliness the west front of York Minster, and the spire of Salisbury Cathedral make known to this day.

Chaucer went to France twice with the army, and between 1370 and 1379 he crossed the channel several times, on peaceful missions for the Government. On his second tour in 1372 he visited Genoa and Florence. Landor makes that visit the setting for an imaginary conversation at Arezzo, Petrarch's birthplace, between the three poets Chaucer, Boccaccio, and Petrarch. The meeting was of course entirely suppositious, although it might have taken place. The firmer ground on which belief of a meeting between Chaucer and Petrarch rests is: The Clerk of Oxford's Tale is Petrarch's Latin story of Griselda, taken from Boccaccio's story in the Decameron. The Clerk in his prologue says, he learned that tale at Padua, of Frances Petrarch the lauriet poet, whose poetry shed light over all Italy. And giving force and reality to that statement he adds:

> "He is now dead and nayled in his cheste,
> I prey to God so yeve his soule rest."

After Richard II became King, Chaucer was entrusted with the delicate mission of negociating a matrimonial alliance between him and Mary, daughter of Charles V, King of France. Charles, called the sage, cared less for the glories of war than for works of peace, and two of his institutions, though dissimilar, the Bastile and National Library, have received world-wide attention. From his predilection for peace, it was thought Charles might favour the object of Chaucer's mission as a means of ending the war; but the negociations were unsuccessful. In 1375, Chaucer became comptroller of customs and subsidy of wools, skins, and tanned hides at the port of London. By terms of his appointment, the rolls of his office had to be written in his own hand. After some time his office was made more important by placing the petty customs of the port in his charge; and he was allowed to engage a deputy. Chaucer may have been, likely was, the first poet of note to collect revenue for the English Government, but he was not the last. Dryden discharged almost the same duties; Burns was an excise officer; and Wordsworth received from £500 upwards a year for some time from the Government Stamp revenue service.

The wedding of Richard II with Anne of Bohemia, took place in January, 1382; and Chaucer wrote in celebration of the marriage his "Parliament of Fowles," a spirited poem in which Richard, the royal eagle, finds favour in the eyes of Anne, when eagles of less royal mien plead vainly for her affections. In 1386, Chaucer sat in Parliament as Knight of the Shire for Kent. Members of parliament then, and for long after, were paid what was bluntly called wages; a Knight receiving four shillings, and a burgess two shillings a day. Chaucer took part in discussions of the hour; but the fates were against his political party. The Government side was supported by Chaucer's patron John of Gaunt, who, before the house met, went to Spain to prosecute some suppositious claim to the Spanish throne; and in his absence the opposition controlled by the Duke of Gloucester, overthrew the Government party. Chaucer's income from the customs, his pensions from

the Crown, and from John of Gaunt, together with his daily allowance of wine from the King, gave him several years immunity from monetary cares. But the wheel of political fortune turned, and forthwith came less pleasant times. With the new Government he at once lost his office in the customs, and in 1388, his Court pension was taken from him.

A further turn of the wheel of political fortune brought Chaucer's party again in power, and he became Clerk of the King's works at Westminster, Windsor, and at the Tower, where costly alterations were made. In two years more he was again out of favour with the dominant power; ousted from office; and though the King never quite forgot him, he was in straightened circumstances so long as Richard II reigned. When Henry IV became King, in 1399, Chaucer addressed to him "a compleint to his purse," stating that it was light, that he needed help: "For I am shave as nye as is a frere." The King answered his application and granted him a pension in October, 1399. Two months afterwards Chaucer leased a tenement in the garden of St. Mary's Chapel, Westminster, and on the 25th of October, 1400, he died. He was buried in St. Benet's Chapel in Westminster Abbey. His place of sepulture, the east aisle of poets' corner in the Abbey, is to all who love English literature a hallowed spot. Near to Chaucer's tomb rests Spencer, "the prince of poets of his time," with Browning and Tennyson, princes of song in our time, while surrounding are presentments in marble of that choir of "singers silent long," whose "glorious music" is our heirloom from the intervening centuries.

Chaucer's manners were pleasing and attractive, and he was a modest, cheerful companion, thoughtful indeed and sometimes taciturn, but when he chose to be jocose, his humour was resistless. Reverential and religious at heart, his satire could nevertheless sting, like a scourge of scorpions, hypocrisy and deceit. The artistic faculty was dominant in his well balanced mind, and was the central gem which gave refulgence to the rich setting of graces which adorned his character. That divine faculty found good in everything, and to it nothing

was common or unclean. After Chaucer's death, Hoccleve, one of his contemporaries, caused to be painted a picture of the poet, which has become famous, and which sustains the best estimates of his character. It represents a well knit elderly man, of medium size, and whitening hair. He is clad in dark hood and gown, and stands with right arm outstretched and index finger extended as if to emphasize something he had just said. In the left hand is a rosary. The eyes are full, features regular, and the brow and nose indicate perfection of refinement. A shade of sadness rests upon the face, and the averted eyes are looking downwards; eyes and mouth both betoken rich humour, and fathomless sympathy. The ballade "Truth, or good Counsel," Chaucer is said to have written on his death bed, incidentally illustrates some of the finer traits of his own character. Though the whole ballade must be read to realize its beauty, I quote one verse:

> "That thee is sent receive in buxumnesse,
> The wrestling for this world asketh a fall.
> Here is no home, here is but wilderness,
> Forth pilgrim forth! Forth beast out of thy stall,
> Know thy country, look up, thank God of all;
> Hold the highway, and let thy spirit lead,
> And truth shall thee deliver, it is no dread.

Five hundred years have passed since Chaucer lived, and in the interval between his day and ours lovers of English literature have devoted no little time and learning to furnish an accurate text of what Chaucer wrote. The result of this labour is embodied in the noble "Oxford Chaucer," edited by professor Skeat and published in 1894, and in the excellent "Globe Chaucer," published by Macmillan & Co., in 1898. These works meet fully all ordinary requirements, although their editors take pains to say, a definitive text, absolutely satisfactory to diplomatic criticism, is yet to come. To rightly estimate the difficult task of establishing such a text one must bear in mind: Chaucer wrote a century before the days of printing; and although more than fifty manuscripts of the Canterbury Tales, and from one to a dozen manuscripts of the several

minor poems are known, they were written when the language was in a transition state, and abound with various readings and interpolations. Had Chaucer acknowledged any one of these written copies its authority would of course have been settled; but excepting a copy of one of the minor pieces written for Henry V when Prince of Wales, and therefore before 1413, the date of all is conjectural, and most likely none goes back to the poet's lifetime. With the perfected system of printing, absolute freedom from typographical error is next to impossible; and it can be no marvel the ancient Scribe, chosen for his writing skill rather than learning, and working with few of the printer's aids to accuracy, should err. And err he did, often and egregiously. How gross some of his blunders were may be inferred from an instance quoted by Lounsbury from a written copy of the Canterbury Tales. The Saxon verb *herian* means, to praise. Wycliffe says: the shepherds when they had seen the infant Saviour "turned glorifying and *herying* God." When the Marquis of the Clerk's Tale has a son born to him, of his folk it is said: "God they thank and *hery*," that is they thank and praise. But in the written copy Lounsbury quotes, the scribe, led away by the sound, wrote: "God they thank, for he was *hairy*." In another passage the monk is said to fasten his hood under his "*shin*," when *chin* is the word meant.

Caxton printed the Canterbury Tales in 1478, and six years afterwards learning his book was not according "unto the book Geoffrey Chaucer had made, to satisfy the author"—as Caxton quaintly writes in his preface—he printed another edition. Only eleven copies of the first edition, and nine of the second are now known to exist. Pynson, one of Caxton's assistants, treading in his master's steps, attempted to gather all Chaucer's poems into one volume; but his collection was incomplete. A better attempt to form a complete collection was made by Thynne, in 1532. Thynne, who served in the household of Henry VIII, obtained a royal commission giving him authority to search all the libraries in England, that his collection might be complete. For more than two centuries it

was the accepted edition of Chaucer. A second edition appeared in 1542, notable for including the Ploughman's Tale. That attack on churchmen had never before been printed with the Canterbury Tales. After much discussion as to whether this tale was written by Chaucer, it is now rejected as spurious.

Without entering into bibliograpical details, foreign to this paper, it may be said that after Speght's Chaucer of 1598, and his second edition bearing date 1602, for which he had aid from Thynn, the younger, whose father had supervised the edition in time of Henry VIII, already mentioned, no important edition of Chaucer appeared until that of Urry in 1711. He began the work of collating fourteen manuscripts of the Canterbury Tales, but died before his task was finished. His work is notable chiefly because he was the first to adopt modern editorial methods of collating written copies of his author, and because his Chaucer was the first in which the ueo s f black letter type was abandoned. In 1775, Trywhitt studied twenty-six manuscripts for his edition of the Canterbury Tales. Knowledge of English grammar has advanced long strides since his day, enabling Wright and others to take him sharply to task for grammatical shortcomings. Nevertheless Tyrwhitt brought to his undertaking, learning, enthusiasm, poetical taste, wide reading, industry, and an acute critical faculty; rare gifts which won for his work praise from impartial judges. With the nineteenth century came new zest for early English literature; and this generation has been favoured with a band of earnest Chaucerian workers and scholars. Wright, Bell, Morris, Skeat, and Pollard have done excellent work by their respective editions of Chaucer; and Henry Morley, Furnivall, Child, Bradshaw, Ten Brink, and Lounsbury have made Chaucer and his times attractive subjects wherever English books are read.

Seventy-seven pieces, each with distinct title, have been at one time or another attributed to Chaucer's authorship. Some of these are flagrant impostures, making reference to events which happened after Chaucer's death. The spurious Pilgrim's Tale refers to the Lincolnshire insurrection, a revolt described

by Thomas Cooper in his "Captain Cobbler," which did not take place till 1536, the time of Henry VIII. Other similar pieces require no iconoclastic spirit to drive them from the estimable company into which they have been thrust; their own crude lineaments bespeak them to be of other workmanship than the master's hand. With some pieces, the task of adjudging is more difficult; and a few of the minor poems are still *sub judice*. The scrupulous examination to which everything doubtful claiming to be of Chaucerian origin has been subjected, has greatly reduced the list formerly accepted. Besides the usual tests applied to works of doubtful authenticity, everything bearing Chaucer's name has had to undergo tests of grammar, dialect, rhyme, and rhetorick of the utmost minuteness, and almost without end. The council of criticism which has confirmed the accepted Chaucer canon decided more than half the seventy-seven pieces under judgment to be apocryphal. Only twenty-two poetical pieces, comprising thirty-five thousand lines, are sent forth from the ordeal bearing an indubitable stamp of genuineness. There are also four prose pieces held to be genuine: the Boethius; Astrolabe; Parson's sermon; and the tale of Melibeus. There remain five short pieces of poetry considered to be doubtful; and doubt still attaches to parts of the Romance of the Rose.

Of rejected pieces, the Pilgrim's Tale and the Ploughman's Tale have provoked more discussion than the rest. The Pilgrim's Tale was lost for many years, but was rediscovered and printed by the Chaucer Society in 1875. Thynne the younger says, when his father proposed to Henry VIII to include this story in his edition of Chaucer, the King said: "I suspect the Bishops will call thee in question for it." But when Thynne further asked the royal sanction to include it, and for protection, the King said: "Go thy way and fear not." Still, for all that, he says at Cardinal Wolsey's instance it had to be thrown aside when printed, and was not allowed to appear in that edition. The Pilgrim's Tale is now admitted on all hands to be spurious; and though Thynne's gossip may in the main be trustworthy, the dates show some mistake in his

story. Wolsey died in 1530, and was out of favour at Court for at least a year before his death; while the elder Thynne's first edition of Chaucer bears date 1532, so that any preventive action by Wolsey regarding the contents of Thynne's book must have been two years before it was printed. Moreover, the Pilgrim's Tale we know refers to Captain Cobbler's revolt in 1536, six years after Wolsey's death. Possibly as the Pilgrim's Tale and Ploughman's Tale were not unfrequently referred to, one for the other, as Lounsbury suggests, the latter tale might be that meant by Thynne the younger. Such an explanation removes most of the difficulty. The Ploughman's Tale certainly deals harder blows against the misdeeds of Churchmen than does the other tale, and would be more obnoxious to the Cardinal than the other. And further, the Ploughman's Tale was not in Thynne's first edition of 1532, but was in the second edition of 1542, when after ten years' antagonism the King became more truculent towards the Church.

Leland, writing in the time of Henry VIII, says: "The "tale of Piers Plowman, which, by the common consent of "the learned, is attributed to Chaucer as its true author, has "been suppressed in each edition because it vigorously in- "veighed against the bad morals of the priests." Leland's opinion, with few exceptions, prevailed until near the close of the last century. Even Dryden shared in it. But Warton, after stating that the Ploughman's Tale is attributed to Chaucer, adds "perhaps falsely." Soon after Warton's expressed doubt, Tyrwhitt shewed plainly by internal evidence of the poem itself that Chaucer was not its author; and his opinion has since been generally accepted. Of recent writers, whose words carry authority, Lounsbury may be taken as a representative. He says: "Nothing but the bitterness of religious "controvery, coupled with defective literary sense, could have "imputed the Ploughman's Tale to Chaucer in the first place. "There was not the shadow of evidence in favor of the view "that he was its author."

A taint of the rancour which then marked religious discus-

sion in England infected this subject. There was hope that by coupling Chaucer's name with the Ploughman's Tale he would be deemed friendly to Wycliffe's followers and opposed to their foes. Wycliffe, a proficient in scholastic disputation, also handled vigorously most of the popular questions of that day. This he did at first in an academic theoretic manner, in the Latin tongue; but after a time his poor parsons in their long, coarse, russet-brown woollen raiment, wandering barefoot with pilgrims' staves from place to place, became efficient propagandists of his doctrine. Some of these parsons were blamed over the peasants' revolt; and John Ball, one of the leaders, claimed Wycliffe for his teacher. But that was said under sentence, and cannot be received without reserve, as Ball was excommunicated before Wycliffe's time. The chance to associate Chaucer's name with this obnoxious tale seemed favorable. His patron, John of Gaunt, was Wycliffe's friend; and Chaucer's artist instinct saw a good side in Wycliffe's followers to which most of their enemies were blind. But proof is lacking that Chaucer sided with Wycliffe in his religious contest. Like the great Italian writers of that time, he satirized the vices of the clergy, as did his contemporary Langland; but in both instances the lash was in the hand of a friend, and not an enemy.

As a pioneer of modern English literature, Chaucer influenced the mother tongue more than any of his successors did. Lydgate, the Monk of Bury, a competent authority, who knew Chaucer well, called him:

> "The first in any age
> That amended our language."

Some of these amendments have been deemed corruptions; still time, the great arbiter, has stamped them with approval. But Chaucer had no set plan to change the English language. He wrote the East Midland dialect of his time, just as Luther wrote in the current dialect of the Chancery of Saxony; and as both writers were more widely read than others, they exercised paramount influence over the written language of their respective countries. The linguistic changes of his age, which

Chaucer's writings did so much to establish, were important enough to mark a new era in English literature. Alliterative poetry was discarded for poetry which rhymed after the French method. Langland's Piers the Ploughman, written in Chaucer's lifetime, was the last alliterative poem preserved. A number of native words were replaced by words of French origin; and many Saxon adjectives were supplemented and reinforced by French forms. That practice was long followed; the Troy Book, by Caxton, abounds in two sets of adjectives—one of Saxon, the other of French derivation, and both meaning the same thing. There also came in vogue important permutations of vowel and consonant sounds, and considerable change took place in inflected words. But structural changes, though important, were likely least noticed at the time, because of their slow growth. Of old English nouns, which had at first six cases, only the *s* of the possessive case is now left. Originally the dative ending was *e* for the singular, and *um* for the plural; in the XIII century only *e* was used for both singular and plural; and in the XIV century the *e* was also lost, and the dative, as it has since remained, became the same as the nominative. The English language, by four centuries of contact with Norman French, took a richer vocabulary and many changes; but its structural features remained essentially Saxon. As an old writer remarks: "The Normans "conquered the land but could not conquer the language, "though they did mingle with it much of the French." Its words for number, and its particles, prepositions and conjunctions, the characteristic traits of a language, kept the German forms. And such forms continue; the strong verbs of the language still take ablaut or change of the root vowel to denote past time; and traces are left of that weakening mutation of vowel sound by a following vowel called umlaut, which is a marked feature of German speech.

Also since Chaucer's time English speech has further changed in many particulars, though its structure remains still the same. Increment of its vocabulary now makes the list of an English dictionary include more than three hundred thou-

sand vocables. What a change, too, in the number speaking that language and the area in which it is spoken. Chaucer wrote for a few readers scattered among a population of less than four millions. The great writer of to-day appeals to an English speaking public of more than a hundred millions that has fewer illiterates to the mass than ever before, a fact which calls to mind these words of Grimm: "The English tongue, "like the English stock, seems chosen to rule in future, in a "greater degree, in all corners of the earth."

The Canterbury Tales are Chaucer's masterpiece. The offspring of his mature powers, their original plan of narration, and finished style, betoken long training and rare gifts. Of cunning pattern deftly wrought, the frame of the picture is like the setting of some Eastern story, while the picture itself portrays in unique manner the life of that age. Boccaccio's prologue to the Decameron adds to the interest of his stories; and the epilogues to the tales written by Marguerite of Navarre a century later are pleasing and instructive; still both are surpassed by Chaucer, whose work carries all the force and realism of life with the attractive charm of art. The poet introduces to his reader with grace, yet directness, a party of pilgrims casually met to rest over night at the Tabard hostelry, Southwark. They are on their way to the shrine of Becket, the Archbishop murdered in his Church by four knights of Henry II in gruesome answer to their Sovereign's prayer that he might be "rid of that turbulent priest." Canonized as St. Thomas of Canterbury, miracles surpassing those at the Rood of Bromholme, or for Our Lady of Walsingham, were by repute wrought at his shrine. Henry II did penance in the Church for his murder; and in after years his shrine was despoiled and his bones scattered by Henry VIII. Pilgrimages to Canterbury were common in Chaucer's day; chiefly from motives of piety, to which secondary pleasures of fashion and perhaps a tinge of politics are also to be added. The word *canter* remains in the English language as a reminder of the easy pace of a pilgrim's horse towards Becket's shrine.

The spring of the year so beautifully described in the

opening of the poem was the time that remarkable meeting took place. Some lover of precision, from particulars incidentally mentioned by the poet of the heavenly bodies at the time, computes the exact date was the 26th of April, 1383, though Prof. Skeat thinks five years later fits best into all the known data. There were "well nine and twenty of the company," a fair representation of English social life, the very highest and lowest excepted. In his prologue to the tales Chaucer has inimitably sketched that gathering, leaving a picture hardly to be equalled, and of increasing value the longer the English language is read. After supper their host, Harry Bailly, a man fit to "han been a Marshal in an hall," made everybody great cheer, and proposed further to them a plan for making theirs a pleasant ride to Canterbury. His plan was: each pilgrim on the way "Canterburyward" should tell two tales, and homewards he should tell other two, of "aventure that whilom han befalle," and on their return to the Tabard the teller of the best tale should have supper at the others' cost. If they agreed to this he, Harry Bailly, to keep them merry would ride with them as their guide at his own expense; as marshall of the company he should tell no tale, and whoso withsaid his judgment "shal paye al that we "spenden by the weye."

The host's proposal was accepted on his own conditions; and the party in the morning, "when day gan for to spring," rode forth at little more than a walk. Pilgrimages were evidently leisurely made, as pilgrims from London usually slept at Dartford, Rochester, and Ospringe, reaching Canterbury on the fourth day. By the "pilgrims' way," on which portions of an old pilgrim's house, it is said, are still left, the distance from London was fifty-six miles. How long Chaucer's memorable company was *en route* is not said. Harry Bailly marshalled the party as behooved his reputation. In all twenty-four tales were told. One, the story of Alchemy, was told by the Canon's yeman who joined the party on their way; two were in prose; the Cook unfortunately was found to be in unfit state to tell a story, and was stopped at the beginning of

his tale; and the Sir Thopas tale—Chaucer's own—in metrical romance style, made the Host's ears ache so that he cried "no more of this"; and nine of the party for reasons unknown told no tales. The company when under way, without the host, appears to have numbered thirty-one or two, a slight addition to the twenty-nine first mentioned. There was also departure from the intention for each pilgrim to tell two stories on the way out, and two returning; but whether that is proof the poem is a fragment, or is only a little artifice to whet the curiosity of the reader, each one determines for himself.

Such is the frame of this famous picture; as for the picture itself, its consideration falls beyond the scope of this paper. It may be fitting to add, that motives for the work were taken from every available source; some from popular stories told in the gloaming, around the peasant's hearth, most of them tales of Latin, Italian and French writers, one or two of which tales have been traced from Buddhist Jatakas, through all sorts of highways and byways of literature. A few of these stories are coarse and repellant; the author says, had they been otherwise they would have been false to the life depicted. It may be added that Chaucer's low comedy is told after the modern dramatic fashion by pairs, not to offend the rest; and all rudeness and selfishness is made to inspire disgust, and beget esteem and reverence for the purity and unselfishness of the nobler characters of the poem. It was an act of poetical daring on the part of Chaucer to transfer the musical work of the Italian poets into the untried ten syllabic metre of his native tongue; but he attempted, and successfully accomplished his task. Swinburne, a past master in the art of melody, says: "Chaucer, with Teutonic accent through English lips, speaks "not only with more vigor, but actually with more sweetness "than the tongues of his teachers." For the rest, let the closing words of introduction by Mr. Pollard to his recent edition of Chaucer suffice: "As a poet Chaucer needs to-day no one "to praise him. He has been praised already wisely and well "by many clever writers. All that is now needed is that the "praise shall no longer be taken contentedly on trust; but

"that his poems, which in their freshness and restfulness must
"in this century have more power of pleasure-giving than ever
"before, should be allowed to speak for themselves to ears no
"longer deaf."

NATURAL HISTORY NOTES.

Read before the Hamilton Association.

BY WM. YATES, ESQ.

The communistic or socialistic tie seems to be as rigidly adhered to in assemblages of the larvae of moths as in the inmates of the bee hive or of the anthill, and in associations of the caterpillars of tree-boring Coleoptera, a regularity in the method of conducting operations is observable, for, as soon as the young emerge from the egg, the grubs assume a numerical organization that reminds one of military recruits under the orders of a drill instructor. The channels gnawed out by companies of these beetle larvae on the inner bark, as also on the surface of the juicy sap wood of recently fallen trees, particularly of the elm species, in symmetry and precision of plan, are interesting objects of regard. The individual grubs advance, twenty to thirty in number, in two parallel lines, feeding at small distances from each other, as it were, en-echelon, with the uniformity of the steps of a ladder. Pieces of elm bark when removed from the tree trunks show an interesting design that would show pictorial effects if correctly imitated by the draughtsman's art. The spinners and weavers, too, in the tent-caterpillar communities seem each animated by a common, yet differentiated impulse that contributes from various starting points to the completion of a harmonious design; the same controlling tendency or idea can be sometimes noticed in groups of larvae of several species of small moths, in their hybernations and winter dormitories, as seen under wood chips and fragments of tree bark, and in undisturbed litter near fences at the forest border. The gregarious habit and instinct is also frequently noticed in ophidians (and it is said by the chelonidae or mud turtles also), when by mischance dug out of their winter retreats, the all-pervading in-

stinct of greater individual safety seems the dominant factor in such communities. Many species of birds, as well as quadrupeds, as is well known, have strong congregating tendencies, and it oftimes seems curious to observe that the sudden oncoming of great danger or cause of alarm impels different behavior or strategy at some times from that at others. Some of the more courageous species of birds, as the crows, jays and picadae, unite their numbers for defense and retaliation when assailed by certain kinds of enemies, and especially such is the case when called on to brave dangers that seem a menace to their young; but there are other occasions when the danger is of a paralyzing nature, such as is sometimes experienced in thunderstorms and tornadoes, by quadrupeds as well as birds. On one such occasion, that we were witness of, one of a flock of thirteen or fourteen sheep was struck when grazing in a field by the electric fluid, and the flock was seen instantly to radiate from the danger center, as the spokes do from a hub of a wagon wheel. One of the ovine group was struck between the hips by the lightning, and in a few hours afterwards died from its injuries. The unfortunate animal was about the finest of the flock, and the only black-colored one in the number, with an extraordinary heavy fleece, and the electric current seemed to have passed along the spine, thence to the stomach, and by way of the œsophagus gullet, etc., through the mouth (as the animal was pasturing at the time), into the ground; the digestive fluids passed from the full stomach in a yeasty condition to the mouth, until the speedy death of the unfortunate beast.

On another similar occasion, being at work in the forest when a violent thunder storm came on, and we were fain to take shelter in a dilapidated log shanty that had been built for the use of wood choppers in years agone, on looking out when the storm gave signs of abatement a vivid flash seemed to strike a large tree not far distant from the shanty, followed instantaneously by the thunder clap, and a flock of about twenty or thirty grackles which had been sheltering near by suddenly dispersed in flight, notwithstanding the rainy down-

pour; and the aberrant and confused movement of each individual bird was an interesting exhibit of hesitancy and complete bewilderment of the ornithic group, yet in a few seconds, as the cause of alarm subsided, the party were seen to reform and the ties of affinity reasserted themselves. It is also affirmed by persons who have had experience on those lines that droves of semi-wild cattle that pasture in the forest avoid concentrating their numbers when trees or tree branches are being blown down by violent winds or sudden tornadoes. In fact, at such times the bovine tribe can be observed to seek safety by deserting the bush territory, if possible, and keeping together in the open or clearings. Many curious incidents where danger or injury to human being was incurred by lightning in this district could be narrated, and we may here be excused for giving several such. Two young women, farmers' daughters of the neighborhood, went to gather raspberries to a place a mile or two distant from their home. In a short time after the girls had begun fruit picking a brisk thunder storm came on and they hastened to seek shelter in the adjoining woods. The rain soon descended in torrents, and as they cowered under the wide-spreading lower branches of the undergrowth saplings a lightning flash struck a large maple tree that grew ten or twelve feet from the position occupied by the girls, who were for a few moments almost rendered unconscious by fright. They afterwards described their situation as being apparently encircled by a small roaring illuminated whirlwind, which caused the dry forest leaves on the ground near to their feet and also the foliage just over their heads to twist and whirl in violent commotion, almost causing suffocation for several moments. The parties, on recovering presence of mind, ran through the drenching rain to the nearest dwelling, about a quarter of a mile distant, where the writer of this happened to be at the time, and as soon as the storm had quite passed away (on being requested to do so) one of the girls kindly returned with him to see what permanent marks might have been caused by the electric discharge at the danger spot. With the exception of a

somewhat "ruffled" appearance of the dead leaves on the surface of the ground near the big tree above alluded to, no havoc seemed to have resulted, but as the said tree stood on land close to the boundary of that which was in our possession, we had frequent occasion to pass that way, and in less than a year after the above incident a rift or lightning crevice appeared from the top to the base of said tree, which soon afterwards died; the electric discharge seemed not to have been sufficiently energetic to force off the coarse bark of the tree over the crack, just at the moment of striking, yet the same had been separated from the sap wood (like a ribbon) the length of the tree trunk, and the truth became manifest that the young women shelterers had had a narrow escape from instantaneous death. Another curious effect of lightning stroke on a forest tree may be here described. The time of the year was the second week in May (about the 15th, I think). Vegetation that year was quite backward, but a warm wave seemed approaching, accompanied by hazy clouds and drizzling rain, when about the hour of three in the afternoon a vivid flash of lightning, instantly followed by appalling thunder, caused the several inmates of our dwelling place much sudden perturbation of mind, yet there was no second flash or second thunder on that day, and we were unaware until the following day what damage had been done by the explosion. About one hundred and thirty yards from our dwelling the lightning had struck a large thrifty basswood tree that had been left to grow in the middle of a clearing smashing the same literally to atoms and scattering the timber fragments in every direction around and among all the woody debris. Only one piece was found sufficiently large for a fence rail. On carefully examining the pieces and portions of the upper trunk, the fact was made plain that the electric bolt or ball of fire had struck the main stem, not at the summit, but on the northeast side, and at a distance of seven or eight feet from the highest part of the tree stem. The place of entrance was of a semi-circle form (the bow upwards) of about two inches across the arc. The phenomenon demonstrated

the irresistible power of the subtle electric fluid in repelling and destroying the cohesion of atoms of matter, for a band of about the same diameter of the spot of entry, the stringy, tough inner basswood bark down to the roots of the tree (or nearly) had been "hetchelled" into fibres as threadlike as those of hemp or flax, and enough of this substance had been instantaneously manufactured to about fill an ordinary flour barrel, and so soft and mosslike was the substance that portions of the same were made use of by the poultry people of the vicinity for "goose nests" in the "setting" season of the anserines for years afterwards.

The pioneers of the Irish had an axiom that basswood trees are more liable to be lightning struck than any other forest monarchs. Can this be owing to their great size and altitude? On our first settlement here about ninety acres of our demesne was primitive forest, and among other varieties of deciduous trees about fifty basswoods could be counted of massive and mature growth, and the fact was notorious that almost every one of the number gave evidence of lightning stroke, yet from whose effects they had recovered without very serious injury. It may here be thought worthy of remark that a majority of these basswoods were of taller growth than the maples and beaches by which they were generally surrounded.

A curious instance of the extraordinary nature and intensity of the heat of some of the lightning flashes was furnished near this spot a few years ago, when, during a July (I think) thunder storm, a very large basswood tree, which had been left to grow for many years amid cultivated grain crops, was stricken by a powerful electric discharge from the clouds. The tree was instantly set on fire and burned with such rapidity and vigor that, notwithstanding its towering mass, its crown of green foliage and its sap-repleted conditions, this monument of the ancient woods was totally consumed in the space of a few days' time, and speedily thereafter the plow furrows were traced over the spot where the tree's noble proportions had adorned the landscape for many a year.

Barns containing a large quantity of hay newly stored, or of recently harvested sheaves of cereals, which may be thought to emit a rarefied air or fermenting gases, seem attractive to electric currents in the atmosphere when thunder clouds are about. About two and a half years ago a large barn near here and valuable contents were burnt by lightning during a nocturnal thunder storm. During the day previous to this burning fourteen large loads of millet sheaves had been hauled from a harvest field and stored in the already partly hay-filled edifice. During the progress of the violent midnight tornado a neighbour who, being anxious for the safety of his own outbuildings, was looking out of the window, saw two streaks of lightning dart together from two separate clouds and unite in the sky just over the doomed barn. The much-enlarged fire streak after the junction struck the building, which, with all it contained, was quickly reduced to ashes. The facts in this case support the above theory.

A subject of occasional reflection has been the difference in the wild plant garniture of two well-defined zones or areas in this county and the sharpness of the limits by which the said areas are bounded. A wooded swamp of only two or three hundred yards in width, but stretching lengthwise across a number of concessions in Burford Township, divides what is called "The Plains" from the heavier timbered sections or districts of Brant County. There are several genera of wild flowers abundant in one of these divisions that do not exist in the other, and even where the genera may be identical or similar the species differ in one zone from the other. A few may be here noted:

SCRUB OAK SECTION OR PLAINS FLOWERS.

Lobelia Virgata; Houstonia Purpurea; Hypoxis Erecta; Gillenia Trifoliata; 3 Gerardia's; Asclepia Tuberosum; Quercus Alba; Rosa Lucida; Polygala Seneca; Laurus Sassafras, etc., etc.

TIMBERED MAPLE SECTION.

Various species of Viburnum Acentifolia; Phlox Divaricata; 2 Hydrophyllums; Actea Rubra and Alba; Asclepias Cornuti; Lobelia Inflata and Incarata; Laurus Benzoin; Euonymus Obovatum; Orchis Psycodes; Epipbjum Angustifolium; Menispirmum Canadensis; Quercus Bicolor and Rubra, etc., etc.*

These varying phenomena must, one would think, indicate essentially different chemically constituted soils, as the plant varieties do not intrude on each other's habitat, and if artificially transplanted refuse obstinately to naturalize in the alien soil. It would seem as if where the right conditions exist, the organizations are sure to evolve as if from omnipresent spores or aerial germ dust. To the southward a few miles another plant zone may be noted where novel species flourish non-existent in either of the aforementioned.

The numbers of the common bluebirds which seemed much depleted three years ago have returned to about their normal proportions, and their warblings were heard at all hours of the day about here until the last days of October, yet it has been noticed that these birds have of late years become much more shy in choosing situations for nesting, scarcely ever of late coming to the near vicinage of dwellings or outbuildings. Probably the repellant influence of the immigrant sparrow may account for this universally admitted change of habit.

The various movements of wild creatures on the approach of the cold season are remarkable. The land snails sometimes utilize for winter shelter the vacant (or otherwise) burrows of the ground hog. The larvae of the May bug, although seemingly so sluggish and helpless in their motions, perseveringly work their way downwards to the warmer subsoil as the temperature of the surface becomes less genial to

*NOTE.—Only a few of the more striking and prominent diversities are enumerated here.

various forms of life. The earthworms also perseveringly descend during the nights of October to the depth of two to three feet from the surface of fields. These annelids seem to avoid light sandy subsoils and choose in far greater numbers those of the unctuous or tenacious clay variety. When the farmers are engaged in digging pits or depositories on some hillside for the winter storage of root crops, numbers of earthworms, having penetrated in various stages of growth, are disinterred; a large proportion of young ones are met with, the parent worms having penetrated into the impacted and indurated clay in an astonishing manner. This tunneling can only have been accomplished by the worms softening the matrix by a saliva-like secretion, and the excavated material serves as food. These annelid burrows are met with to a depth of three feet, are beyond the reach of frost, but early in May or sooner the annelids, etc., promptly reappear at the surface to enjoy the increasing vital warmth.

II.

An indisputable portent of the approach of spring was the curve of warm temperature that manifested itself during the second week of February, and of five or six days' duration. On the 11th our thermometer stood for several hours at 53 degrees in a Northern exposure. On the 10th one of our acquaintances tapped several maple trees, and from sap procured from them on two or three succeeding days informs us that he made more than two quarts of delicious syrup, and during the same week of mild skies those true forerunners of spring, the horned or prairie larks, made good their appearance about our pasture stubble-fields in small scattered parties. And judging from former experiences these ornithic visitors might have been expected. They come into these districts usually after the first of February thaw, and are known to our rural residents as the February "larks." They like the town sparrows, are a sort of "scavenger" bird, and

obtain a part of their food supply from the ejectae and half-digested seeds found on the highways and in fields frequented by farm animals.

To these larks the chill breezes and dull skies of February and March seem to present few terrors, and the species must be nearly as hardy in constitution as the Arctic snow-bunting and as resourceful as the bluejay or bearded tit (chicadee). The notes of the prairie lark, though feeble, are enlivening and somewhat larklike, and are poured forth remittently on the outbursts of feeble sunshine on raw March days or in declining afternoon. Their advent to these parts first began to be noticed and talked about 36 or 37 years ago, when, through great progress in land clearing, the numbers of cattle and acreage of grass lands had much increased. These tufted larks have not been noticed about here since about the beginning of October last (1897), but they usually stay after breeding their young in April, their nests containing callow young have (it is credibly affirmed) been found about here even during last week in March, whilst remains of large snowdrifts still lingered about fence corners and in such grass fields as the nests were found in. But May is the month they usually breed in, though nests containing eggs have also been reported of in the month of June.

These birds are at any rate a welcome addition to the list of our feathered visitants and are clearly lovers of an open country, and have no arboreal proclivities, but seem contented with such shelter and food as is afforded by grassy hummocks and weedy leas.

A few of the non-migrating species of birds show an inclination to live on friendly terms with man. This trait is noticeable in the chicadee, small parties of which come regularly to the wood-choppers' shanty at dinner-time, and if not repelled by unfriendly demonstrations, will alight on his knee or shoulder if a bit of food is placed thereon, but show much shyness and suspicion at the presence of a cat or dog. The bluejays and several species of woodpeckers are occasional visitors to the farmer's garden trees or else to the

corn-crib. The so-called hairy woodpecker (Picida Villosus), which is larger and lighter in color than P. Pubesens, has been this winter a more frequent visitor than usual.

Several of the smaller wild quadrupeds seem impelled to come forth from their winter dormitories during the occasional February thaws. The legendary myth, that ursa major comes out of his hollow tree on February 2nd, may possibly have a germ of probability to rest upon. This year one heard the remark made that as there was intense frost with clear sunshine on that date, if Bruin looked over his shoulder his shadow was distinctly visible, so the "dictum" was that he must return to the somnolent condition for six weeks longer. Yet there came a few days afterward a relenting of the rigorous cold, and the bear's cousins, the racoons, seemed seized with the mating instinct, and started forth on their peregrinations about the bush, and by their footprints on the snow were tracked by prowling hunters to their temporary visiting dens, and so became victims to the peltry dealer in numerous instances that one became cognizant of in this vicinity.

About the same time frequent captures of Mephitis Mephitica were reported of by the local dealers in raw furs, etc. In general the trappers narrated that the snow tracks revealed that parties of these perfumed quadrupeds had found shelter in underground burrows, whence, after smothering, the quadrupeds were disinterred and skinned, as their furry vestment is now at a small premium in the market. In most instances one was assured that the proportion of the sexes in the underground rendezvous was three females to one male, and this latter sex in marks of bitings and scars, appeared to have just recently gone through an election contest.

The inference, therefore, seems a safe one that several of our small quadrupeds of the bush incur many dangers of extermination from this periodic instinct to ramble, and are much in harm's way, when some of the rodents are safe in the darkness and repose of the cataleptic sleep, as the dor-

mouse, flying squirrel, bat, chipmunk and marmot, and perhaps muskrat.

The porcupine and otter that had scarcely any hybernating instincts have been exterminated from the earlier settled districts of Ontario.

The somewhat ungainly rodent, the marmot, arctomys monax (that seems half way between a squirrel and a guinea pig), holds its ground well, despite the extensive changes brought about by land clearing. Does the arctomys instinct of four or five months' somnolency evince a lingering relic of the reptile in its constitution? People who have kept the groundhog as a pet say that arctomys almost invariably retires to frost-proof burrow as soon as the early autumnal frosts have killed the tenderest wild plants, that are the choice food of this herbivorous rodent, such as the desmodiums, vetches and other leguminosæ, and to the list may be added some of the convolvulaceæ, as the pumpkin vine leaves, of which the quadruped is inordinately fond, and their obese state in September, seem to induce sluggishness and somnolency.

A big curve of their vital orbit has been outlined and travelled through, and the other portion, as indicated by the calendar, is lived out, as it were, "below the horizon." The limits seem to be a set time, for some individuals emerge from the winter trance state early in March, whilst the ground is yet snow-laden and suitable food must be far harder to come at than when the lotus-like forgetfulness came over them; these aberrant individuals, who thus (in appearance) inopportunely wake up, seem to have "slipped a few cogs" in the cataleptic clockwork, but they manage to live on by nibbling the buds of low shrubs and the bark of small saplings, and, like the experimentary 2nd February bear mood, add "a codicil" extension to the hybernating term. It has been noticed that the marmots have sometimes some of the bodily fat remaining when spring comes, but that they rapidly become thin on resuming active life and fulfilling mating instincts before even all the snows have disappeared.

The ground hog, too, requires a partly wooded and partly arable territory to prosper in; he has limited tree-climbing powers, and often seeks security when pursued by enemies by preferably ascending tree hollows, but with muscular effort can ascend in about the same ungainly manner as the bear or racoon, some of the rough-barked forest trees, but, like the plantegrade, can only safely descend "rear end first." The rodent's brief period of gestation (said to be about 30 days) may show co-relation to the climate where the quadruped can so firmly and persistently maintain its status in the chain of organized life.

The marmots show foresight and sagacity in the choice of a site for their hybernating burrow, a gravelly ridge in a sheltered part of the forest not likely to be flooded during winter thaw or rains. In summer fields of tall-growing wheat near clover meadows are their homes, and in a drouth they are frequently known to desert their holes on the ridges and knolls and excavate fresh ones in lower levels, where it has been supposed they can dig to a water supply or to cooler or moister quarters. (This conjecture about digging for water may be untenable; cleanly, or sanitary, reasons seem to carry more probability).

To country boys with their dog the ground hog affords much summer sport. The boys say that the marmots have a traverse or excavated enlargement in the interior of their burrow to turn round in, or to make strategic evolutions in, when invaded by an enemy, like mephitis, but that they never or rarely have a rear entrance to their earth fort, but in the fall carry in a supply of soft and dry leaves, and enclose their sanctum with an earthy partition door, but store up no crude food supply, but trust the resources of absorption, as in Bruin's fable of "sucking his paws."

III.

The genial warmth returned so early this year, March 9th, that many supposed (or surmised) that we were about to be visited by a premature spring, but up to this date (April 28th) the result has not fulfilled those apprehensions, and now there are occasional frosty nights that may keep back the fruit blossoms from a too early "setting." The month of March was almost unprecedented in its mildness, and a number of the hardier feathered visitants appeared here from the 3rd and 9th to the 24th. Robins, bluebirds, grackles, killdeers (plovers) and cranes were seen on the 21st and the phoebe fly catchers on the 20th.

The sugar (maple tree) making had an early beginning. Sap-flowing began on the 8th and 9th of March, with a range of the thermometer of from 40 to 65 degrees in the shade. The first ten days of April were colder, yet the dandelion flowers appeared in considerable numbers (on sunny slopes) on Easter Sunday (10th), and the first scarce fully expanded hepatica flowers were to be seen in the forests on the same day.

From the beginning of Easter week there came a cooler wave, with northeast airs. Heavy rains and chilly breezes on the 10th and 20th retarded farm work for a week or more. More warmth and sunshine eventuated on the 25th and swallows promptly appeared and bats were seen on wing in the twilight of evening at the present date (April 28th). Some idea may be formed of the progress of the season from observing that numbers of birds are incubating. Crows were setting two weeks since, and now the phoebes, quails, killdeers (plovers), bluebirds and robins are at the same interesting proceeding. One of my neighbors was regretting the loss of a brood of young goslings which inopportunely emerged from the egg during the violent northeasterly rain storm of the 19th instant, and died of cold, etc., ere seen by their human superintendent. A greater number than normal of thunder storms visited these regions during the past three months,

and during one, which occurred about 10 p.m. on the 16th March, a valuable barn and contents were thereby set fire to and destroyed. The illumination from which burning building was seen from the spot where I now write (Mr. Landon's, of Burford Township). Many vivid electric flashes occurred, attended with hail, but with only a light rainfall.

The farming operations are now about in as advanced a stage as during average seasons, and there seem to be no unpropitious conditions around us thus far. Yesterday, on walking through a half-mile of woodland, I heard the metallic notes of the "chewink" in four or five instances, at short intervals. Of course their sounds were from four or five individual birds, indicating that a flock of that species had arrived about there. These are prettily colored and are hardy and strictly sylvan in their habits and associations.

The golden-shafted (or golden-quilled) woodpeckers were also much in evidence, but none of the small May warblers, of which the redstart fly-catcher (S. ruticilla) is generally the pioneer, seem to have yet arrived. The wild gray rabbits have already given evidence of their reproductive powers, our little terrier dog having killed one two weeks since which, on close examination, proved to be on the eve of giving birth to five young ones, and next day the dog cornered another bunny, evidently near its parturition time, but the dog was driven from his intended victim this time. A day or two previous to this the same dog got barking savagely at the end of a hollow log in the bush and his would-be, or wished-for, victim was soon discovered and got at by my son. It proved to be a full-grown ferret, which was safely captured (unhurt) and brought home, and is now contentedly inhabiting a large box in our woodshed. The ferret must have escaped from rabbit hunters, but may have travelled a considerable distance from the possession of its former owners. It is rather pretty and is freely handled by my son without showing any symptoms of viciousness.

The renovation (annual) of nature is moving on in pleasant "renaissance" and the cathrapalustris, erythronium, dicentra, etc., are now in full sway, and seed oats, barley, peas and clover are being energetically deposited in the earth with most hopeful anticipations.

W. Y.

REPORT OF THE GEOLOGICAL SECTION.

To the President, Officers and Members of the Hamilton Association:

The Section, in submitting this report for the session of 1897-98, desires to state that the usual interest has been maintained; that the work of collecting new specimens has been continued during the year by the members; and a large number of specimens has been added to the Museum.

Quite a number of boys of the City of Hamilton have taken enthusiastically to the work of collecting Fossils and specimens of Rock, making themselves familiar with the Rock Structure in the vicinity, and the preserved impression of animal remains. This is the best and only way to acquire a correct and lasting impression, as well as a continuance in the pursuit of knowledge pertaining to any branch of Science.

These young students of Geology naturally seek counsel and guidance from our constant and untiring laborer in this particular field (Col. C. C. Grant), who is always delighted to lend such help, and give such encouragement as is necessary to stimulate the energies and develop the mind of the student along the lines of Geological research.

The members of the Section had the pleasure of a visit from some of the distinguished and able scholars from Britain and elsewhere who were attending the meeting of the British Association, which met in Toronto during the month of August, 1897. All who visited the Museum were pleased to find such a large collection of Fossil Sponges and Graptolites obtained from the rock formation represented here.

There has been added from time to time a number of new specimens of Graptolite and Sponges, as well as other varieties collected from the Clinton and Niagara formation and the

Barton beds. Some of the Lingula from the Clinton beds show the rich natural coloring of the original shell, some of them being new to science.

Col. C. C. Grant drew the attention of the Section to a work recently published by Mr. Schuchardt, of the Geological Department at Washington, D.C., who deals largely with the present nomenclature of Palæontology, suggesting a revision of the whole classification, removing some classes altogether, and even families, transferring them to altogether different genua from those to which the student of science has associated them in the past, the adoption of which would involve an immense amount of labor to the section.

A very interesting fact was brought before the Section on Nov. 26, 1897, when Mr. A. E. Walker, the Chairman, exhibited a specimen of a fossil Parasite adhering to a fossil specimen of Bryozoon, and recently a living Parasite of the same genus was found adhering to a living Bryozoon, closely allied to the fossil specimen. As is variously stated by Geologists, millions of years have passed since the fossil specimen had performed the functions of an organized being.

There have been five meetings held during the term, at all of which papers of interest have been read. Following are the dates and the subjects:

November 26—Geological Notes, by Col. C. C. Grant.

February 4—Geological Notes, continued, by Col. C. C. Grant.

February 25—The Lost Atlantis, by Col. C. C. Grant.

March 25—The Lost Atlantis, by Col. C. C. Grant.

April 22—The Lost Atlantis, by Col. C. C. Grant.

A. T. NEILL, Secretary.

GEOLOGICAL NOTES.

Read before the Geological Section.

BY COL. C. C. GRANT.

It has been customary for some years at the opening session of this section to bring to the notice of the members anything new that came under observation regarding the geology and palæontology of the district. The papers on the former subject by Profs. Spencer, F.G.S., "Kennedy" and "Wilkins" and others, have so completely exhausted the matter that one finds some difficulty in discovering anything omitted worthy of notice. However, a recent visit to Grimsby satisfied me that in some instances things have been unrecorded. For instance, the variation in the thickness of the Upper Green Clinton layers at Hamilton and Grimsby I may remark here, this is also perceptible on comparing the Upper Clinton beds at the Jolley Cut, near the Hancock quarry, with the ones at "The Bluff," a little beyond the City Reservoir. You will find the lowest wedge-shaped sandstone bed at the former varying from 9 to 4 or 5 inches at the thin end, while at "the Cliff" above the railway track the same layer is not unfrequently mistaken for the thick Niagara Limestone bed, known to quarrymen as "The Niggerhead." I have on several occasions obtained from the surface of blocks which had been detached and rolled down the slope, when the frost was disappearing there, specimens of "Lingulæ." They are difficult to extract, since the matrix bears a close resemblance to Quartzite, and unless they put in an appearance on the very edge of the block, only a heavy sledge or chisel, worked patiently for a considerable time, will afford perhaps a rather indifferently preserved Brachiopod, which undoubtedly may be classified with "Lingula Oblonga" Conrad, so numerous in the Iron band, and

red shales below. In a former Paper I think published in the Proceedings, I called attention to the boulder clay resting on the Niagara chert, as also underlying the Burlington Heights. The Antient Lake Iroquois Beach of Dr. Spencer I omitted to state. It may be found also at the foot of "The Escarpment" whenever landslides take place there.

It is well known to the section that the Glacial Grooves, Scratches, etc., are nearly at right angles with the axis of Lake Ontario, in this neighborhood, on the brow of the so-called Mountain. Dr. G. J. Hinde remarked Scratches (Glacial) corresponding with the axis at both extremities of Ontario, and inferred from this fact the excavation of the lake itself was effected by glacial action. The late Dr. Newberry considered "A Pre-glacial Valley determined the direction of the continental glacier. In a Paper read before the American Philosophical Society, in 1887, by Dr. Spencer, F.G.S., on the Origin of the Lower Great Lakes, the author remarks: "Only in one instance, at Hamilton, have I noticed glacial scratches and polishing corresponding with the axis of the Lake and submerged Valley." The place referred to was a projecting ledge of Medina Sandstone at the Russell Quarry, under "The Mountain View Hotel." I was with him at the time, but an old friend of mine called my attention previously to this marking on more than one quarry (since worked out) to the east of the place in question. In every instance I noticed scratching and polishing, but not grooving, such as you may see when the soil and boulder clay are removed from the glaciated chert beds on the Niagara Escarpment. While Dr. Spencer has, I think, proved the existence of a great river and pre-glacial valley in this neighborhood, perhaps he may find it more difficult to convince many Geologists in Canada that the late Dr. Newberry was quite mistaken in his views respecting glacial action on this continent, when Director of the Ohio Survey. The Report on the Surface Geology of this State, especially that portion respecting "the Origin of the Great Lakes Erie, Ontario," etc., is of great interest now, when we find such a difference of opinion regarding this point among Field Geolo-

gists. Dr. Newberry states as follows: "All our Great Lakes are probably very ancient, as since the close of the Devonian period the area they occupy has never been submerged beneath the ocean."

"That they have been filled with ice, and that ice formed great moving glaciers we may consider proved."

"The West End of Lake Erie may be said to be carved out of corniferous limestone by ice action as its bottom, and sides and islands—horizontal, vertical, and even overhanging surfaces—are all furrowed by glacial grooves, which are parallel with the major axis of the Lake."

"This, at least, may be positively asserted in regard to the agency of ice in the excavation of the lake basins, that their bottom and sides wherever exposed to observation, if composed of 'resistant materials,' bear indisputable evidence of ice action, proving that these basins were filled by moving glaciers in the last Ice period, if never before, and that part at least of the erosion by which they were formed is due to these glaciers." I underscore this paragraph in Dr. Newberry's Report Geological Survey of Ohio, because it expresses the same view as I held when my Regiment (the Bedfordshires) was encamped at Fort Erie during the Fenian troubles in 1866. I think I remarked two sets of striæ near the exit of the Lake, shallow scratches and polishing along its axis, and deeper grooving in the direction corresponding nearly with one Barton local chert striæ. The latter I attributed to the Great Continental Glacier. When this arrived at the boundary, or walls, of the pre-glacial valley, a portion was deflected probably. The Lake put forth then, pursued the course where little resistance was encountered, filling the valleys of Erie and Ontario and pushing on before it many of the fragmentary rocks of "The Hudson River Series," combed out of the North Shore near Toronto. These water-worn shales, pebbles, rearranged subsequently on the shore of the ancient Lake Beach (Irrequois), formed its western boundary. In a former Paper published in our Proceedings I pointed out some of the recent

changes of the Southern portion of the Ontario Shore near Winona, where the Lake is rapidly encroaching on the land. As far as I know, no Field Geologist has noted the sub-aerial changes taking place in the Niagara Escarpment here, and its recession at several points, despite the protection afforded by the vegetation, grasses, etc. when the rocks were laid bare and exposed as the glacier retreated. This must have been a powerful agent in land, and rock degradation, and its agency was probably sufficient to remove the entire face of the Escarpment. For even since the small reservoir was excavated, almost annually, tons of material which fall from the Clinton Series above it are removed by the city. I regret Dr. Pettit, of Grimsby, was laid up by illness last summer and unable to point out the place in the ravine where he had noticed "Glacial Scratches," etc., on the face of the cliffs corresponding to its axis.

ORGANIC REMAINS.

The Barton Niagaras during the past collecting season afforded no new species, but some fine slabs were obtained from "The Waterlime Beds" above "The Albion Mills," containing apparently Plant Remains, alluded to in our local catalogue, "Niagara Fossils." Specimens were forwarded "The Redpath Museum, Montreal," and furnished to Dr. Ami, F.G.S., Canadian Geological Survey, Assist. Palæontologist, on his recent visit to Hamilton. The base of the Barton Shale, near the City Drain, resting on the chert, afforded me a fine Brachiopod Rhynchonella Tennesseensis Roemer. Dr. Hall found one and gave it the same name, which slightly differs, a variety perhaps. He renames it "Uncenulas Stricklandi." It may be. It would be necessary to obtain both originals for comparison to be certain as to which it belongs.

The Niagara Chert, as usual, displayed some "New Graptolites," and the Glaciated Flint Flakes (Chert) in the field, close to "the Corporation Drain," presented a few "Bryozoons," "Fenestelledæ," and "Cladoporæ." A small parcel of the latter was given to Prof. Ami, who remarked, on one of

the branches, that striated epitheca was preserved. This appars to be very rare. In the chert it escaped my notice in this instance, and out of several scores of specimens obtained I can only recall two cases where it was preserved. Dr. Jas. Hall, who founded "The Genus" and described it as "a Coral composed of a series of tubes, or cells, radiating equally on all sides from the axis, and apparently destitute of septa, or rays. This corresponds with its general appearance here, when the epitheca was not preserved. Indeed, then, it resembles a branching "Chetætes," or "Monticulipora," rather. Nicholson, in "The Palæontology of Ontario," states: We are unable so far as our specimens enable us to judge, to separate the forms referred to, "Cladopora," from Favosites. The Professor's were obtained in Niagara Limestones (two species only, as far as I can see). He was not likely to find either well preserved in this material, and neither "Hall" or "Nicholson" mention an Epitheca, so we may infer this feature was unknown to them. Prof. Foorde, former Assistant Palæontologist Canadian Geological Survey, considered "Cladopora" belonged to "the Monticuliporidæ." So you may perceive a difference of opinion exists regarding it. Dr. Ami received a small collection from "the Glaciated Chert," which may throw a little light on this obscure "Family Group." There are several forms probably undescribed yet. The Chert (flint flakes) near the Corporation Drain presented some fragments of "a Cornulites," which I have not seen figured. Outwardly it bears a near resemblance to a dwarfed "Orthoceras." This is deceptive. Other fragments likewise obtained display neither "Septa" or "Syphencle," but a hollow tube inside, or in some cases, one filled with darker chert; so no doubt can exist regarding the classification. On the whole the organic remains there were disappointing, since the removal of "The Indian Corn" last Autumn, and few rare fossils were found. The same may be said of the Niagara Limestones in our local quarries. They presented merely a few New Graptolites, perhaps.

THE CLINTON SERIES.

During the past Summer, when staying at Winona Park, I paid several visits to "The Gibson Quarries," formerly worked there and now abandoned, in order to secure (chiefly) as many portable Upper Clinton Slabs as possible displaying Dr. Hall's Fucoid "Arthrophycus Harlani." Many specimens were obtained in fine preservation for the Redpath Museum and general distribution. One in the side case of the Museum, to which I may call particular attention, clearly proves how erroneous it was to suppose that any "Crustacean" or "Annelid" could ever have produced the impression on the flags, when the lobed nodules on the surface extend to the sides of the branches also. A single branch displaying a tuft of others at the extremity has been placed in an upper case of the Museum.

The Iron Band of the series afforded an interesting "Lamelli Branch." It appears to be a species of Conrad's "Leiopteria," that has only been found in higher beds, and in the absence of "the Type Species" for comparison, it would be very unsafe to rely altogether on mere verbal description, more especially since we have only the impression of "a flattened single valve."

A large slab containing several branches and portions of the main stem of Hall's Fucoid "Buthotrephis" was extracted from the lower Green Band and placed in a side case with a few other Fossils of local interest.

The Medina Beds presented nothing new. In a work by Professor C. Schuchert, Washington, a great many alterations have been made recently in the nomenclature of "the Brachiopods" by the Chief Palæontologists of "the United States," under the sanction of "the Director General of the Survey, C. D. Walcott. If the changes intimated are generally accepted for the reasons assigned, this section cannot lag behind recent discoveries which led to it, and must conform also. Probably some of the men attending the lately established College here from other parts of the Dominion may wish to

become members of the Geological Section of the Hamilton Association. We must impress on them that while success or failure in collecting local organic remains greatly depends on accidental circumstances, it is absolutely necessary to know the places where Fosils are found, and also the Fossiliferous beds in the different quarries. This would save much disappointment. Some of the layers seldom or never present organic remains, and time is lost in a fruitless search. The writer would be pleased to have an opportunity of pointing out likely localities to any one wishing for information regarding the Geology of the District, and has put aside a few characteristic fossils for an enquirer's acceptance.

GEOLOGICAL NOTES CONTINUED.

Read before the Geological Section.

BY COL. C. C. GRANT.

Much of the ignorance regarding Geological matters in Canada 'tis said, may be attributed to the influence of the published sermons and theological writings of the clergy of a former age. The Honorable Dr. A. D. White, ex-President Cornell University, in his "Chapters on the Warfare of Science," notices that even so recently as the eighteenth century we find how such great and good men as "John Wesley," "Adam Clarke," and "Richard Watson," in Geology, were hopelessly fettered by the mere letter of Scripture and by a temporary phase in theology. Now, we must not forget all our Christian Churches in Wesley's time held similar beliefs, as expressed, regarding Witchcraft, Comets, Earthquakes, How Death Came Into the World, The Six Days' Creation, etc. If one wishes to learn something of the views universally entertained, then we can consult the work of the United States Ambassador, the Honorable A. D. White. I find the Papers to which I refer have recently been published in England in book form (in the States, also, I suppose). I cannot say whether the scattered writings of the late Dr. Huxley have as yet assumed a similar shape. That they are important factors in dispelling theological superstition hitherto entertained is evident. His Grace of Argyle, who was put forward to oppose Huxley, appears to have fared even worse in the conflict than Archbishop McGee. He now frankly confesses he abandons the position he held regarding the Antiquity of Man, being convinced it was untenable. In the warfare of Science to-day she possesses the gates of her enemies. Her opponents may for a brief period endeavor to retard her progress; her ultimate triumph is assured.

Already we find a powerful body of the Church of England known as "the Broad Church" party, while accepting the historical accuracy of the Jewish records from the time of Abraham, prepared to abandon as non-historical the events of an earlier period. They would save the battered hull of Ecclesiasticism by flinging part of the cargo overboard.

The little interest taken in Scientific matters here was clearly shown when the British Association for the Advancement of Science recently visited Toronto. While full reports of the proceedings of the different sections appeared in the daily papers of that city, the Hamilton ones did not afford a single column for the purpose. Why should they? The editors and managers were well aware that their respective readers, as a general rule, took little interest in things of that sort, and therefore abstained from publishing what they felt an enlightened public in this city did not require.

The splendid address of the new President of the British Association (Sir John Evans), I find, has been published in pamphlet form, a copy of which I received from Toronto since its delivery. Perhaps among the many Old World Geologists and Antiquarians you cannot find a more cautious Scientist than the distinguished one selected to fill the Presidency of "the British Association." If even a particle of doubt exists, he is only too ready to put forth the verdict of "Not Proven," and to counsel we had better await further development. He may as an individual be perfectly satisfied as regards the correctness of the views of others submitted for investigation, but he never fails to impress on his hearers the absolute necessity of slowly and surely proceeding in scientific matters. To take nothing for granted, but seek proof which admits of no denial and which cannot be by any possibility evaded. Once satisfied that he stands on firm ground, he fearlessly expresses himself, utterly indifferent to hostile criticism. The proofs adduced at Toronto regarding the Antiquity of Man were so irresistible that no attempt at refutation has been attempted, I believe. Are the clergy of our day less fettered by old traditional beliefs than their predecessors? It may be so. One

may notice greater liberality in all denominations to-day, less inclination to substitute abuse for argument, an avoidance of such a term as "Infidel," which was so lavishly bestowed on Sir Chas. Lyle and several others by the champions of Orthodoxy formerly. "In New Chapters in the Warfare of Science" (A. D. White), ex-Principal of Cornell University, to which I have referred already, he states: "It is a duty and "a pleasure to mention here that one great Christian scholar "did honor to religion and to himself by quietly accepting "the claims of science and making the best of them, despite "all these clamors." That man was Nicholas Wiseman, who afterwards became Cardinal Wiseman. The older Church had learned by her earlier mistakes, especially in the cases of Copernicus and Galileo, what dangers to her claim for infallibility lay in meddling with a growing science. He also notes an article by a Catholic gentleman (St. George Mivart), in the Nineteenth Century, July, 1885, in which this passage occurs, viz.: God allowed the Pope and the Church to fall into this grievous error, which has cost so dear, in order to show once for all that the Church has no right to decide questions in Science. I wonder if other churches are now profiting by these examples. It seems rather surprising to the writer that some of the statements passed unchallenged; that not even a mild protest was forthcoming. The churchmen of "Toronto the Good" apparently are as ready to cast aside Jewish traditions as the Bampton Lecturer (of Huxley), who said: "We most of us remember when in this country (England) the whole story of the Exodus and even the legend of Jonah, the fabrication of Eve, were seriously placed before boys as history and discoursed as dogmatically as Agincourt or the Norman Conquest. All this is now changed; the whole world of history has been revolutionized; the mythology which embarrassed earnest Christians has vanished as an evil mist." We may notice while Sir John Evans clearly proves that man existed in England in even pre-glacial times, as was shown by recent cave discoveries where human implements and bones were found mixed with the remains of animals now confined

to the African Continent, and while he sees reasons for accepting the discovery of Palæolithic implements in the ancient pleistocenes of India, mingled with the bones of the extinct animals of that age, he abstains from pronouncing any opinion regarding the recent interesting discoveries in British Columbia and elsewhere on the American Continent. Although the matter is still under discussion, the evidence adduced already seems strongly to prove the existence of mankind here also in pre-glacial times, and perhaps even as far back as "The Pleistocene," since Whitney's discoveries in California have been since confirmed by Prof. Alfred Russell Wallace, who was perfectly satisfied the claim was well founded, and that human remains were buried under a flow of lava of the age in question.

I have not yet seen a reliable account of Professor Skertchly's discoveries in British Columbia. He is credited with asserting the relics he obtained there are as ancient as any in Europe.

I was perfectly satisfied when quartered at Gibraltar in 1846-7 that the Rock must have been joined to the African Continent, from whence it derived its tailless Monkeys, Porcupines, etc. I was also aware that at one time animals from the Dark Continent overspread Europe, but until Sir J. Evans produced evidence of the fact, I never imagined proof could be found of man's existence at such an early period. I knew human remains were mixed with those of the Bear, Elephant, Reindeer, in caves. This may lead only to the probability of man's presence in "Glacial" or "Interglacial" times.

I recently noticed in a United States Scientific Journal that Professors Scheuchert and White had arrived at Washington with a large collection of organic remains from Greenland for the Smithsonian Institute. Through the writings of Oswald Heer, Nordensjold, we learn Greenland yields "Carboniferous Triassic," "Iurassic" Fossils, pointing to a tropical climate. The Cretaceous Rocks there indicate a subtropical one, probably. But the Miocene Flora of Disco, etc., is its more interesting feature. Where on earth can we find

such an assemblage of land plants of the age as these? Only think of the numbers (nearly 200 species) made known to us already, extracted from exposed strata of exceedingly limited extent. Sequois, resembling the gigantic trees of California, appear to be very numerous. Tree Ferns and Magnolias, such as may be seen in Jamaica, seem mixed with Laurel, Beech, Elm, Oak, etc. The modern flowering plants, Lichens, etc., bear a marked recemblance to the Flora of North Europe, strong confirmation of the opinion held by the writer that a land connection existed recently, geologically speaking, between Europe and America.

The Hamilton Association recently honored a Canadian lady here (and reflected honor on itself also) by unanimously electing her one of its "honorary members." A Conchologist, she has collected from Seas, Lakes and Rivers the beautiful and valuable assemblage (duly named and labelled), which we all appreciate. The lady did not confine her researches to "Natural History Objects," for you may notice how much she was interested in Antiquarian matters, and also from the extensive collection of "Mound Builders" and other "Indian Relics" in one of the cases. Not long since she wished to obtain some pieces of "Mexican Native Pottery," which cannot be had here, so she requested a dealer in the States to forward the articles in question to her. On their arrival, as imported "Crockery," a high duty was placed on them, I presume, to encourage the manufacture of Antiques in the Dominion.

The writer some time ago required an old "Japanese Sword," which he found could not be got in Canada (of course), so he procured one from the State of "New York." It was on arrival (mind you, an ancient second-hand article), liable to a duty of 30 per cent, because it came under the head of "Imported Arms!" Such facts require no comments. They prove, however, to the outside world what little reason Canadians have in boasting of progress in Scientific research, as claimed at Toronto recently. That claim has no foundation, as far as the Federal Government was concerned, "The Provincial Parliament" displayed at least a little more liberality.

THE LOST ATLANTIS.

Read before Geological Section.

BY COL. C. C. GRANT.

Did it ever exist, or did the Roman Naturalist, Pliny, simply express a popular belief among his countrymen in his time regarding its submergence? Can any reliable proof be produced of such a fearful catastrophe as the destruction of an inhabited continent in the North Atlantic? No satisfactory answer, perhaps, can be given to the above questions.

Herbert Spencer, who is looked upon by many as the greatest Philosopher of the age, some years since arrived at the conclusion "that all Myths appear to have a foundation in fact."

In our own days we find many instances of the elevation or depression of the earth's crust in several places, as for instance at the mouth of "the Indus," where a large tract of country was submerged, with its villages and fort in 1819, while another tract known as "the Ullah Bund" (God's gift) was elevated. Again, in 1822, about 100 miles of the Coast of Chili was raised from four to six feet. Yet more recently islands in the North Pacific, with their inhabitants, disappeared altogether. Independent of the few out of the many sudden changes enumerated, all Geologists know that a gradual elevation or depression is taking place at the present moment in various localities. The late Sir C. Lyell discovered instances of this kind of elevation along the shores of the Baltic, where places which a century ago were at sea level, are now several feet above it. In this case the rise has been noted since 1820, and it amounts to some inches. At the North Shore of Anticosti, in rear of the settlement at "English Bay," the writer traced an ancient beach containing portions of the skeleton of

a large whale buried in the shingle. One vertebra alone was a fair weight for a man to carry. A large Archain boulder (in front of the village) which formerly was completely under water at low tide, is now uncovered, and even a portion of the shore outside it exposed. The old fisher folk there imagined the sea had receded about two feet in 30 years. The falling of the water, however, is a manifest impossibility, as the relative levels of the sea and land outside were unaltered. Not long since, Dr. Spencer, F.G.S., who has more carefully studied the Field Geology of the Niagara District than any of us, positively asserts that changes are even here progressing in the vicinity of Lake Ontario, which may threaten the stability of the Ambitious City of Hamilton itself. Well, it may be so, but what changes have taken place since our Niagara Rocks became dry land, countless ages ago. No violent action in the earth's crust here has put in an appearance. No earthquake has ever impressed its presence on its undislocated, undisturbed and untilted rocks. Elsewhere you will find massive beds which once lay horizontally on ancient sea bottoms, elevated and presenting the opposite position.

You may think it perhaps an unpardonable omission on my part not to instance the case of Port Royal, in Jamaica, which was said to be swallowed up by an earthquake in 1692. I know the place in question. Its destruction was not owing to the sinking of the earth crust there, in the usual manner, but to a series of tidal waves (caused by an earthquake), which washed away the loose sandy beach on which the inhabitants erected churches and foundationless dwellings.

The ancient Port Royal (like the modern one, of same name), was built on this spit of sand called "The Palisades," from the timber wharfs and crib work, piles, etc., used by the inhabitants to prevent the material thrown up by the sea from disappearing. There was sufficient water at the wharf to allow vessels of 700 tons to come alongside. Sir H. de la Reche, one of the best Field Geologists of his day (the Director of the British Geological Survey), who was well acquainted with Jamaica, remarks: "Had it been a general subsidence the

"Fort and rocks adjoining must have disappeared with the "rest." (They were not disturbed.) To a landsman the harbors of Port Royal with its "Keys" and Coral Reefs, seem difficult of access. The writer retains rather a faint recollection of the well known "Mangrove" Bushes along the lowland coast of the Island, which appeared to reclaim from Neptune's Dominion a portion of the territory lost, perhaps in other times, when "the West India Islands" were part and parcel of the American Continent.

Sir Henry de la Reche noticed the Devonian Conglomerates of Jamaica. An isolated patch occurs near Komoka, Ont., and it appears strange to recognize it in such distant places. Detached rounded fragments occur below "the Falls of Niagara" on the Canadian side. The proprietor of a Sugar Estate in Jamaica told an amusing story of a Naval Officer who had been stationed at Port Royal. On his return from "the West Indies" he spent his leave down in Devonshire with his two maiden aunts. They were anxious to hear all about the Island, particularly the Botanical features. He informed them that one tree there produced the butter which the military men used for breakfast and called "Subaltern Butter." The ladies had heard of "the milk in the cocoanut," so they may not have been so much astonished to learn that another tree presented a more finished production. 'Twas only natural. But when he added "the Mangrove trees there furnish crops of Oysters," their graceless nephew fell considerably in their estimation, and they expressed their belief that the Royal Navy appeared to have but a limited regard for veracity. The inocent-looking Midshipman (so the story goes) felt a little indignant at the manner in which his Island experience was received by his near relations, and congratulated himself on abstaining from asserting that "Washing Soap" used by the colored population of the Island largely was obtained from a species of land plant growing there. However, seeing he had little hope of regaining his Aunts' good opinion, he concluded to reel off a regular sailor's yarn and ascertain what effect that would produce on his relations. So

he mentioned when the ship he was in previously was stationed in the Red Sea, they were surprised to find on weighing anchor a bronze wheel entangled in it, which the Chaplain on board assured them must have belonged to one of the War Chariots of the Host of King Pharaoh that perished there. O how interesting! Maria, does not that confirm all we read about regarding the escape of the children of Israel from the cruel Egyptians?" So this modern Ananias contrived to get restored to the good graces of his relatives—by a fluke.

One of the most remarkable discoveries of the early English Geologists was what is known as "the dirt beds" of the Wealden Group, Isle of Portland, more recently recognized at Weymouth, also in France, Germany, etc. The Marine Limestone on which they rest is called "The Oolite." When this was raised up and became dry land a tropical climate prevailed in England and a sufficient soil had accumulated on its surface to enable the rich Flora of the period to flourish abundantly. "Tropical in its nature, viz., Cycadeoideæ," etc., remarks de la Reche, who furnishes me with the following extract taken from his Geological Manual, third edition: "This "land was then depressed; but so tranquilly that the vegetable "soil, mixed with a few pebbles from the subjacent rock, was "not washed away; neither were the trees considerably displaced, but they were left in much the same way as we have "seen other trees in the submarine forests which surround "Great Britain in various places and occur on the Coast of "France. Like them also, the trees of the dirt bed are found, "some prostrate, others inclined, and others nearly in the po- "sition in which they grew, the upright portions being partly "imbedded in the limestone strata above. There is nothing "singular in the gradual depression of land. This has hap- "pened at various periods."

A good many years ago the writer received from Sir W. Dawson, then Principal of McGill University, an able Paper on "The Geneses and Migrations of Plants." Through his kindness on former occasions I was indebted to him chiefly for the little knowledge he acquired of Devonian Fossil Land Plants,

etc. The late Dr. Asa Grey noticed nearly forty years ago the relationship existing between the Modern Flora of Japan and North America. Dr. A. Henry more recently claims that the "Tulip Tree" of China is identical with the American one. As regards the Geographical distribution of land plants on this Northern Continent, it bristles with physical difficulties, remarks Sir William. Indeed the same may be said of the Fauna. He then gives an account from a lecture by the late Dr. Asa Grey on Forest Geography and Archæology, published in the American Journal of Science, xvi., 1878, and taking the following as his text, he imparts to his readers most valuable information on "The Geneses and Migration of Land Plants from Mesozoic times until now. "I can only say at large that the same species of Tertiary Fossil Plants have been found all round the world; that the richest and most extensive finds are in Greenland; that they comprise most of the sorts which I have spoken of as American trees which once lived in Europe—Magnolias, Sassafras, Hickories, Gum Trees, Southern Cypress, and especially Sequoias, not only the two which obviously answer to the two Big Trees now peculiar to California, but several others. We have evidence not merely of "Pines" and "Maples," "Poplars," "Beeches," "Lindens," so like those of our own time and country that we may fairly reckon them as the ancestors of several of ours. We appear to be within the limits of scientific inference when we announce that our existing temperate trees came from the North. Remains of the same plant have been found fossil, in our temperate region, as well as in Europe." Commenting on this extract, Sir W. Dawson remarks: "The truly Eocene Flora of the temperate and Northern parts of America has so many species in common with that called "Miocene" in Greenland that its identity can scarcely be doubted. This "Eocene Flora" established itself in Greenland and probably all around the Arctic Circle in the warm period of the early Eocene, and as the climate of the Northern hemisphere became gradually reduced from that time to the end of "the Pliocene," it marched on over both continents to the South,

chased behind by the modern "Arctic Flora," and eventually by the frost and snow of the Glacial Age." The causes which led to the latter coincide with Sir Charles Lyell's views. Woodward, in "The Manual of the Mollusca," under the head "Land Shells, Canadian Region," states: "It is chiefly re-"markable for the presence of a few European species which "strengthen the evidence of a land passage across the North "Atlantic, having remained until after the epoch of the exist-"ing animals and plants." Professor E. Forbes, the famous Edinburgh Naturalist, referring to the Boreal Sea Shells common to Europe and North America, out of 140 examined, found more than half common to Europe. He adds: Many of the species, it is believed, could only have extended their range, so distantly by means of continuous lines of connecting coast, now no longer existing. Sir John Richardson, speaking of "The Cod and Turbot Tribe (common to both continents), remarks: Most of "the Gadoidea" feed at the bottom, so their great diffusion ought not to be attributed to migration from their native haunts, it is probable they never wander out of soundings into "the mid sea"; they seem analagous to "the Owls," which tho' stationary birds, yet include a larger proportion of species common to "the Old and New World," than the migratory families. Again the celebrated traveler and scientist, Humboldt, informs us "That the common heather (Calluna Vulgaris) of Ireland, Scotland, and "The Urals" (a plant characteristic of the Moorland Zone); in the Pliocene period spread to Iceland, Greenland and Newfoundland, where it still grows the only heath indigenuous to the New World. We may feel inclined to reverse the migration (that, however, is immaterial), a land passage existed, unless we accept the discredited doctrine of "Spontaneous Generation." The Botanists, Hooker and Brown, alluding to the modern Flora of Greenland, arrived at the conclusion "that in its general features it was essentially the same as that of the Highlands of Northern Europe," and Professor Lesquereux states that in the Carboniferous Age no less than "two-fifths" of the American species were growing also in the carbonifer-

ous forests of Europe. Does not this clearly show a connecting land passage also at that time (a chain of Islands probably)?

FRESH WATER AND LAND SHELLS.

When we compare the shells we find in the Rivers, Brooks, Lakes of Canada, with the ones familiar to us in the Old Country, we recognize the identity in many instances, viz., "Limnea," "Planorbis," "Sucinea" (the writer is not in possession of any European Unios—River Mussels to compare with specimens found here, and therefore abstains from expressing views which may be erroneous). The writer when in command of the Depot 2nd Battalion, 16th Regiment, in the South of Ireland, collected a large number of the banded land snails of the district. Many years after, when employed in Geological researches in the Island of Anticosti, he discovered, many miles away from any human habitation by the sea shore, three living specimens which were obtained identical with the one familiar to him in the Old Country. Two I placed in a rockery here (I have not seen them since); the other I gave to Mr. Hanham, who ascertained from a friend in Ottawa that "he was quite right in his opinion regarding the land snail recently forwarded." It is said Mediterranean sailors take such live stock on board sometimes, and that the common garden one has by some accident established itself on "the Banks of the St. Lawrence." That may be; yet I doubt whether "British sailors" ever conveyed to Anticosti "the Helices" I found there. My countrymen, I feel assured, would be as willing to recognize such things as an article of diet as "the Indian Curry Powder," which a well-meaning but not overwise English Peer suggested, as a means of meeting Irish starvation in Famine times.

I certainly read an account of the accidental introduction into the States of a British banded snail some years ago. It was found attached to a plant brought from England, and after arrival produced a number of young ones with bands, color, etc., differing in several instances. Such, no doubt,

would be considered distinct species. For my part, I am not quite satisfied regarding the truth of the statement, although under the impression it came from Philadelphia, a city which can boast of some well-known "Conchologists." The writer may be misunderstood, for perhaps the title "The Lost Atlantis," is misleading. He never supposed for a moment that there was any probability of ever obtaining proof of a submerged continent, with all (or nearly all) its inhabitants. It is certain, however, that, despite what has been urged by the well-known Antiquarian, Sir Daniel Wilson, and others, against Mr. Donnelly's views, the question regarding them remains unsettled. The possibility of the occurrence can be inferred from the writings of a few of the many Famous Fossil Botanists who believe a land passage must have existed between the continents to account for "the migration of Plants." Sir W.Dawson considers the so-called "Miocene Flora" (Heer) of Greenland, is actually "Eocene." A similar view to this was held by Mr. Starkie Gardiner, a well-known English Palæobotanist. The primal distributing point of it may be The Adirondacks (as Sir William thinks), yet the writer may be permitted to imagine that "Greenland" itself, or some land even north of it, may dispute the claim to the original migration.

As regards The Owls, to which one writer alluded, we all know sufficient of their nocturnal habits to feel satisfied that their flight between the continents under the present existing conditions was simply impossible.

Independent of the views if a few, out of several men of science, you may permit me to read an extract from a work entitled "Touch and Go Papers," Travels of the Rev. H. R. Hawers, M.A., Incumbent of St. James, Marylebone, a gentleman intimately acquainted with the recent discoveries in Egypt, Assyria, etc. The extract is rather long, but, perhaps, instead of curtailing it, it were better to adhere to the actual words used and omit nothing bearing on the matter, viz.; "I "was rather glad and surprised to find that amongst the few "travellers really interested in Ancient Mexico whom I came

"across, Donnelly's book, 'Atlantic,' was considered to indi-
"cate the only possible solution of the Ancient Mexican civil-
"ization question. A conceited young New York Professor,
"who had never put his nose beyond Boston and Washington,
"and had probably never looked twice at a bit of Aztic pottery,
"pooh-poohed Donnelly and his theory of a buried continent
"called Atlantis, which, with its related islands, was, he con
"ceived, formerly the great highway between Africa and Am-
"erica. Of such a continent the Azores and Canaries are
"supposed to be still extant peaks. This theory is neither
"dead nor buried yet. I trust more to the impressions of
"those who have examined Mexican antiquities, let alone my
"own eyes, than to slapdash statements of sucking Professors.
"Those who have been to Mexico are mostly unanimous in
"the conviction that the mysterious people who built these
"strange cities (the number of which is unknown), were colon-
"ists from Africa, and brought with them something akin to
"Egyptian Art and Civilization. Not only is there the same
"delight in massiveness, the same science in raising huge
"blocks of stone, the same solidity and magnificence in what
"are presumed to be the burial places of the Kings; but such
"undecipherable written characters as have been found as yet
"bear a strong resemblance to Egyptian hieroglyphics. Per-
"haps they represent a still older form of the most ancient
"symbols known to us. But there is one feature about the
"Aztec relics which appeals with dumb but persuasive elo-
"quence to the most casual observer, and seems to proclaim
"aloud the African and even Egyptian origin of the deserted
"cities. Jug after jug comes up, decorated with the same fa-
"miliar face, the straight, strong nose, the square, wide brow,
"the almond-shaped eyes, the hair dressed flat and low down
"on either side of the high cheek-bone. It is the face of 'The
"Sphinx.' Any notion of Mongolian or Asiatic origin seems
"knocked on the head. I cannot find a trace, as far as I can
"gather such traces, either in the buildings, written characters
"or art work decorations of the deserted cities of Mongol or
"Asiatic influence."

Scientific conjectures, however ingenuous, may fail probably to carry conviction against the foregoing statement of the travelled Antiquarian. We may safely let the matter rest there. A writer, whose name I forget, alluding to "The Guachos, the ancient inhabitants of the Azores," pointed out the peculiar burial customs of this exterminated people and things also to show how widely they differed from other races on the adjacent continent. He expressed his belief that they were descended from some few survivors occupying an unsubmerged summit of "The Lost Atlantis."

THE LOST ATLANTIS.

Continued.

Since I read the above portion of the Paper on this subject, Mrs. Myles kindly called my attention to a work in her possession by Dr. W. F. Warren, President of Boston University, entitled "Paradise Found," "The Cradle of the Human Race at the North Pole." Being unable to procure many books I read, relating to the Arctic Regions here, I felt unwilling to give merely the purport of what had been written on the subject of the Fauna and Flora of the earlier Tertiaries. I felt quite satisfied the Doctor would naturally allude to some of the authorities who suggested to him the novel theory of An Eden in the Arctic Circle. On consulting the work of the learned gentleman, I found he not only names the leading scientific men, but also furnishes many extracts from their writings in support of his views. From a very early period to the days of the late Dr. Livingston, who expected to find Paradise somewhere near the source of the Nile, theologians and travellers have endeavored to fix the site in Ceylon, etc. It has been claimed as having existed in different parts of Asia, Africa, Europe and America, but no such place as is described in Geneses can be recognized now, so in order to save the credit of the writer of the ancient Hebrew legend, following the hint taken from a French writer, Bailly, who early in the century expressed a similar belief respecting "The Lost Atlantis." He selects the Polar Circle as "The Cradle of the Human Race," and a submerged Miocene (or Eocene) (Dawson) continent as the seat of Paradise. The situation selected presented serious obstacles to scientific investigation perhaps. However, it must afford Dr. Talmage and his admirers very great satisfaction to feel that one President of a U.S.A. University yet is left, who firmly believes in ancient Chaldean

Legends—In "Edens" and "the Fall," "Noachean Deluges," transformation of Lot's wife into "Sodium Chloride" (Huxley), and Prophets treated to a submarine cruise in a fish's belly." In Sir W. Dawson's "Geneses and Migration of Plants" you may notice in a note to the first page he expresses the opinion that most of these brochures (on Arctic Vegetation) were based on "The Flora Fossilis Artica," of the Swiss Palæobotanist, Oswald Heer, published in 1868. Sir Archibald Geikie pronounced the Professor's discovery of Tropical or Sub-Tropical Fossilized Plants so far North as one of the most remarkable in modern times. Dr. Asa Grey, in his work on the Botany of Japan, independently at about the same time pointed to a Northern origin (high latitude) of various related species now widely separated, during the Tertiaries, when Sequoias occurred all around the Arctic zone. Count Saporta, in a paper published in Popular Science Monthly, October, 1883, states: "It follows that man issuing from a mother region (still undetermined), but which a number of considerations indicate to have been in the North, radiated in several directions. It will be seen we are inclined to remove to the circumpolar regions, the probable cradle of primative humanity." "Paradise Found," although not published in book form until 1883, embodied a series of University Lectures delivered by the Author before he had seen the Count's conclusions from a Geological point of view.

In 1876 Dr. A. Russell Wallace, one of the leading scientific men of the age, wrote: "All the chief types of animal life appear to have originated in the Northern continents, and that man himself may have appeared so far back as the Miocene time." Well, it may be so, Dr. Warren, and even if the fact was established, how could it prove the truth of the Creation as recorded in Geneses? We have written tablets from Nineveh and other Chaldean cities inscribed 2,500 before the birth of Moses, giving seven or more different versions of this ancient legend, apparently from two of these mythical records, altered to suit the beliefs of the chosen people, the Hebrew tale is derived." To borrow the words of the late Professor

Huxley: "The melancholy fact remains; the position taken up is hopelessly untenable; it is raked alike by the old-fashioned artillery of the churches, and by the weapons of precision with which the advancing forces of science are armed." In a note the learned author refers (and evidently with approval) to Southall's "Recent Origin of the World," published in 1875. Nothing could be more damaging for his theory than calling attention to a work so completely refuted and universally ridiculed both by Anthropologist, Archæologist, and Geologist. The gentleman in question contended that the stone and flint implements found in various localities clearly proved that mankind once highly civilized had degenerated. Look, for instance, to Egypt; it had no Stone Age, its people were born civilized." Was it not most interesting to the Traditionalists to find in this faithless age such facts from so authoritative a source? We express no little sympathy with them in their bitter disappointment, when the discoveries of Dr. Reil at Cairo, Jukes Brown, etc., settled that matter, when Prof. Havnes, of Boston, U.S.A., brought home from thence scores of the very articles declared to be non-existent; the cores of the flints and account of the workshops where they were manufactured. Some were from Luxor (the ancient Thebes), where French Explorers recently discovered the burial place of the deified Osiris and his Consort, "Isis," deposited there 8,000 years ago. But the final proof which settled the question entirely, Dr. A. D. White remarks, came, when General Pitt Rivers, a "Fellow of the Royal Society," "President of the Anthropological," and J. F. Campbell, F.C.S., England, found implements in alluvial deposits at Djbel Assas, near Thebes, but others, chipped flint in the hard stratified gravel from 6 to 10 feet below the surface, relics evidently older, remarks the latter than the oldest Egyptian temples and tombs. Thus ended the contention of Mr. Southall."

The Doctor has been equally unfortunate in referring to the views of the Duke of Argyle regarding "the Antiquity of Man." Is he not aware that His Grace "was forced to admit the proofs of his opponents were so convincing that he was

willing to yield the point on mature reflection?" I doubt also whether some geologists he names would hold the prominent position in which he so injudiciously places them.

The leading Palæontologists of the States, their patient investigation and its wonderful results were welcomed with the approbation of their separated brothers throughout the civilized world. The Copes, Marshes, Newberrys and others have departed perhaps to scenes of higher research, but the lesson they bequeathed to us is to search in the Rocks themselves and the remains therein entombed the ages of a Book inscribed in a permanent form by the hand of the Great Creator Himself. It may be more satisfactory than wasting one's time in a fruitless search for an Earthly Paradise, which merely existed in Akkadian fable. There are some seven or eight different accounts of the Creation. The Inscribed Tablets from the Temple of Nero, for instance (discovered by Professor Smith) are supposed to have been written in uniform language 2500 B.C. From two of these Chaldean accounts, considerably altered (to suit the views of the Jewish people) we have "the story of the Creation," recorded in Genesis. A good many of the clergy of to-day discredit it. Herroz alleges the Legend of Eden has no historical character, and Lichtenberg states: "The whole story in Genesis" is a Philosophic Myth; and we know the views entertained of such matters by the great preachers of the Church of England, the Stanleys, Maurices and Farrers. The writer already mentioned that Dr. A. Russell Wallace has expressed his opinion that Man may have appeared so far back in the Tertiaries as "The Miocene." We have no satisfactory proof that such was the case. In Dr. Alleyne Nicholson's "Life History" you will find that the mammals of the period were very numerous. Elephants larger than any species still existing, but a skeleton found at Malta points to one not exceeding a Newfoundland Dog in height; Anthropoid Apes equalling man in stature (Dryopithicus), and Monkeys under various forms, Horses, Tapirs, Sloths, Whales, Deer, occur. But the lacustrone deposits of the Western United States contain the most extraordinary

assemblage of organic remains yet discovered. Hogs as large as Rhinoceros, Camels, Lions, Mastodons, a true Rhinoceros, together with many others named by Cope, Marsh, etc. Yet in no instance has any satisfactory proof been obtained of man's existence on earth at such an early period as the Miocene. No implements have been discovered. Dr. Warren asserts "the Arctic Rocks tell a more wonderful tale than "The Lost Atlantis" of Plato, when referring to the discoveries at Spitzbergen and other parts of the continent unsubmerged. That may be, but we seek in vain for any indication of the high civilization mankind displayed when humanity emerged from the Arctic Eden. The Dr. considers the prehistoric relics discovered in every part of the earth peopled under the sun merely point to subsequent degeneracy. Now here he repeats the church's belief of olden times, viz., "that man at the beginning was created perfect with great moral and intellectual powers, and then came the fall. "All barbarous and savage races," remarks Whately, Archbishop of Dublin, "are fallen descendants of more civilized ones," an idea proved to be erroneous long since.

The submergence of the Arctic as a recent occurrence (geologically speaking) is universally admitted by leading scientific men. It is ascertained that the close of Mezozoic time (and commencement of the Tertiaries) was marked by extraordinary disturbance over the Globe. For instance, in the Indian Deccan, Sir A. Geikil, states 200,000 square miles of country lie buried beneath a sheet of lava from 400 to 500 feet in thickness, and in the Miocene period the Great Mountain chains of the earth were raised into the present position. The Himalayas were elevated between 16,000 and 17,000 feet above sea level. We absolutely know little regarding the depression in the earth's crust elsewhere; so the conclusions of eminent scientific men, based on the depth of "The Atlantic," between Africa and America, in proof that no connecting land could have existed, may be doubted.

"The true Atlantis," "the Cradle of the Race, "the long lost Eden," is found, but it is barred against us, exclaims Dr.

Warren. The concluding part seems indisputable, fixed at the bottom of the Polar Sea, it lies beyond research. Like a Kerry Property, "so well secured, we cannot get at it."

Old beliefs die hard; and many of us feel little inclined to accept modern views, which unquestionably differ from ones previously entertained. The churches put forth their champions to war against the heresies of Science in our day, but merely find defeat and retire discomfitted from the field. I may conclude with the following remarks of Professor E. Morse, the retiring President of the American Association for the Advancement of Science, in 1887: "Judging by centuries of experience, as attested by unimpeachable historical records, it is safe enough to accept promptly as true any generalization of Science which the Church declares to be false. One realizes the lamentable but startling truth that without a single exception every theory or hypothesis every discovery or generalization of Science has been bitterly opposed by the Church."

BIOLOGICAL REPORT FOR THE SESSION 1897-1898.

The Biological Section has met once each month during the session, when interesting talks have been given on our local flora, the only subject taken up being Botany.

More interest has been shown by young people than heretofore and we hope this will increase the attendance at our next session.

The following list of plants includes a few omitted from catalogue of last year.

Since publishing the 1897 proceedings several species credited to Creigie, Logie and Buchan have been rediscovered.

Cardamine rotundifolia—Michx. and Munroa squarrosa—Torr. must be omitted, the latter having been accidentally inserted in place of Cynosurus cristatus—L. Sysimbrium canescens—Nutt. Aster tenuifolius—L. and Erigeron hyssopifolius—Michx. should have been credited to Buchan, not having been reported by any other collector. Viola sagittata gives place to Viola ovata—Nutt. from which it has been separated, and notice of different forms of Asarum are withheld until more light is shed upon this genus.

Ranunculus septentrionalis—Torr.
Arabis perfoliata—Lam.
Arabis confinis—Watson.
Sysimbrium Sophia—L.
Thlaspi perfoliatum—L. (New to America.)
Viola ovata—Nutt.
" blanda Var. palustriformies—Gray.
Dianthus Armeria—L.
Lychnis vespertina—Sibth.
Cerastium arvense var. villosum—Holl. & Britt. (New to Canada.)
Geranium Bicknellii—Britton.
Oxalis acetosella—L.

Prunus Mahaleb—L. (New to Canada.)
" avium—L. (New to Canada.)
Valeriana sylvatica—Banks.
Artemisia annua—L.
Lactuca scariola—L.
Vaccinium Canadense—Kalm.
Liparis Lœselii—Richard.
Juncus articulatus—L.
Cyperus diandrus var. castaneus—Torr.
Carex sychnocephala—Carey.
Cynosurus cristatus—L.

J. M. DICKSON,
Chairman.

H. S. MOORE,
Secretary.

DONATIONS TO THE HAMILTON ASSOCIATION MUSEUM, SESSION OF 1897-1898.

Specimens of Star Fish "Euryola." All the tentacles perfect.

Specimens of Coral from the West Indies, and other shells.

Specimen of the Trochus pica shell.

A quantity of Java grass made into dress ornaments.

Coral sea fan.

A South American native pipe. Donated by Mrs. Beasley, Hamilton.

Some pieces of the Wire Cable of the first Suspension Bridge over the Niagara River. Donor, Mrs. Bartlett, Hamilton.

Specimens of compressed Peat, as hard as coal.

Two Terra-Cotta (small) figures from one of the Mexican Cliff dwellings.

Nine glass cases of Stuffed Canadian Birds. Donor, J. M. Eastwood, Hamilton.

A piece of Peacock Coal.

A petrified Fern Leaf in Coal and a slab of Slate Coal covered with Iron Pirites, from the Newton Coal Mine near the City of Pittston, Pa., U. S. Donor, Mr. W. Dixon, Hamilton.

The Museum has been kept open every Saturday afternoon during the year, when two or three of the members of the Association have been present to welcome the large number of visitors.

ALEX. GAVILLER,
Curator.

HAMILTON ASSOCIATION.

Statement of Receipts and Disbursements for Session of 1897-1898.

RECEIPTS.

Cash balance from 1897	$ 91 03	
Government Grant	400 00	
Members' Subscriptions	73 00	
		$ 564 03

DISBURSEMENTS.

Rent of Museum and Dark Room	$ 153 50	
Caretaker	42 00	
Gas	11 75	
Printing and Engraving	32 15	
Postage and Stationery	20 99	
Annual Reports	159 55	
Sundry accounts	51 39	
Grant to Photographic Section	25 50	
Balance on hand	67 20	
		$ 564 03

P. L. SCRIVEN,
Treasurer.

We have examined the vouchers and found them correct.

H. P. BONNY,
F. HANSEL, } *Auditors.*

July 22nd, 1898.

HONORARY MEMBERS

OF THE HAMILTON ASSOCIATION.

1881 Grant, Lt.-Col. C. C., Hamilton.
1882 Macoun, John, H. A., Ottawa.
1885 Dawson, Sir Wm., F. R. S., F. G. S., F. R. C. S., Montreal
1885 Fleming, Sanford, C. E., C. M. G., Ottawa.
1885 Farmer, William, C. E., New York.
1885 Ormiston, Rev. William, D. D., Gladstone, Los Angeles, Cal.
1886 Small, H. B., Ottawa.
1887 Charlton, Mrs. B. E., Hamilton.
1887 Dee, Robert, M. D., New York.
1887 Keefer, Thomas C., C. E., Ottawa.
1890 Burgess, T. J. W., M. D., F. R. S. C., Montreal.
1891 Moffat, J. Alston, London.
1898 Carry, Mrs. S. E., Hamilton.

CORRESPONDING.

1871 Seath, John, M. A., Toronto.
1881 Clark, Chas. K., M. D., Kingston.
1881 VanWagner, Lieut.-Col. P. S., Stony Creek.
1881 Spencer, J. W., B. Sc., Ph. D., F. G. S., Savannah, G.
1882 Lawson, A. C., M. A., California.
1884 Bull, Rev. Geo. A., M. A., Niagara Falls South.
1885 Frood, T., Sudbury.
1889 Yates, Wm., Hutchley.
1889 Kennedy, Wm., Austin, Tex.
1891 Hanham, A. W., Quebec.
1891 Woolverton, L., M. A., Grimsby.

LIFE.

1885 Proudfoot, Hon. Wm., Q. C., Toronto.

REPORT OF THE CORRESPONDING SECRETARY FOR THE SESSION OF 1897-1898.

To the Officers and Members of the Hamilton Association:

Your Corresponding Secretary for the year 1897-98 begs leave to report that:—

1. He has carried on the ordinary correspondence of the Association.

2. He has received and acknowledged the exchanges in accordance with the subjoined list of institutions and societies, and these various bodies have also been furnished with copies of our last annual "Journal and Proceedings."

M. C. HERRIMAN.

LIST OF EXCHANGES.

I.—AMERICA.

(1) Canada.

Astronomical and Physical Society.....Toronto.
Canadian Institute.....Toronto.
Natural History Society of Toronto.....Toronto.
Department of Agriculture.....Toronto.
Library of the University.....Toronto.
Public Library.....Toronto.
Geological Survey of Canada.....Ottawa.
Ottawa Field Naturalists' Club.....Ottawa.
Ottawa Literary and Scientific Society...Ottawa.
Royal Society of Canada.....Ottawa.
Department of Agriculture.....Ottawa.
Entomological Society.....London.
Kentville Naturalists' Club.....Kentville, N.S.
Murchison Scientific Society.....Belleville.
Natural History Society.....Montreal.
Library of McGill University.....Montreal.
Nova Scotia Institute of Natural Science.Halifax.
Literary and Historical Society of Quebec..Quebec.
L'Institut Canadien de Quebec.....Quebec.
Natural History Society of New Brunswick.St. John.
Manitoba Historical and Scientific Society..Winnipeg.
Guelph Scientific Association.....Guelph.
Queen's University.....Kingston.
Niagara Historical Society.....Niagara.

(2) United States.

Kansas Academy of Science.....Topeka, Kan.
Kansas University Quarterly.....Lawrence, Kan.
American Academy of Arts and Sciences.Boston, Mass.

Psyche.....Cambridge, Mass.
Library of Oberlin College.....Oberlin, Ohio.
American Association for Advancement of Science.....Salem, Mass.
Museum of Comparative Zoology.....Cambridge, Mass.
American Dialect Society.....Cambridge, Mass.
United States Department of Agriculture..Washington, D.C.
Biological Society of Washington.....Washington, D.C.
Philosophical Society of Washington....Washington, D.C.
Smithsonian Institution.....Washington, D.C.
United States Geological Survey.....Washington, D.C.
American Society of Microscopists.....Buffalo, N.Y.
Buffalo Society of Natural Sciences.....Buffalo, N.Y.
California Academy of Sciences.....San Francisco, Cal.
California State Geological Society.....San Francisco, Cal.
Santa Barbara Society of Natural History.San Francisco, Cal.
University of California.....Berkley, Cal.
Minnesota Academy of Natural Sciences....Minneapolis, Minn
Academy Natural Sciences.....Philadelphia, Pa.
Academy of Sciences .....St. Louis, Mo.
Missouri Botanical Gardens.....St. Louis, Mo.
American Chemical Society.....New York City.
New York Microscopical Society.....New York City.
The Linnean Society.....New York City.
American Astronomical Society.....New York City.
American Geographical Society.....New York City.
New York Academy of Sciences.....New York City.

Terry Botanical Club.....New York City.
Central Park Menagerie.....New York City.
American Museum of Natural History....New York City.
Scientific Alliance.....New York City.
Cornell Natural History Society.....Ithaca, N.Y.
Johns Hopkins University.....Baltimore, Md.
Kansas City Scientist.....Kansas City, Mo.
Wisconsin Academy of Science, Arts and Letters.....Madison, Wis.

Society of Alaskan Natural History and Ethnology.....Sitka, Alaska.
University of Penn.....Philadelphia, Pa.
Franklin Institute.....Philadelphia, Pa.
War Department.....Washington.
Field Columbian Museum.....Chicago.
Academy of Sciences.....Chicago.
Agricultural College.....Lansing, Mich.
Colorado Scientific Society.....Denver, Col.
Museum of Natural History.....Albany, N.Y.
State Geologist.....Albany, N.Y.
Rochester Academy of Sciences.....Rochester, N.Y.
Indiana Academy of Sciences.....Indianapolis, Ind.
Davenport Academy of Natural Sciences. Davenport, Iowa.
Pasadena Academy of Sciences.....Pasadena, Cal.

(3) West Indies.

Institute of Jamaica.....Kingston, Jamaica.

(4) South America.

The Royal Agricultural and Commercial Society of British Guiana.....Georgetown.

II.—EUROPE.

(1) Great Britain and Ireland.

England.

Bristol Naturalists' Club.....Bristol.
Literary and Philosophical Society of Leeds.....Leeds.
Conchological Society.....Leeds.
Royal Society.....London.
Royal Colonial Institute.....London.
Society of Science, Literature and Art...London.
Geological Society.....London.
Manchester Geological Society.....Manchester.

Mining Association and Institute of Cornwall.....Camborne.
Cardiff Photographic Society.....Cardiff.
Owens College, Conchological Society....Manchester.

Scotland.

Glasgow Geographical Society.....Glasgow.
Philosophical Society.....Glasgow.

Ireland.

Royal Irish Academy.....Dublin.
Royal Geological Society of Ireland.....Dublin.
Naturalists' Field Club.....Belfast.

(2) Austria-Hungary.

Anthropologische Gesellschaft.....Vienna.
K. K. Geologische Reichsanstalt.....Vienna.
Trentschin Scientific Society.....Trentschin.

(3) Belgium.

Societe Geologique de Belgique.....Liege.

(4) Denmark.

Societe Royal des Antiquaires du Nord..Copenhagen.

(5) France.

Academie Nationale des Sciences, Belles Lettres et Arts.....Bordeaux.
Academie Nationale des Sciences, Arts et Belles Lettres.....Caen.
Academie des Nationale Science, Arts et Belles Lettres.....Dijon.
Societe Geologique du Nord.....Lille.
Societe Geologique de France.....Paris.

(6- Germany.

Naturwissenschaftlicher Verein.....Bremen.
Naturwissenschaftlicher Verein.....Carlsruhe.

(7) Russia.

Comite Geologique.....St. Petersburg.
Russich-Kaiserliche Mineralogische Gesellschaft.....St Petersburg.

III.—ASIA.

(1) India.

Asiatic Societies of Bombay and Ceylon.
Asiatic Society of Bengal.....Calcutta.
Geological Survey of India.....Calcutta.

(2) Straits Settlements.

The Straits Branch of the Royal Asiatic Society.....Singapore.

(3) Japan.

Asiatic Society of Japan.....Tokyo.

IV.—AFRICA.

(1) Cape Colony.

South African Philosophical Society.....Cape Town.

V.—AUSTRALIA.

(1) Australia.

The Australian Museum.....Sydney.
Royal Society of New South Wales.....Sydney.
Linnean Society of New South Wales....Sydney.
Australian Natural History Museum.....Melbourne.

Public Library of Victoria.....Melbourne.
Royal Society of Queensland.....Brisbane.
Queensland Museum.....Brisbane.

(2) New Zealand.

New Zealand Institute.....Wellington.

(3) Tasmania.

Royal Society of Tasmania.....Hobartown.