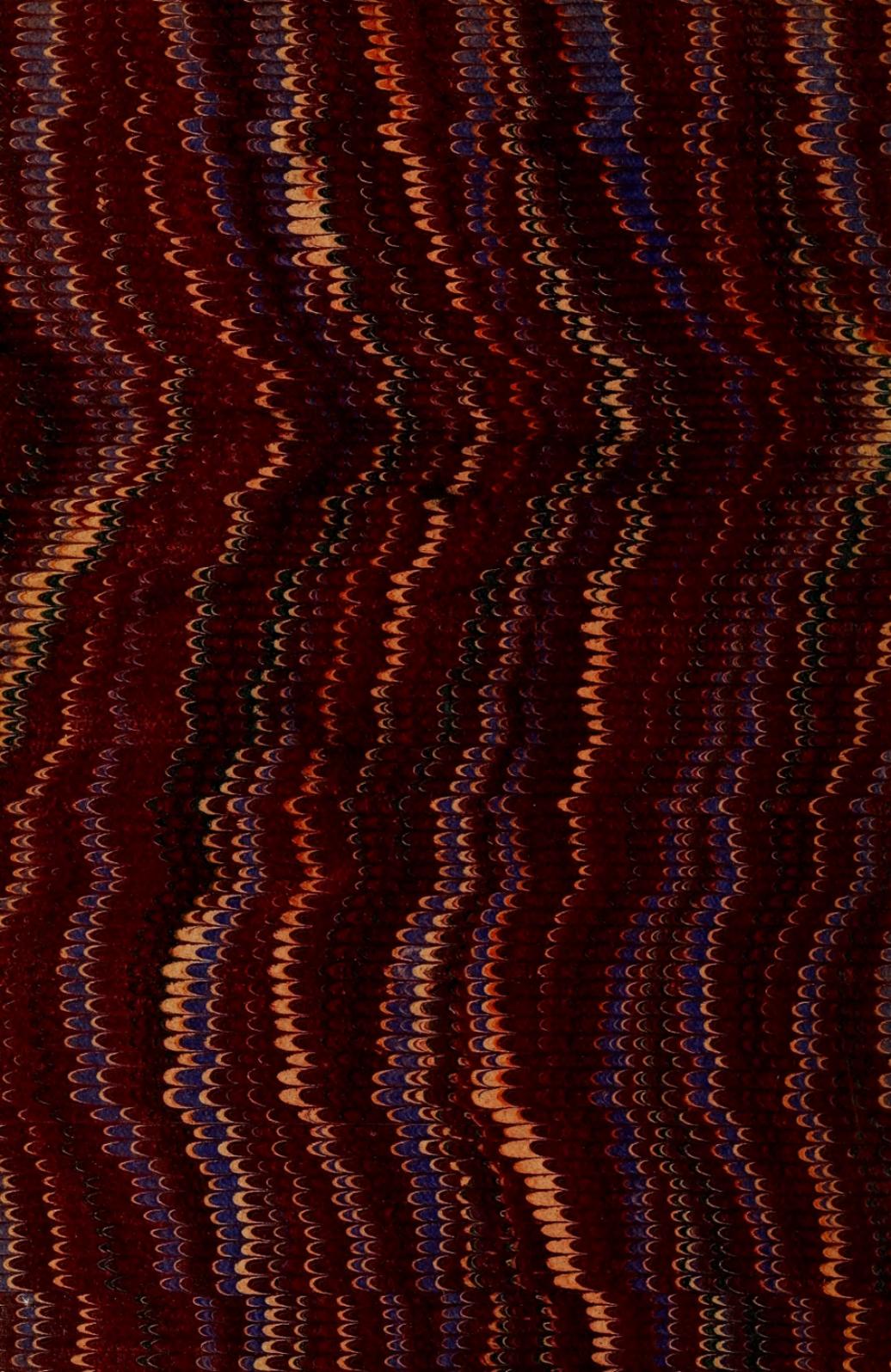
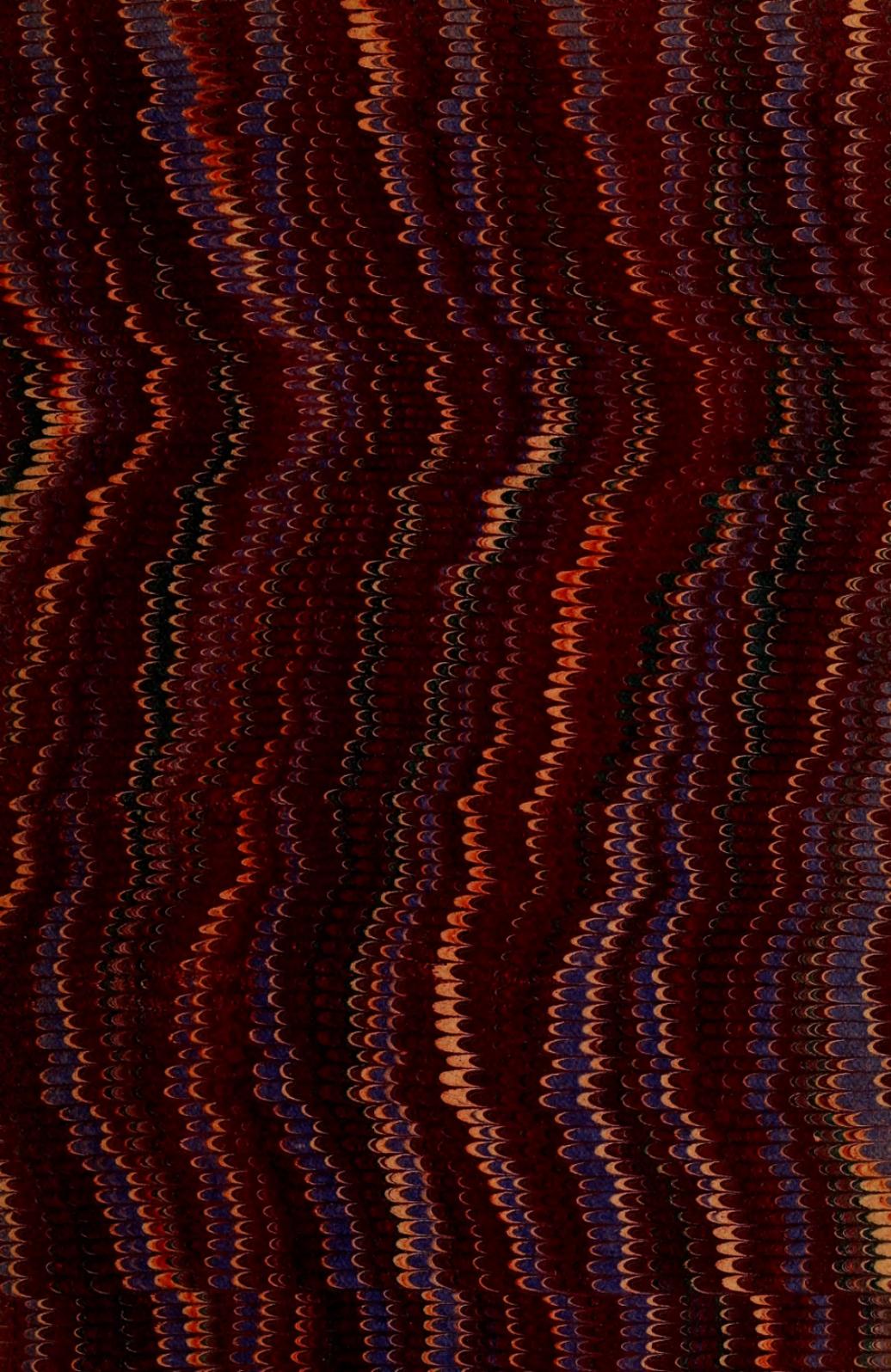


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Hamilton Association

FOR SESSION OF 1897-98.

NUMBER XIV.

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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 rockèd 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, $\frac{3}{4}$ mile and $1\frac{1}{4}$ 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 inhabitation 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 $10\frac{1}{2}$ hours, and has a period round the sun of $29\frac{1}{2}$ 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 $10\frac{1}{2}$ 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 $8\frac{1}{2}$ 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 Polar ice 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 fleetier 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 aqueduct 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 aqueduct 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 condemning 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 anoint 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 glistening 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 car,
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." Unparadoxically 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 attempts 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 history 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 insignificant 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 withhold 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 monopoly 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 eliminate 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 particular hope was centered in the great Pyramid! Could I but climb where ancient builders 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. But 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. 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 ancestor 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 Columna 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 negotiating 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 Bastille and National Library, have received worldwide 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 negotiations 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 bibliographical 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 use of 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 Trywhitt 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 inveighed 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 controversy, 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-

instinct 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 oftentimes 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 bush 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*; *Epilobium Angustifolium*; *Menispermum 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 repellent 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 sub-soil 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 hibernating 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) inopportunately 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 experimental 2d February bear mood, add "a codicil" extension to the hibernating 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 inopportunately 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 genera 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 quarymen 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 1881, 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, re-arranged 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 appears 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 Monticuliporidae." 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 Furoid "Arthrophyucus 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 Furoid "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 Fossils 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. Lytle 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, Nordensjöld, we learn Greenland yields "Carboniferous Triassic," "Jurassic" Fossils, pointing to a tropical climate. The Cretaceous Rocks there indicate a sub-tropical 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. Sequoias, 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 resemblance 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 innocent-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 position 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 happened 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 remarkable 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 existing 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 indigenous 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," "Succinea" (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 Aztec 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 primitive 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 lacustrine 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 Meozoic 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 Himalavas 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. *palustriformis*—Gray.

Dianthus Armeria—L.

Lychnis vespertina—Sibth.

Cerastium arvense var. *villosum*—Holl. & Britt. (New

Geranium Bicknellii—Britton.

[to Canada.)

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 Læselii—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 Froot, 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 SciencesSt. 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.
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(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.....Cornborne.
 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.
 Trencschin Scientific Society.....Trencschin.

(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 Gesell-
 schaft.....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.

—OF—
WASHINGTON.

Journal and Proceedings

OF THE

Hamilton Association

FOR SESSION OF 1898-99.

NUMBER XV.

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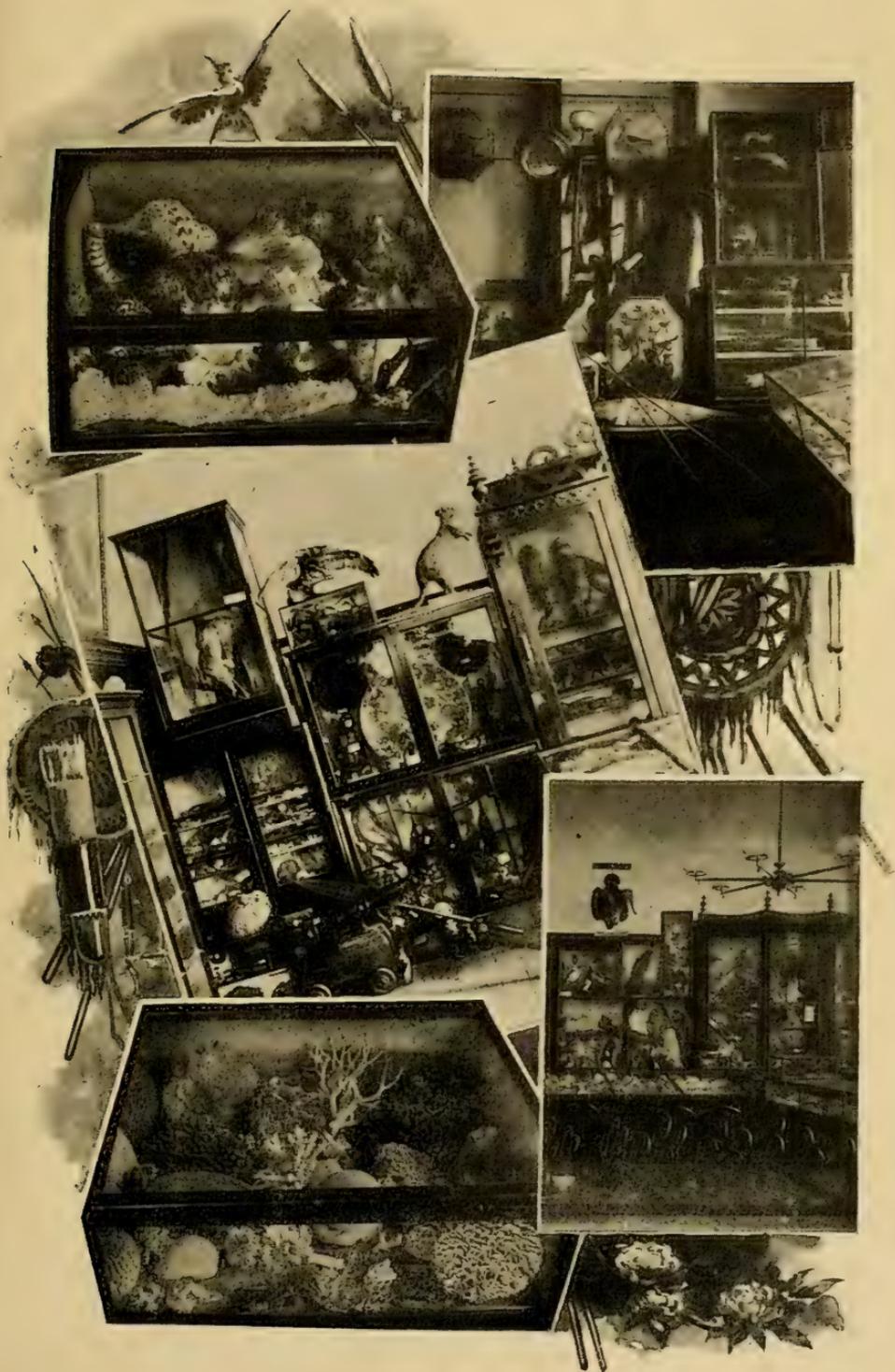
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AUTHORS OF PAPERS ARE ALONE RESPONSIBLE FOR STATEMENTS
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1899





VIEWS WITHIN THE MUSEUM.

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2nd Vice-President.

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F. HANSEL, D. D. S.

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1872	Judge Logie	H. B. Witton, M. P. . . .	Richard Bull
1873	H. B. Witton, M. P. . . .	J. M. Buchan, M. A. . . .	A. T. Freed.
1874	H. B. Witton, M. P. . . .	J. M. Buchan, M. A. . . .	A. T. Freed.
1875	H. B. Witton	J. M. Buchan, M. A. . . .	W. H. Mills.
1880	T. McIlwraith	Rev. W. P. Wright, M. A.	H. B. Witton
1881	J. D. Macdonald, M. D.	R. B. Hare, Ph. D. . . .	B. E. Charlton
1882	J. D. Macdonald, M. D.	B. E. Charlton	J. A. Mullin, M. D. . . .
1883	J. D. Macdonald, M. D.	B. E. Charlton	H. B. Witton
1884	J. D. Macdonald, M. D.	H. B. Witton	Rev. C. H. Mockridge, M. A., D. D.
1885	Rev. C. H. Mockridge, M. A., D. D.	Rev. S. Lyle	W. Kennedy.
1886	Rev. C. H. Mockridge, M. A., D. D.	Rev. S. Lyle	Matthew Leggat.
1887	Rev. S. Lyle, B. D.	B. E. Charlton	W. A. Childs, M. A. . . .
1888	Rev. S. Lyle, B. D.	T. J. W. Burgess, M. B. F. R. S. C.	W. A. Childs, M. A. . . .
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1890	B. E. Charlton	J. Alston Moffat	A. T. Neill.
1891	A. Alexander, F. S. Sc. . .	A. T. Neill	S. Briggs
1892	A. Alexander, F. S. Sc. . .	A. T. Neill	S. Briggs
1893	A. Alexander, F. S. Sc. . .	A. T. Neill	T. W. Reynolds, M. D.
1894	S. Briggs	A. T. Neill	T. W. Reynolds, M. D.
1895	A. T. Neill	T. W. Reynolds, M. D.	A. E. Walker
1896	A. T. Neill	T. W. Reynolds, M. D.	A. E. Walker
1897	A. Alexander, F. S. Sc. . .	T. W. Reynolds, M. D.	A. E. Walker
1898	T. W. Reynolds, M. D.	A. E. Walker	J. M. Dickson

BEARERS

COR. SEC.	REC. SECY.	TREAS.	LIBR. AND CUR.
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T. C. Keefer, C. E.	Wm. Craigie, M.D.	W. H. Park.....	A. Harvey.
T. C. Keefer, C. E.	Wm. Craigie, M.D.	W. H. Park.....	A. Harvey.
Wm. Craigie, M. D.	Wm. Craigie, M.D.	W. H. Park.....	Chas. Robb.
Wm. Craigie, M. D.	Wm. Craigie, M.D.	W. H. Park.....	T. McIlwraith.
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Geo. Dickson, M.A.	Geo. Dickson, M.A.	Richard Bull	T. McIlwraith.
Geo. Dickson, M.A.	Geo. Dickson, M.A.	Richard Bull	T. McIlwraith.
Geo. Dickson, M.A.	Geo. Dickson, M.A.	A. Macallum, M.A.	T. McIlwraith.
R. B. Hare, Ph. D.	Geo. Dickson, M.A.	Richard Bull	A. T. Freed.
Geo. Dickson, M.A.	A. Robinson, M. D.	Richard Bull	W. H. Ballard, M. A.
Geo. Dickson, M.A.	Wm. Kennedy.....	Richard Bull	W. H. Ballard, M. A.
Geo. Dickson, M.A.	Wm. Kennedy.....	Richard Bull	W. H. Ballard, M. A.
Geo. Dickson, M.A.	A. Alexander	Richard Bull	Wm. Turnbull.
Geo. Dickson, M.A.	A. Alexander	Richard Bull	A. Gaviller.
Geo. Dickson, M.A.	A. Alexander	Richard Bull	A. Gaviller.
H. B. Witton, B. A.	A. Alexander	Richard Bull	A. Gaviller.
H. B. Witton, B. A.	A. Alexander	Richard Bull	A. Gaviller.
H. B. Witton, B. A.	A. Alexander	Richard Bull	A. Gaviller.
H. B. Witton, B. A.	A. Alexander	Richard Bull	A. Gaviller.
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Thos. Morris, Jr. ...	C. R. McCulloch...	Richard Bull	A. Gaviller and G. M. Leslie.
W. McG. Logan, B. A.	S. A. Morgan, B.A.	Thos. Morris, Jr. ...	A. Gaviller and W. Chapman.
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Rev. J. H. Long, M. A., LL. D.	S. A. Morgan, B.A.	J. M. Burns.	A. Gaviller and W. Chapman.
Rev. J. H. Long, M. A., LL. D.	S. A. Morgan, B.A., B. Paed.	P. L. Scriven.....	A. Gaviller and H. S. Moore.
Wm. C. Herriman, M. D.	S. A. Morgan, B.A., B. Paed.	P. L. Scriven.....	A. Gaviller and H. S. Moore.
Thos. Morris, Jr. ...	S. A. Morgan, B.A., B. Paed.	P. L. Scriven.....	A. Gaviller.

MEMBERS OF COUNCIL.

1857—Judge Logie ; Geo. L. Reid, C. E. ; A. Baird ; C. Freeland.

1858—Judge Logie ; C. Freeland ; Rev. W. Inglis, D. D. ; Adam Brown ; C. Robb.

1859—Rev. D. Inglis, D. D. ; Adam Brown ; Judge Logie ; C. Freeland ; Richard Bull.

1860—J. B. Hurlburt, M. A., LL. D. ; C. Freeland ; Judge Logie ; Richard Bull ; Wm. Boulton ; Dr. Laing.

1871—Geo. Lowe Reid, C. E. ; Rev. W. P. Wright, M. A. ; A. Macallum, M. A. ; A. Strange, M. D. ; Rev. A. B. Simpson.

1872—Judge Proudfoot ; Rev. W. P. Wright, M. A. ; John Seath, M. A. ; H. D. Cameron ; A. T. Freed.

1873—Judge Logie ; T. McIlwraith ; Rev. W. P. Wright, M. A. ; A. Alexander ; I. B. McQuesten, M. A.

1874—Judge Logie ; T. McIlwraith ; Rev. W. P. Wright, M. A. ; A. Alexander ; I. B. McQuesten, M. A.

1875—Judge Logie ; T. McIlwraith ; Rev. W. P. Wright, M. A. ; A. Alexander ; I. B. McQuesten, M. A.

1880—M. Leggat ; I. B. McQuesten, M. A. ; A. Alexander ; Rev. A. Burns, M. A., LL. D., D. D.

1881—T. McIlwraith ; H. B. Witton ; A. T. Freed ; Rev. W. P. Wright, M. A. ; A. F. Forbes.

1882—T. McIlwraith ; H. B. Witton ; A. T. Freed ; A. F. Forbes ; Rev. C. H. Mockridge, M. A., D. D.

1883—A. Alexander ; A. Gaviller ; A. F. Forbes ; T. McIlwraith ; R. Hinchcliffe.

1884—A. Gaviller ; A. F. Forbes ; T. McIlwraith ; R. Hinchcliffe ; W. A. Robinson.

1885—W. A. Robinson ; S. Briggs ; G. M. Barton ; J. Alston Moffat ; A. F. Forbes.

1886—J. Alston Moffat ; Samuel Slater ; Wm. Milne ; James Leslie, M. D. ; C. S. Chittenden.

1887—J. Alston Moffat ; James Leslie, M. D. ; P. L. Scriven ; Wm. Milne ; C. S. Chittenden.

1888—J. Alston Moffat ; B. E. Charlton ; T. W. Reynolds, M. D. ; S. J. Ireland ; Wm. Kennedy.

1889—T. W. Reynolds, M. D. ; S. J. Ireland ; William Turnbull ; A. W. Hanham ; Lieut.-Col. Grant.

1890—Col. Grant ; A. W. Hanham ; W. A. Robinson ; A. E. Walker ; Thomas Morris, Jr.

1891—Col. Grant ; W. A. Robinson ; J. F. McLaughlin, B. A. ; T. W. Reynolds, M. D. ; Wm. Turnbull.

1892—T. W. Reynolds, M. D. ; W. A. Robinson ; P. L. Scriven ; Wm. Turnbull ; Wm. White.

1893—James Ferres ; A. E. Walker ; P. L. Scriven ; William White ; W. H. Elliott, Ph. B.

1894—James Ferres ; A. E. Walker ; P. L. Scriven ; J. H. Long, M. A., LL. B. ; W. H. Elliott, B. A., Ph. B.

1895—J. E. P. Aldous, B. A. ; Thomas Morris, Jr. ; W. H. Elliott, B. A., Ph. B. ; P. L. Scriven ; Major McLaren.

1896—J. E. P. Aldous, B. A. ; Thomas Morris, Jr. ; W. H. Elliott, B. A., Ph. B. ; George Black ; J. M. Burns.

1897—W. H. Elliott, B. A. ; Thos. Morris, Jr. ; Robt. Campbell ; J. R. Moódie ; Wm. White.

1898—W. H. Elliott, B. A. ; Robt. Campbell ; W. A. Childs, M. A. ; Wm. C. Herriman, M. D. ; W. A. Robinson.

ABSTRACT OF MINUTES
OF THE PROCEEDINGS OF THE
HAMILTON ASSOCIATION
DURING THE
SESSION OF 1898-99.

THURSDAY, NOVEMBER 17th, 1898.

OPENING MEETING.

The meeting was called to order by the retiring President, A. Alexander, F. S. Sc., who introduced to the members the newly elected President, Thos. W. Reynolds, M. D.

The President, after thanking the Association for the honor conferred upon him, delivered his inaugural address, in which he outlined the past history of the Association and briefly reviewed the work already accomplished in its various departments.

At the conclusion of his address, the President called on the Camera Section, who favored the members with an excellent series of views from St. Louis and Redlands.

The remainder of the evening was devoted to an informal display of the work of the various sections.

Attendance for the evening about two hundred and fifty.

THURSDAY, DECEMBER 8th, 1898.

The President, Thos. W. Reynolds, M. D., in the chair.

Minutes of the previous meeting were read and confirmed.

The President, on behalf of the Council, reported the result of the negotiations of that body with the officers of the Hamilton Y. W. C. A. *re* rental of rooms in their new building.

An application for membership was read from Mr. Fred. P. Clappison.

W. A. Logie, M. A., LL. B., then read a very instructive paper on "Public International Law." The lecturer gave a clear and logical explanation of the various departments of International Law, and of the regulations governing each.

An interesting discussion followed the reading of the paper.

THURSDAY, JANUARY 5th, 1899.

President Thos. W. Reynolds, M. D., in the chair.

Minutes of the last regular meeting were read and confirmed.

The report of the Biological Section *re* the distribution of prizes in connection with the botanical exhibit was read and adopted.

The Corresponding Secretary reported the usual exchanges, and outlined the programme for the remaining meetings of the Session.

Mr. Fred. P. Clappison was elected a member of the Association.

The President then called on the Recording Secretary, S. A. Morgan, B. A., B. Paed., who read a paper on "The Theory of Telepathy." Without seeking to advance or disprove the theory, the essayist set forth the phenomena which it claims to explain, and suggested the chief arguments for and against its acceptance.

A lengthy and interesting discussion followed the reading of the paper.

THURSDAY, FEBRUARY 2nd, 1899.

The President, Thos. W. Reynolds, was in the chair. Minutes of the last regular meeting were read and confirmed.

The attention of the Association was called to the proposed establishment of a Central Library of Reference at Toronto.

Wm. C. Herriman, M. D., then read the paper of the evening, which consisted of a series of Natural History notes from Mr. Wm. Yates, of Hatchley, and were written in Mr. Yates' usual interesting and instructive style.

A short discussion followed.

THURSDAY, MARCH 9th, 1899.

In the absence of the President, Vice-President J. M. Dickson occupied the chair.

Minutes of the previous meeting were read and confirmed.

The Recording Secretary read the Table of Contents of a work about to be published on The Bermudas, from the pen of Mr. H. B. Small.

Inspector J. H. Smith then read a very interesting paper on "Odd Characters Among the Early Settlers." The paper gave a carefully authenticated account of the lives and characters of a number of the early settlers of the district, and proved very instructive to the members.

A lengthy discussion followed.

Messrs. A. Alexander and H. B. Witton, Sr., spoke feelingly of the deep loss sustained by the Association through the death of the late J. A. Mullin, M. D., and paid a deserved eulogy to his learning and character.

THURSDAY, APRIL 13th, 1899.

President Thos. W. Reynolds in the chair.

Applications for membership were read from Messrs. J. Schuler, John E. Wodell, W. Toye and T. Cummings, M. D.

It was resolved that the several applications be received and balloted on at the present meeting.

Messrs. Schuler, Wodell, Toye and Cummings were elected members of the Association.

Prof. James Fletcher was appointed to represent the Association at the coming meeting of the Royal Society of Canada.

Mr. David Boyle, of Toronto, then read a paper entitled "Some Mental and Social Inheritances." This paper proved very interesting and instructive to the members, and an animated discussion followed.

THURSDAY, MAY 4th, 1899.

President Thos. W. Reynolds, M. D., in the chair.

Minutes of the last regular meeting were read and confirmed.

W. A. Childs, M. A., read an instructive and carefully written paper on "Poisonous Mushrooms and Edible Toadstools."

A series of "Natural History Notes," from Mr. William Yates, were also read.

The annual meeting was then held, and the following reports were read and adopted :

Report of the Council, by the Secretary.

- " " Curator, by Alex. Gaviller.
- " " Geological Section, by A. T. Neill.
- " " Biological Section, by J. M. Dickson.
- " " Photographic Section, by J. M. Eastwood.
- " " Corresponding Secretary, by Thos. Morris, Jr.
- " " Treasurer, by P. L. Scriven.

The following officers were elected for the ensuing year :

- President, - - - Thos. W. Reynolds, M. D.
- First Vice-President, - A. E. Walker.
- Second Vice-President, J. M. Dickson.
- Corresponding Secretary, Thos. Morris, Jr.
- Recording Secretary, - S. A. Morgan, B. A., B. Paed.
- Treasurer, - - - P. L. Scriven.
- Curator, - - - Alex. Gaviller.
- Auditors, - - - H. S. Moore and F. Hansel.

Council: W. A. Childs, M. A., W. H. Elliott, B. A., Wm. C. Herriman, M. D., Robert Campbell, W. A. Robinson.

REPORT OF THE COUNCIL.

Your Council take pleasure in submitting their report for the Session of 1898-99.

The Session just closed has been, on the whole, a successful one, both in the character of the work done and in the interest displayed by the members.

Seven general meetings of the Association have been held during the session, at which the following papers have been read, viz. :

1898.

NOV. 17th—"Inaugural Address"—President T. W. Reynolds, M. D.

DEC. 8th—"International Law"—W. A. Logie, M. A., LL. D.

1899.

JAN. 5th—"The Theory of Telepathy"—S. A. Morgan, B. A.,
B. Paed.

FEB. 2nd—"Natural History Notes"—Mr. Wm. Yates.

MAR. 9th—"Odd Characters Among the Early Settlers"—Inspector
J. H. Smith.

APRIL 13th—"Some Mental and Social Inheritances"—Mr. David
Boyle.

MAY 4th—"Poisonous Mushrooms and Edible Toadstools"—
W. A. Childs, M. A.

MAY 4th—"Natural History Notes"—Mr. William Yates.

We are pleased to be able to report an increased interest on the part of the public in the work of the local Museum, as evinced by the largely increased numbers who avail themselves of the opportunity of visiting it each Saturday afternoon. It has been especially encouraging to the Council to note that a large number of these are from the young people of the city, many of whom are thus becoming interested in the work of collecting local specimens.

We cannot close this report without referring to the death of two of the oldest and most valued members of the Association. Rev. W. Ormiston, D. D., was the first President of this Association, and it was largely to his efforts that the success which marks its early history must be attributed. The late John A. Mullin, M. D., was always deeply interested in the welfare of the Association, as in all other movements having for their object the bettering of mankind. Their noble characters and faithful devotion to duty are too well known to the members to require an extended eulogy.

All of which is respectfully submitted.

THOS. W. REYNOLDS,
President.

S. A. MORGAN,
Secretary.

INAUGURAL ADDRESS.

DELIVERED BY T. W. REYNOLDS, M. D., PRESIDENT,
NOV. 17TH, 1898.

Ladies and Gentlemen :

I would be very lacking indeed if I did not appreciate the honourable position in which I now find myself, that of President of this distinguished body, a position which has been held by fourteen others, all men who have done themselves and the Association credit by the manner in which they discharged the duties devolving upon them. Let me, therefore, before proceeding further, return my sincere thanks to my colleagues, the members of this Association, for their kindness in placing me in such a distinguished company. At the same time I can assure you all that while I appreciate the honour of this office, I am equally aware of the responsibilities attached, and particularly that of preparing a fitting introductory address.

This address, though at its outset imposes a very pleasing duty, that of welcoming our visitors, for we must admit that we cannot claim all present as members, much as we would like otherwise to do ; however, we are always ready, on the one hand, to admit new members to our ranks, while, on the other, we are ever pleased to see visitors at any of our meetings.

I might take this opportunity of stating that we have different classes of meetings, each intended for special purposes. Of these we have, first, our open meeting, which, of late years, like to-night, has taken the form of a social function, in order to bring the members and visitors together in an informal way, while the latter are given some idea of what the Association and its members are really trying to accomplish, and of what their quarters contain. The second class of meetings are the general meetings, held at least once a month during the winter, for the transaction of business and the reading of papers. The third class are the section meetings for work proper, but I shall have more to say later on of both of these classes.

Let us all now, both members and visitors, consider the objects of the Association, by way of affording information to our visitors,

and reminding our members of some facts they may have lost sight of. To do this, I think it would be well to look back at our history. The Hamilton Association was instituted on November 2nd, 1857, and continued its meetings regularly to the close of the year 1860. Then there was an interregnum of irregular meetings till 1871, when what I shall call the 2nd epoch of our history ensued; it lasted for five years and was followed by another interregnum of four years. Since 1880 the Association has been in active operation. In the first volume of our Transactions, the fact is recorded that the annual meeting held in May, 1884, was the one hundredth meeting of the Association, and since that time we have had more than a hundred additional meetings. The Association was incorporated in the year 1883.

When the Association was instituted it was customary for the members to affix their names in a book to the by-laws, in token of their submission to the same, and the book, which is still in existence, therefore contains some valuable autographs. Unfortunately, of late years, this very laudable practice has fallen into disuse; as a matter of fact the last name, or last but one, is that of Thos. Wm. Reynolds, but I am thankful to say that many useful and hard working members have joined the Association in the thirteen years since that time. As this book shows, our membership from the very outset has been composed of those well known, not only in our own community, but in the Province, and in fact the Dominion; it will, therefore, perhaps not be out of place to refer to some of them, many of whom you will notice in the list of officers published at the front of the Proceedings. The Association, as I have already mentioned, has had 14 Presidents, and to the best of my knowledge 11 of them are still alive, most of them being still active members.

The first name in the Signature Book is that of the first President, and it has but to be mentioned to recall in the minds of many that sturdy old Scotchman, Rev. William Ormiston, D. D., who was so thrilling with energy that it seemed to affect even the tips of his hair, to judge from his appearance and the portraits of him to be seen in so many of our homes. His 1st Vice-President and successor in the presidential chair the following year was Dr. John Rae, so well known as the discoverer of Sir John Franklin's remains, and who only died within the last few years. On the resumption of the

meetings in 1871 the President was William Proudfoot, Esq., better known as Vice-Chancellor Proudfoot, though he has now retired from the Bench. His 1st Vice-President and successor in office the following year was the late Judge Logie, who was one of the original members of the Association. I may be pardoned for dwelling upon his name, because, apart from any personal private regard I may have for it, wherever Hamilton is mentioned amongst botanists they will at once speak of the work done by Judge Logie in Hamilton and its vicinity. The third era of our Association had for its first President one whose name is also familiar to all. I refer to Mr. Thos. McIlwraith, who was also one of the early members, and whose work on the "Birds of America," first published in our Transactions, has done much to bring the name of the Hamilton Association before the scientific world. Another name, that early appears amongst our list of past officers, should not be overlooked. I refer to that of Mr. H. B. Witton, whose genial countenance is, we are all happy to say, still to be seen at nearly all our meetings, and one of whose contributions is to be found in our last Transactions. Of other worthy members I would fain speak, but time will not permit.

Having thus briefly referred to our past membership, I must remind you of what I intimated previously, that this gathering is intended to make you acquainted with our present members, and ere long I hope our future membership will include the names of many who may be only visitors to-night; and here let me inform you that ladies are equally as eligible for membership as gentlemen, and we would be very ungrateful if such were not the case, for many of our finest specimens have been contributed by ladies, notably by Mrs. Charlton, who is one of our honorary members, and Mrs. Carey, another of our honorary members, whose collection of shells forms such a valuable part of our museum. I would also remind our botanical members of the fact that Judge Logie received much assistance from his sister-in-law, Miss Kate Crooks, when preparing his valuable list of the Hamilton flora.

Let us now look at the objects of our Association. These, according to our Constitution, are "the cultivation of Science, Literature and Art, the formation of a Museum, Library and Art Gallery, and the illustration of the Physical Characteristics, Natural

“History and Antiquities of the country.” It would not be expedient for me to dwell at any length on the value of the cultivation of Science, Literature and Art, for that has already been very fully done before by my predecessors in their inaugural addresses, but I will reiterate what has been said, that in this busy age of ours we are too often assailed with that question of expediency that is advanced as regards anything beyond mere money-grabbing by the average man or woman. For even our lady friends are too prone to let their peculiar cares become too pressing, whether they are engaged in business or feel themselves bound down by domestic ties. Humboldt in his *Cosmos* refers very aptly to the value of a study of the Arts and Sciences, and although written forty years ago his opinions are still pertinent; he says as follows:

“An equal appreciation of all branches of the mathematical, physical and natural sciences is a special requirement of the present age, in which the material wealth and the growing prosperity of nations are principally based upon a more enlightened employment of the products and forces of nature. Those States which take no active part in the general industrial movement, in the choice and preparation of natural substances, or in the application of mechanics and chemistry, and among whom this activity is not appreciated by all classes of society, will infallibly see their prosperity diminish in proportion as neighboring countries become strengthened and invigorated under the genial influence of arts and sciences.”

But better, perhaps, even than these remarks, apt though they are, is a consideration of what we witnessed last year in the class of men who took part in the British Association meeting in Toronto, for what do we find? An array of business men who also take an interest in scientific matters, notably the President, Sir John Evans, a man without a university education as regards an ordinary arts course, but a member of many scientific societies, and so one of our visitors told us in Hamilton, the only man, or one of the few, who has read the *Encyclopaedia Britannica* through. Another good example is that of Sir John Lubbock, who, although an active member of the banking firm of Robarts, Lubbock & Co., is better known as a popular writer and lecturer, and of whom *Punch* used the following parody:

“How doth the busy banking bee
Improve each shining hour,”

in allusion to his investigations on the subject of Ants and Bees.

As regards the second set of objects of our Association, and to which we must now turn, viz., the formation of a Museum, Library and Art Gallery, I shall not say much, as my predecessor, Mr. Alexander, has already in a paper on Museums very exhaustively dealt with that phase, still we must not lose sight of the fact that we certainly have a good nucleus for a public museum, of which we are justly proud, but we need larger quarters so that our collections can be better displayed and more use made of them, and our museum be all the more attractive to visitors.

The Library feature is not so incumbent upon us, as the Public Library fills in a great measure the want so long felt. But here, also, I would refer to a mine of wealth in our possession that has been too much neglected; I mean our valuable collection of Transactions that are so well worthy of perusal. We receive publications from 122 societies in all parts of the world, so I think we should no longer delay in making arrangements for a systematic use of them.

The Art Gallery feature, though in a great measure lost sight of by us, is, I am happy to say, being looked after by other institutions in the city.

The last group of objects to which our attention is directed, viz., the illustration of the Physical Characteristics, Natural History and Antiquities of the country has been to a great measure undertaken by our Geological and Biological Sections, and it is proposed to establish an Archæological Section, which will utilize our by no means small collection of antiquities.

Let us now see how we can best carry out these laudable objects to which I have alluded, and for this purpose I have intimated that we have two special classes of meetings—our general monthly and the several section meetings, the former being intended to be of more general interest, though not, perhaps, of such practical value.

The section meetings are intended to be the really practical working ones, and although they have done a great deal of valuable work, there is a wide field before them. Our old Constitution provided for seven sections, but at present we have only three really active ones, viz., the Geological, Biological and Camera Sections, to all of which we are much indebted. But here I would offer a word of caution, and that is that there is too much disposition in each

section to let a few members do all the work ; for instance, in the Geological Section, our old and valued friend, Col. Grant, is a regular Atlas, who, in his enthusiasm, not only bears on his shoulders the ordinary work that may be prepared by others, but is heaping up much more of his own, even in the direction of the lost Atlantis, as our last Transactions show. It seems only fair, therefore, that some of the younger members should come to his assistance and relieve him.

Though these three sections are at present the most active ones, I am pleased to be able to state that in addition to the Archæological one to which I have alluded, the Philological expects to open work vigorously at an early date, and I would also suggest that a Transaction section should be formed, the members of which would systematically examine all the exchanges and then call the attention of the several sections to those papers that would be of use to them, and also at each general meeting present a comprehensive summary so that the members would have their attention called to what is most of interest in these publications.

But now having said something about the work of our sections and the value of them, I am met by the objection from some members, "I am not a specialist in any branch, what am I to do?" To such a man I would say I pity you, for I was once of a similar opinion, but when the Biological Section was revived a few years ago I joined it as Secretary, thinking in that way I could do a little, but by dint of keeping my eyes open soon found plenty to occupy me, and work that was most pleasant. John Burroughs in his "Locusts and Wild Honey" says : "Noting how one eye seconds and reinforces the other, I have often amused myself by wondering what the effect would be if one could go on opening eye after eye to the number of say a dozen or more. What would he see? * * * This would require not so much more eyes as an eye constructed with more and different lenses ; but would he not see with augmented power within the natural limits of vision. At any rate some persons seem to have opened more eyes than others. * * * How many eyes did Gilbert White open? how many did Henry Thoreau? how many did Audubon? Not outward eyes but inward. We open another eye whenever we see beyond the first general features or outlines of things." To these very pertinent queries I would add

these: How many eyes has John Burroughs himself opened, and how many has our friend Mr. William Yates? Cultivate, therefore, my friends, this opening of the eyes, and if you have no taste for any of our present established sections we have plenty of room for others. Thus by cultivating our various talents we will soon find our Association fulfilling the wishes of the founders, and instead of finding the study of Nature a trial we will be ready to say with the poet Wordsworth:

“ Therefore am I still
A lover of the meadows and the woods,
And mountains: and of all that we behold
From this green earth; of all the mighty world
Of eye and ear,—both what they half create,
And what perceive; well pleased to recognize
In nature and the language of the sense,
The anchor of my purest thoughts, the nurse,
The guide, the guardian of my heart and soul
Of all my moral being.”



QUARRY, MOUNTAIN TOP, AT HEAD OF "JOLLEY CUT" ROAD.

NOTES AND QUERIES ON NATURAL HISTORY.

Read before the Hamilton Association, February 2nd, 1899.

BY WM. YATES, ESQ.

Probably the old-time herbalists had some notions of modern bacteriologic theories and of germicides by giving such quaint names to plants as vermifuge, fleabane pedicularium and bugbane—our modern pyrethrum, or insect powder, merely to come in contact with which or to touch, is death to such larval forms as the common cabbage butterfly caterpillar. The name catmint indicates perhaps that that labiate was eaten by domesticated felines as an anthelmintic; and even the mammoth felines, such as the lion and tiger, when caged in menageries, are known to manifest a liking for the nepeta cataria and other odoriferous herbs of the mint family; and the house cat's love for catmint and for the valerian herb is easily seen as they purr and lick and nibble over a leafy sprig, and to the malady of intestinal parasites the cat tribe are frequent victims, the epidemic being sometimes spoken of as the cat murrain, as a remedy for which ailment powdered areca nut has been recommended by newspapers.

A majority of species of the mint order of plants are inimical to the insect race, as the housewife's faith in the use of lavender, rosemary, thyme, hyssop, pennyroyal, when placed in clothes drawers and bureaus as a deterrent against moths, may sufficiently prove. The pyrethrum insecticide is a plant said to be of the same natural order, that is, the compositæ, as wormwood and tansy—*tanacetum vulgare*, and is said to be imported from the Balkan regions. If kept, that is, the dried stems and leaves sold in the drug stores as insect powder, slowly burning in a censor, the mild aromatic fumes immediately drive house flies and mosquitoes from a room.

The eating at certain seasons of acrid herb substances, such as the lobelia inflata and burdock, by horses and colts, may have a powerful sedative effect, as these two herbs grow abundantly in

many pastures, and are believed to cause copious salivation when eaten by equines, though the same effects are also attributed by some to the fondness for eating the blossoms of white clover, which horses evince, and the ripening seeds of which plant are thought to cause working farm teams to lose flesh in the latter summer months. An acquaintance near here thinks that the eating of the above nauseous herbs, and also the bitter sumach, is—as an item in natural pharmacy—as a prophylactic for “bots,” which are believed to be an insidious and frequently a fatal foe to the equine genus of farm animals; and another rural philanthropist, whose name one could mention, used to aver that tobacco juice was the proper and efficient destroyer of the typhoid bacillus, and he earnestly and persistently advised his rural confreres, at times of typhoid prevalence, to take abundant and frequent “chaws” of “Myrtle Navy” or other brands of the opiate weed, and, as was popularly believed, with beneficial results to such as could bear up against the heroic remedy.

This episode had a date before the era of pasteurism, or at least before those notions had obtained notoriety. The tobacco quack had a rough philosophical notion of the microbe-in-the-blood source of typhus, and of the serum method of treatment, and had unshaken faith in his method of immism, akin to the homœopathists combating evil by a lesser ill, or, as the politicians sometimes say, “fighting the devil with fire,” that is, “outlying the liars.”

Many farmers are made aware by experience that young lambs, and those, too, in a very thriving condition and fit for the butcher, are infested with tapeworms in the smaller intestines; said parasites do not seem detrimental for a time to the lambs' health, which are often in a state of extreme fatness, but about weaning time show a strong propensity to take bites of bitter shrubs, such as the wild cherry and sumach. This habit occasionally causes the death of the lamb from inflammation of the throat and salivary glands, ending in much swelling of the throat, and gangrene.

A rural Burford cowleech relied on logical analogies, and in his treatment of a sick cow or ox, cases of what he termed “embargo in the maniplus,” recommended to give a dose of half a pound of gunpowder in water solution. Sometimes the cure threatened by exaggeration worse dangers than the malady had done.

The cat plague breaks out at irregular periods in a locality and numbers die off in spasms and convulsions. About the time of cutting the adult teeth healthy cats brought from a distance into an infected district have been known to die in a day or two. An intelligent acquaintance thinks the cause is frequently, the felines are fed on unsterilized milk, that is, they attend at milking time in the cowbyres and get new milk, as from the udder and unstrained, in a saucer kept there for the purpose, and lung tubercles may possibly thereby result. Milk of ruminants seems a substituted food for cats, being specialized carnivores.

Scarcely any samples of the hermit thrush or even of the veery are around us this year, and fewer individuals, strictly wood birds, than ever before. Cause, perhaps, bush fires in later years and extensive draining and clearing of swamp thickets; yet the whippoorwills came in unthinned numbers to their time honored haunts, and were very demonstrative by their weird vociferation in the warm summer nights.

A neighbour raided a hawk's nest last week. The old pair had been making depredations on poultry near by. The nest contained four young ones of various ages. One was just entering the pin feather stage, with long waving white down on the head and neck; two others nearly ready to depart from the nest, which was situated in the main divide or bifurcation of a large red or swamp maple tree, and it was rather a dangerous climb for the boy to get at the raptors. Like the cuckoo, the female hawk is irregular in the time of laying her brood of eggs, and it would seem that the warmth of the earlier hatched young is utilized in lieu of the old ones constantly sitting to the full incubating period. About five species of hawk visit this district, that is, sharp skinned hawk, red tailed hawk, cooper's hawk (so termed), the goshawk, small sparrow hawk (*f. sparxerious*), and the kestrel, and occasionally the black hawk of the Western States, which is known by its louder outcries resembling the screams of a young pig when in difficulties.

An acquaintance in this vicinity took a young crane (*ardea herodius*) from the lofty nest in a tree in the midst of the herony, where, for many summers, the big waders had been accustomed to associate to the number of fifteen or more pairs in community for nesting purposes. Being well fed and kindly treated, the young

heron became fearless and tame, and in a month or less after capture would answer a call of its name, "Bill," given on its first frog feeding operations. The owner or his children, on finding a frog or lizard, mouse, crayfish, or young ophidian in the fields, even when a good distance intervened, would hold aloft a white handkerchief and shout "Bill" at the top of the voice, and the crane would fly straight to the objective point and gobble down the piscatorial or amphibian food. The bird would evince alarm on hearing the scream of the locomotive as a train passed on the near by railway, but when the steam engine of an itinerant gang of grain thrashers appeared and began its puff, puff, puffing near the roosting place by the barn, this, to heron ideas, partook too much of the marvellous, and the pet bird, esteeming itself an entire solecism, took flight to parts unknown and was seen no more by its erstwhile human associates. A similar going off, as to the abrupt manner of it, was recorded of a pet bittern that a Burford farmer of our acquaintance once tamed so as to associate in his poultry flock, and which would even walk into his kitchen and seize food from the dishes on the table if permitted. As the autumn came on no apprehensions were felt as to the pet proving a deserter from the seeming contentment and fraternization in the poultry yard, but one fine Indian summer-like afternoon, late in the month of October, (*betaurus lentiginosus*), being in the farm house, and the human inmates seated around, the door being wide open, suddenly seemed to hear a call none else could hear, and with a weird scream ran out of doors into mid garden, soon taking a high circling flight skyward, and presently getting his instinctive bearings steered off south-westwards, was soon a vanishing speck on the sky, and from that hour to this was seen nor heard of no more by Burfordites. Both the bittern and the crane above mentioned had been allowed a free range about the farms, and the difficulty of procuring them suitable food in winter induced an expectancy of their migration southward in the fall.

The autumn is proving a remarkably fine and warm one, and there is an abundant return for the labors of the farmers.

Frosts have been slight and infrequent, and many tender vegetables are still looking green and luxuriant. Until quite recently humming birds visited the morning glory flowers at the

west side of our dwelling, and also the nasturtions, hollyhocks and sunflower tribe. Less than or about two weeks ago one of the feathered gems, perhaps attracted by some potted flowers that were blooming on our window sill, flew through the partly open window into a front room and fluttered violently close to the ceiling, and at length fell exhausted to the floor and was soon afterwards picked up quite dead by my granddaughter, who is trying to preserve the feathered mite in a parcel of ground pepper. It was the hen bird, as indicated by the lack of the ruby brilliancy of the throat peculiar to that species that comes to Canada every summer. Many creatures besides birds seem unable to draw inferences. The ruby throat's instinct was to rise and soar aloft, the window of entrance being still open. Perhaps fright and nervous agitation paralyzes in part the ornithic intellect; yet bats and swallows, and even the wrens and phœbee fly catcher in similar quandaries, after a chance for second thought, descend to a broken pane or partly open door and so save their lives by regaining liberty in time. An intelligent acquaintance, whose opinion deserves consideration, is of opinion that humming birds rarely, if ever, succeed in raising a brood of their young so far north as Canada.

The man says that he has met with—he was born near here and is about forty years of age—many or quite a number of humming birds' nests, some of which contained eggs, but he never yet found a nest containing young ruby throats (*Trochilide*) or ever even saw the old ones feeding their young or piloting or guarding or caring for the same. Hence his doubts, which are only jotted down for what they may be considered to be worth. It may be mentioned, however, that the man is an all round enthusiast on the subject of birds, and says he could give Mr. McIlwraith many pointers *re* the birds of Ontario. I may here mention that I, a short time ago, loaned Mr. John Scott, of Hatchley, Mr. McIlwraith's work on that theme.

October 2nd.—Robins were singing blithely to-day and feasting on the ripe grapes; song sparrows, too, are yet tuneful (two species); meadow larks and shore larks are about us, the former frequently piping their pensive refrain. Higholders, so called, and other pickadee, as well as numerous blue jays, find a feast on the abundant fruit of the elderberry bushes in the neglected fence corners.

Some of our neighbors are uttering threats against the owl tribe, which have begun to make more frequent marauding visits to the poultry roosts. A few evenings since, when house lamp had just been lit, we were somewhat startled by strange buffeting sounds that seemed to proceed from a barrel that stood just outside our kitchen door, and was about half full of water. On going out to investigate, lamp in hand, two round, big, glaring eyes and a hooked beak and a screech owl's beautifully mottled plumaged upper parts met our vision, but the strix unfortunate was unable to rise from the surface of the water. My son said to me, "Lift the bird out, it is dying." "Not without a pair of tongs," replied I. I would as soon handle poison sumach as that ill-omened visitor, which my son speedily jerked out of the water in a dead or last dying paroxysm. The owl had probably come to grief in the too eager pursuit of a big moth. A friend of mine writes from St Paul three days ago: "I and a friend went out to a lake about eleven miles from here the other morning. We arrived at the lake shore before sunrise in quest of wild ducks. All we obtained of that species of game was two teal, a whistlewing duck, and one jacksnipe. Just after sunrise, and whilst we were taking lunch under oak trees, we noticed a big hawk strike into the lake waters and saw it soon emerge with a fish, the raptore flying off to its mate, which we could see sitting on a branch of a dead tree some distance off, where, we believe, the two falconidee enjoyed an orthodox meal. One of the birds returned to the lake and repeated its former feat, and as we had hid in ambush one of us fired a shot and the fish fell from the hawk's claws; soon after the hawk came down with a mutilated wing. The bird was snow white in all; its under side parts and its extended wings measured more than I could stretch to with my arms extended to their uttermost."

NATURAL HISTORY NOTES.

Read before the Hamilton Association, May 4th, 1899.

BY WILLIAM YATES, ESQ.

A source of loss and regret to great numbers of Canadian landholders in the Province of Ontario was the rather sudden dying of the fine forests of black ash trees (*Fraxinus Sambucifolia*) about the year 1888. Immense areas were occupied in the early period of the colony by this fine and useful tree, as, in a majority of the annually flooded lowlands, this species held almost entire possession, these areas being generally known to the pioneer settlers by the term "black ash swales." The timber was of inestimable value to the land clearers as fencing material, by virtue of its free splitting qualities and durability.

From some not easily ascertainable cause (in a very extensive portion of Ontario) death overtook simultaneously the whole of these forests about eight or nine years ago. Various causes of the phenomenon were assigned. By some the loss was attributed to the clearing up of the environing dry lands; by others extensive draining operations were given as a reason, while others asserted that excessive cold during winter or else abnormal summer frosts suffered to bring about the effect. There was much conflicting opinion expressed, and the real cause seems still surrounded by mystery. As we heard of few or no insect depredations being concerned in the matter, and as the decadence was sudden and quite general, only a very small percentage of saplings being left as survivors, the cause seems to have been atmospheric changes as to moisture, or abnormalities in temperature and new cycles of growth. Since the change adverted to there has been a very general invasion in semi-cleared and neglected lands of the poplar, which was in the early days of Canadian settlement a tree quite of rare occurrence.

Allusion to the recent disappearance of the black ash forests, which appear to have lived out their appointed time (for it was a

matter of observation that young and vigorous individuals shared the same fate as the mature and senile instances of growth), like a displacement of "race" in higher planes of life, and a new departure. This allusion, as we above remarked, brings to mind a somewhat similar blight in forest growth, which was, in or about the year 1848, experienced over a rather extensive area in the Township of South Norwich, County of Oxford. In that year or the year following many hundred acres of thriftily growing pine trees were suddenly invaded by the larvæ of a moth. The resinous, needle-like foliage was consumed by the caterpillars, which were about three-fourths of an inch in length, and plumed with a waving growth of cotton down. The said pine tree leafed out no more, and over several thousand acres there was soon a dreary sight of withering dead trees, a source of immense loss to individuals, and perhaps to the community.

A curious coincidence was spoken of at the time, as the newspapers of the day contained promiscuous statements that a similar unwelcome insect visitation had just overtaken large strips of the Black Forest region in Germany with similar destructive results, as was then feared and was verified in the sequel.

And now owners of forest lands in this Township of Burford are asserting that what are left of our ancient beech areas are showing signs of speedy death from natural causes, and are being swiftly removed for fuel purposes ere total loss results from rapid timber decay. And probably the thinning of the beech groves for their conversion into wheat fields was a main cause or factor in the extinction of the myriads of wild pigeons, which were up to the year 1874 such an interesting feature in Canadian ornithology.

Arborists of experience now assert that the elm and the maple and the native pine are the kinds of trees that evince the best power of adaptability to changed environment, to which test the white ash may be added as a vigorous grower and a producer of valuable timber material, and that this tree is quite tenacious of life after transplantation some of us have had convincing personal experience.

In our primitive forests in the Burford timbered region (as distinguished from the Burford plains), as also in Oxford County and Middlesex, instances of large-sized butternut trees were not infrequent. Hickory growths were not uncommon, and also, but more

rarely, the black walnut incidentally was found of large size. The usual abundance of the nuts of the beech, as well as those of the hickory and of the two or three varieties of the oak tree, furnished an ample supply of food for the wild pigeons, and also for the flocks of wild turkeys which roamed about our hardwood forests, and not infrequently visited our buckwheat and wheat stubble fields in the autumn; certainly up to the year 1851, and more sparsely up to the year 1854 or 1855.

Quite a number of our neighbors and of our acquaintances, after the work of forest destruction for clearing purposes had been somewhat satiated, became inspired with the taste for transplanting evergreens from the swamps. The white cedar proves hardy, also the native pine. But the truly national representative (*Abies Canadensis*) of the Abietian family proved very difficult of successful removal. The spruce (*Abies Nigra*) was found more sure of growth on removal to well drained situations, but proved to have a habit of sending its main roots near the surface of the soil, and after twenty or thirty years of flourishing growth, and perhaps in consequence of its tall habit, was invariably uprooted by wind storms of occasional severity, but some that were planted in groups around dwellings and home shrubberies, by the mutual protection of their numbers, still survive, and give pleasure to the eye by the contrast in form and tint of their foliage to that of the other members of the Coniferæ, particular to the cedars, whose tints in winter time give forth bronze reflections towards the showy landscape, and next, perhaps, to the native pine (*J. Occidentalis*).

The cedar seems to have the greatest capability of flourishing on either wet or dry land.

The hankering for prophecy and foreknowledge is rebuked in the 53rd and 54th verses of St. Luke's Gospel, and perhaps in other places in Scripture, but without straining ourselves by standing everlastingly as it were on the tip toe of expectation, and without abating our habitual trustfulness "by possessing our souls in patience and to await what may betide," there can be but little imprudence in looking ahead, for is not the future, especially in our youth, a sort of terra (terror) incognita. Yet the sages teach us that Intellect annuls Fate. "So far as a man thinks he is free." "Fate is a name for

those causes which have not passed under the power of thought. — *Emerson*. So, perhaps, to be forewarned is to be forearmed, and it is often seen to be prudent to take in sail ere you are caught and cuffed by the gale. In support of the theory that shocks and bumps are not the usual order of nature, see how gently changes displace and glide into each other.

“Thief-like step of liberal hours,
Thawing snow drift into flowers.”

The passing winter seems to have been characterized by frequent and by very abrupt changes, some of which have formed interesting themes for comment and discussion, one side maintaining that nature works by gradual and recognizable methods, rather than by shocks, cataclysms or violence.

Yet the immense local snowfall of last December, succeeding to mild temperature, has hardly been previously experienced by the present generation, and the immense snow drifts had more the appearance of a three months' winter accumulation than of the fantastic work of one or two days and nights. This was a surprise to all.

“At the conjuror's,” it has been printed, “we detect the hair by which he moves his puppet, but we have no eyes sharp enough to descry the thread that ties cause and effect.”

Yet one event exudes from, or grows from or on the same stem as another event, and we read in the scientific papers that the lighthouse keepers on the Eastern Atlantic coast of the United States affirm that those violent and destructive atmospheric commotions known as northeasterly hurricanes invariably give ample and unmistakable notice of their coming, even to an unscientific observer, very many hours previous to their onset, and that no one studious of his own safety and interest need be taken by surprise by those violent agitations.

Cloudforms frequently denote what is “brewing” in the atmosphere that surrounds us. The big snowfall of the 4th December last was ushered or heralded some evenings previous to its advent by a dense “anvil-edged” cloud, that seemed to stretch clear across the southern horizon, at or just after sunset two or three evenings before the storm eventuated. Traditions of early Canadian settlers always associated the above mentioned appearance as a presage of

snowfall, and there really is usually an index to the coming hour, which, perhaps, to read properly, requires a delicate impressionability, or a habit of contemplation and watchful observance. Has it not become an adage that "coming events cast their shadows before"? and co-ordination and co-relation seem hackneyed scientific terms, and poets, the most ancient as well as some of the more modern ones, have had faith in Nature's prophecies. (See *In Memoriam*, Canto XCI.) :

"Yea, tho' it spake and bared to view
A fact within the coming year,
And tho' the months, revolving near,
Should prove the phantom-warning true."

"They might not seem thy prophecies,
But spiritual presentiments,
And such refraction of events
As often rises ere they rise."

Old Chaucer tells (See *Canterbury Tales*) :

"That Destiny warneth all, and some
Of every of their adventures
By previsions or figures,
But it is warned too darkly."

i. e., the hints are writ in too colossal character to be read, except in a just and appropriate mental perspective.

Wordsworth avers, in the poem on "Presentiments," that

"God instructs the brute to scent
All changes of the element."

"Blest times when mystery is laid bare,
Truth shows a glorious face,
While on the isthmus which commands
The councils of both worlds she stands."

"'Tis said that warnings ye dispense,
Emboldened by a keener sense,
. . . And teach us to beware."

Storm centers gyrate and cycles revolve, but to discover when one's energy or influence has run its course and another is advancing to replace the spent force perhaps requires more than mortal acumen; but many among us try to read Nature's riddles. In daily phenomena the "Idea," the "Concept," the "Fiat," the decree

seems to precede. There is the "Storm Centre," the often invisible (to the eye) "focus of energy."

To illustrate the practical phase which perhaps may be claimed for such fantasies, the following notes and jottings may seem pertinent :—

On Monday, the 19th of December last, we had extreme frost, a clouded sky with north-easterly winds, when some woodcutters accosted the writer of this with questions as to the purport of peculiarities in the changes of level of the water in a small frozen-over rivulet near to where the two men had been working all day. On chopping through the 3-inch thick ice the water was observed at first to sink or recede two or three inches, so the men asserted, but soon afterwards more than regained the normal level, and in an hour or two overflowed the ice to the depth of an inch or more and remained at the level. Probably this indicated changes and perturbation in the elasticity of the atmosphere, but there was no barometrical instrument near to consult. However, we in the course of the confab alluded to the traditional belief of farmers that a sudden rise in springs of water or of spring-fed rivulets invariably betokened storms to be near at hand.

In the present case in a few hours there was a big rise of temperature and distant thunder was said to be heard. On the 20th December my diary records southerly winds and a foggy atmosphere and a general thaw setting in. The thick ice on ponds and rivers moans and upheaves and cracks, probably in response to the removal or lessening of atmospheric pressure on the upper surface of the ice, and it is often brought to the notice of foresters that after a spell of severe frosty weather and before there are any prominent indications of change the boles of large trees may be heard to give out loud snapping sounds, many of them resembling the explosion of a pistol or air gun, and which they really represent. This phenomenon must have an electric cause, as there is no abatement of the frost and usually a clear evening sky with strong radiation in the crystal clear air. Decided weather changes almost invariably follow these sylvan sounds (explosive). This list of incidents might be extended,

" Eterne alternation
Now follows, now flits."

“ The journeying atoms,
 Primordial wholes,
 Firmly draw, firmly drive,
 By their animate poles.”

“ Open innumerable doors the heaven where unveiled Allah pours
 The flood of truth, the flood of good, the seraphs' and the cherubs' food ;
 Seek not beyond the cottage wall, redeemers that can yield thee all.”

—*Translation from Saadi.*

In the alleged premonitory sinking of the water level, and in the case of a warning fall of the barometer or thermometer like what occurred on Sunday, 8th of January last, in the morning of which day the mercury rapidly rose from about 10° to 31° , some thought a thaw was imminent, but the rise proved a sort of *ruse de guerre*, shall we say a deceptive move, and was abruptly succeeded by a drop to 5 degrees below zero, and the frigidity lasted three or four days, or sixty hours.

This fake reminds one of the French phrase, *Recieler pour mieux sauter*, a sort of concentration of energy for an antagonistic effort.

As when in meteorology a cold wave treads on the heels of a warm one (or vice versa), there is crowding of the molecules at “ the ragged edge ” of contact, and in bucolic weather lore an unseasonably fine day is thought to be unreliable and termed a “ weather breeder.” In meteorology there seem from time to time fresh attitudes or “ moods ” or new grouping of the ruling conditions. The rationale of this perhaps is that if the design can be perceived in one region of physics, analogy would tolerate the assumption through the whole purview and range of human thought.

Occasionally during some of the recurring cold spells of mid-winter these parts are visited by small parties or squads of aquatic birds, such as the grebes and the loons or divers.

The grebes occasionally alight among the ducks or geese of the farmer's barnyard. A few incidents of this kind came to our notice one very severe spell in the month of February several years ago. About sunrise one clear morning, when the temperature was about 23° below zero, a grebe alighted in one of our fields, seemingly exhausted by a long flight and famine. At the base of the bird's

beak, near the nostril's apertures, icicles had formed from the congelation of the breath consequent on the intensity of the cold.

These wanderers seemed to have been attempting to escape from the rigor of northern regions, and we soon after heard that one or two individuals of the species were seen a day or two before the above narrated occurrence to alight in a limited area of open water, just in the rear of the water-wheel of one of our local grist mills. The squads of web-footed migrants were moving in a direction from northwest to southeast. On one or two of these wayward wanderers alighting near, attempts were made to feed and restore and refresh them, but with little success, as they died in a few days, probably from inaccessibility to appropriate food.

A week or ten days ago a small flock of similar aquatic birds of passage were noticed flying over head past our homestead and taking a southeasterly course. There were seven or eight in number, and they seemed as large as geese, but in their flight had more resemblance to loons. Their migration was just preceding the advent of the late spell of arctic weather, which it was conjectured had compelled the bird movement to more genial latitudes.

A few of the February larks have lately been noticed about here, about bare spots in the fields and also on well-travelled highways. This species usually appear here after a few days' thaw, about the first week of February, yet the weather has been almost abnormally cold since the 28th or 29th of January, and last night, February 11th, there was a rather bright display of Aurora Borealis from 7 to 10 o'clock, and fainter through the night.

SOME MENTAL AND SOCIAL INHERITANCES.

Read before the Hamilton Association, 13th April, 1899.

BY DAVID BOYLE.

If the time is not yet quite passed when it is unnecessary to address some audiences in a semi-apologetic manner on subjects more or less intimately associated with the development theory, the time certainly *is* passed when one need have any fear that by so doing he is likely to bring upon himself the condemnation, or, to put it more mildly, the displeasure of those whom he addresses. Neither need he entertain a doubt when thus treating his subject that he is in a measure aiming away above his mark, for now that biological science is studied on the basis of evolution by everybody, or that everybody has, to some extent, become acquainted with this tendency of thought, the popular mind is in a condition of receptivity rather than of antagonism. As a matter of course I use the term "everybody" in a qualified sense, for it is undoubted that there are still those whose prejudices, or whose timidity, place them in an attitude of defiance, or of defence, to the theory in question, just as for a long time there were numerous worthy souls who declaimed against the theory of gravitation. On this occasion my "everybody" embraces the members of the Hamilton Association.

There can scarcely be a doubt that ever since the dawn of human reason, or, if this be too strong, ever since the observing faculties of man became worthy of the name, it was noted by some that this or the other person was marked by some quality or defect that characterized his father or his grandfather. Of a good runner it would be observed that his father was also one; and of a poor stone-thrower or bowman, that his son was no better. In primitive conditions of society it would be only along such lines that observations of this kind were made, because in these conditions man's attention was solely directed to the procuring of food.

With advanced conditions, mental traits would claim a share of

attention, but from the earliest times until our own day it has been impossible to adduce anything like philosophical reasons to account, not only for individual, but for racial peculiarities. Very glibly we could quote, "The fathers have eaten sour grapes and the children's teeth are set on edge," but the question always remained, why did the fathers eat the sour grapes in the first place?

This paper is written as an attempt to account in a measure for some human predilections by referring them to early conditions of society—to conditions that must have existed for many thousands of years, and which, notwithstanding the fact that for some hundreds of years such conditions have not existed, yet exhibit their persistency as a part of our being.

In a purely savage state it must needs be that the supply of food is both precarious and inconstant, and of savage people more than of any others it may be truly said, "They eat to live, and live to eat." In time they acquire tastes for various kinds of amusements and pastimes, but eating is the main business of life—it is not a means, it is an end—*the* end. It therefore behoves each member of the family, or of the tribe, to lose no opportunity of securing that which is necessary for the subsistence of himself and of his fellows. He runs his prey down, or he attacks it with missiles, or he shoots arrows at it, or he lays a trap for it, or he inveigles it into some place from which escape is impossible, but in any event his wit is always superior to brute faculties.

As population increases the supply of animal food diminishes, and man's mental resources are more largely drawn upon to circumvent the tactics of his prey, for the beasts themselves become more knowing.

Even when our suppositious savage is not actually engaged in hunting, he will not fail to avail himself of any chance that fortune may throw in his way to secure an animal. Even to him, habit has become second nature. He goes in chase sometimes merely for excitement; he kills because he loves to kill; hunting has become one of his pleasures. In other words, untold repetitions of such acts through many hundreds of generations have transmitted a tendency to slay the lower animals—a tendency which remains long after man has arrived at a stage of advancement when it is no longer necessary that he should kill at all, and we find accordingly a

betrayal of this tendency—of this murderous instinct—on the part of all and sundry, young and old, in civilized society.

The small boy delights in throwing stones at anything, or at nothing; it would appear that he *must* throw, and as he becomes less and less of a small boy he indulges himself with a catapult, a pea-shooter, a sling, a bow-and-arrow, a revolver, and at last a rifle. The hit-and-knock-down feeling is as strong in him as if it were a necessity of his existence.

Many older people gratify this predatory instinct in the pursuit of what they call *game*. Once, or oftener, a year, and with as much regularity as marks the course of nature in other respects, hard-headed business men become uneasy—they tell us they are getting “run down,” that they require “a whiff of country air,” “a smell of the pine woods,” and so on, and they are quite sincere, for the old-time instinct is simply re-asserting itself in this desire for a “run out-of-doors,” or “a spell in the bush,” but above all, in the case of the hunter, there is the desire to kill something. A deer is a prize, a bear is glory! So many brace of ducks or other game-fowl is something to boast about until next season—not that this kind of food is a necessity, but solely and simply on account of an indescribable pleasure experienced in the taking away of life!

In the not-long-ago when trans-continental travellers on the Pacific railways, in crossing the prairies, happened to see a buffalo within rifle range, shots were fired at the animal from the car windows to gratify a spirit of pure savagery, for there was no hope that should a buffalo be killed its carcase or its hide would reward the ah—the ah—the sportsman. Sportsman indeed! the savage rather, for what cared he though the poor brute should linger for days in agony before lying down to die?

Another class of so-called sportsmen to whom such opportunities are denied, indulge their manly tastes in the slaughter of pigeons released from traps, or they commit sad havoc among chipmunks, robins and other ferocious creatures that infest the woods near home.

In all ranks and conditions we find manifested the same spirit of slaughter, the same desire to inflict pain, and the same gratification consequent upon the practice of cruelty upon the brute creation. On no other theory than that of savage impulse does it seem possible

to account for the terrible atrocities inflicted by young people on the dumb beasts. With what ghoulish zest do they pluck the members of a fly! And how gleefully do they witness the contortions of the mutilated creature in its vain attempts at locomotion.

I knew a boy who once took a pair of callow Baltimore orioles from their beautiful nest, and, pinning them wing to wing, hung them across a branch, leaving them thus to perish while he stood by in gleeful admiration of the grief-stricken parents trying to entice the young ones back to their home. For this boy, at the time, I predicted nothing less than a termination of his career on the gallows, but he ultimately became a captain in the Salvation Army!

It is well for our race that with increasing years, that is to say, as we get beyond boyhood; that period of lifetime which is most pronouncedly savage, a change comes over the spirit that dictates such acts. But this not always. For the records of the police courts frequently bring to light many acts of almost incredible cruelty as inflicted by mature persons on children and on the lower animals. Such perpetrators are veritable savages, notwithstanding their existence among ourselves, and they should be made to feel the arguments of the law and of humanity, physically, for the simple reason that they are totally unable to understand what they owe to civilization by any other means.

Closely related to this phase of persistence in savagery is another inheritance affording pleasure of a low kind, namely, that which arises from the seeing of animals inflicting pain on one another, and this continues to afford enjoyment for a much longer period of the modern savage's life, and it is participated in by a vastly larger number of people. Hence cock-fights, dog-fights, bull-fights and man-fights, which are still ranked among the amusements of the populace.

If these things, or rather the desires which prompt them, are not savage inheritances, what are they? And that tens of thousands among us take a shocking delight in perusing accounts of how these things are done, is evident from the amount of space that is devoted to details in the columns of newspapers which regard themselves, and are regarded by us, as exponents of public opinion.

Games of chance are of religious origin, that is to say, they were at first employed for purposes of divination, but in course of

time as stakes were laid, or bets made on the possible results, the element of gambling found its way in, and there is no feature of primitive or savage life so universally prevalent as is this, and there is no inheritance from the long-ago which has clung to civilized men with more persistence than the spirit of gambling, which is neither more nor less than an unintelligent and wholly blind trust in luck, and it is notorious that among no class of people more than among confirmed gamblers is abject superstition so supreme, and superstition of every kind is an inheritance for which we have to thank our savage ancestry.

Games of skill may have originated as mimic combats in friendly guise. It would be difficult to name one which does not involve loss and defeat on the one hand with capture and victory on the other. They all appear to be modifications of old-time pugnacity—of the days when family feuds and tribal wars were maintained fully as much for the sake of gore and glory as for aggrandizement. Most of our popular games, whether indoor or outdoor, demand that something shall be hit, or some person or some place captured, and so persistent is the ancient idea of war involved in the playing of such games, that even in many of the quietest and most thoughtfully conducted ones, we speak of the pieces employed as “men,” and as men whom it is a duty to “take” if possible.

In athletic sports, again, muscle is, of necessity, the chief prerequisite, and while it must be patent to everybody that although in these almost twentieth century days there is comparatively little need for the exercise of excessive brute force, we find many of our fellow-beings devoting their lives to the attainment of notoriety or of celebrity, as the case may be, in walking, running, wrestling and rowing, not for recreation or occasional diversion only, but as so-called “professionals,” while those of us who for many reasons may be unable to practice such exercises ourselves, manifest a decidedly lively interest in the doings of these latter-day savages, even to the extent of betting heavy odds for or against a particular contestant, in this way laying ourselves alike open to the charge of exemplifying by inheritance an ancient savage predilection, for betting is but gambling, and all gambling operations are only the improved, refined, systemetized, *i.e.*, evolutionized forms of deity or fetish placation or cajolery, practised universally in the early days of human society, as I have already said.

We are too apt to consider the belief in luck, ghosts, fairies, witches, dreams, amulets, charms and premonitions as being entertained by ignorant people only. A very little inquiry will serve to dispel this too partial view. Superstition is apparently spiritualistic. It has been transmitted to us from a time when some reason had to be assigned for phenomena that were inexplicable on natural grounds, and it is really astonishing to what an extent it maintains its hold upon the minds of intelligent (or, shall I say, of otherwise intelligent?) people. The belief in dreams is, perhaps, most widely spread, and chiefly among women. Lucky and unlucky times and seasons influence the actions of many persons whom it would be a mistake to characterize as weak-minded, only in so far as this inheritance from savagery is concerned.

Powerfully occult influences have always been attributed by primitive man to the heavenly bodies, and especially so to the moon, and in this year of grace, one thousand eight hundred and ninety-nine, there are farmers all over the world who regulate their sowing and planting, their killing of cows and pigs, by her phases, just as their wives take these into account in the making of butter and in the weaning of their infants. Even the weather is popularly regarded as being regulated by Luna's influence, and so wise a man as Sir John Herschel actually prepared a tabular statement illustrative of his belief, but of course no possible use can be made of it by meteorologists of to-day. Sir John tried to square his acquired astronomical knowledge with his inherited tendency to the crudities of astrology.

One of the first indications given by the new-born infant that he is henceforth to be regarded as a member of society is the making of a noise, or as Shakespeare has it in *King Lear*:

“ When we are born we *cry*, that we are come
To this great stage of fools,”

and elsewhere he says: “ We came crying hither.”

From this time forward it may be observed that noise of one kind or other, often merely for its own sake, enters largely into many of the relations and pursuits of life.

According to the theory on which this paper is based, the child exhibits much more of the savage than does the full-grown man, and

it may be said without a particle of exaggeration that *minus* noise a child is nowhere. So tacitly do parents recognize this as a fact, that they actually provide their children with the means of gratifying this propensity. Spoons, tin pans, drums and wind-instruments of "fearful and wonderful" construction occupy a place in every juvenile chorus. When a little more advanced in years the sweetest of music seems to have no charms for sturdy boyhood comparable to that produced by the rat-a-tat-tat of a stick drawn rapidly over the pickets of a fence or the bars of a window grating, the result being not unlike that from the favorite rattle of most primitive peoples.

To grown-up boys the production of loud and discordant sounds affords joy ineffable. I have listened with pleasure (not æsthetic, but scientific pleasure,) to a group of boys from ten to fourteen years of age, sitting on a pile of lumber during a summer evening, enjoying themselves to the full as they vied with each other in giving utterance to the most unearthly howls and yells.

During the periods of maturity and old age the noise producing proclivity is less noticeable only because it is more under control, for the exercise of thought is not calculated to encourage the making of unmeaning sounds, unless under emotional influences, when it can scarcely be held that the judgment is responsible. In connection with political triumphs, victories in war, celebrations, and popular rejoicings of every kind, nothing short of lusty cheers and the discharge of firearms seem to satisfy the average human being in his desire to testify gratification. On such occasions "three cheers and a tiger" indicate the highest attainable point of happiness.

In process of time we have harmonized the dissonant utterances of our ancient forefathers. We have formed a gamut of such notes as the voice is capable of producing. From the bow-string and the reed we have elaborated the piano and the organ, and just in so far as we are capable of appreciating refined vocal and instrumental utterances are we judged to possess musical culture, *i. e.*, are we reckoned to be above primitivism.

In the gentle rhythmical motion, or the rapid whirl of the "mazy dance," it is not difficult to guess shrewdly as to the sources.

When the original dance was not of a religious character it was either to anticipate or to celebrate victory in a fight, and in the civilized forms of this amusement, so far as the latter origin is con-

cerned, we observe evident traces of the advance, the attack, the capture and the retreat. We see the votaries of this art marching in single file round the room. They effect flank movements, they take ambush by devious routes, they seize their adversaries, they simulate a struggle, and eventually succeed in placing the captives (usually fair ones) in a place of safety. Single dances like Ghillie Callum and the jig may be interpreted with reference to recitals of individual prowess in presence of the foe, accompanied by expressions of contempt, and by ridicule of the enemy's valor.

Even in our more personal and domestic habits it seems easy to discover some intimate relations between ourselves and our far-removed forefathers. I may refer just by mere mention to the fondness of some for half cooked or nearly raw meat, and to the not uncommon relish of others for animal food, especially fowl, in a condition that verges on what some would call putridity, but which is known to the *gourmets* as simply "gamey," and yet we shudder at the thought of a Sioux or of a Hottentot who regales himself on the decaying carcasses that fortune may throw in his way.

Again, many of us who think we can afford to pity those of such depraved taste, betray our own prehistorically acquired instincts in a manner scarcely less remarkable when we exhibit a fondness for rotten or rotting cheese. What a tit-bit is a lump of the rare old mitey article! And how appreciatively does the admirer of it smack his lips at what he calls its "nutty flavor!"

If I am not in error, vegetarians declaim respecting the use of flesh as food, not only because of what they declare to be its unfitness for this purpose, but on account of the cruelty and inhumanity that are involved in the necessary slaughter of the animals, which is equivalent to a declaration of these people's belief that the custom is a savage one, and yet one of the most highly prized vegetable preparations is thought to be edible only when it is far gone towards putrescence.

It is, indeed, not improbable that from the consumption of decayed, and consequently fermented vegetable substances, there has arisen in so many widely sundered portions of the world the desire to indulge in alcoholic intoxicants, although it is not always necessary that fermentation should take place, for the desired result sometimes follows from the consumption of a vegetable in its

original condition. In the northeastern part of Siberia there grows a somewhat rare mushroom, an average specimen of which, by means of an exceedingly peculiar and disgusting process, is capable of producing intoxication in all the members of a large family. Still, even in this case, it may be that the fungus is in a decayed state before it is eaten, so that it may be wrong to speak of it as being in its original or fresh condition.

Closely related to intoxicants are narcotics, and it would be hard to say which has claim to priority in use. Neither is it easy to divine why savages or any one else ever thought of such a ridiculous and apparently wholly unnatural process as that of smoking.

Perhaps they first chewed or snuffed the material, and the use of pipes may have been an after-thought for religious purposes, enabling the smoke to be whiffed as an offering to the cardinal points and to the sky. On any supposition the habit of smoking is purely a savage one; and although, so far as we are aware, our forbears knew of no such practice, it is amazing how kindly many of them took to the use of tobacco, quite as much so, indeed, as the Indian took to rum. In both cases it may have been that long dormant instincts were awakened. Who can say?

We all understand what is meant by savage finery, but do not we ourselves show some atavism in this respect? Do we not really enjoy a display of "fuss and feathers"? We do not pierce our noses and lips for rings, nor tattoo our faces, because it would be inconvenient so to do; but whenever a ring can be worn to advantage, whenever a chain of the precious metal can be displayed, wherever we can attach feathers, ribbons, tinsel or gew-gaws of any kind, we make the best possible use of our opportunities.

Members of the sterner sex may deny that there is any tendency on *their* part to go *very* far in this direction, but it would seem pretty plain that we are all, to a great extent, what are known as the "slaves of fashion;" that in this, as in so many other respects, we are "A' John Tamson's bairns," for if we but give the male portion of the community a chance to figure in the procession of some secret society, or in the ranks of a military display, at some high-class ball or levee, or in a grand civic demonstration, we find the "lords of creation" adorned in "full fig" with aprons, sashes, belts, gold lace, medals, badges and other regalia, in which they

strut about with fully as much consequence and pomposity as characterize the movements of an Indian chief when acting as Master of the Ceremonies at a big pow-wow on the prairie.

Even tattooing, to which exception has been made with respect to our faces, holds its ground to some extent, but chiefly among boys, sailors and lumbermen. Women seldom indulge this savage taste, probably owing chiefly to the fact that its consequences are too permanent. It admits of no compliance with changing fashion, so they prefer another not less savage, but more variable method, for the purpose of heightening their charms by means of color.

One of the pests, the manifestations of whose primitive predilections meet us almost at every turn, is the jack-knife sculptor, a modern savage who, in imitation of his ancient congener, makes his mark upon all available surfaces, as if either to remind himself on a future visit that he has "been there" before or to acquaint the other members of his tribe that he has travelled past this spot. He will even laboriously carve his initials or his "totem," which is often much more objectionable, in the hardest stone, and take his departure with the happy consciousness that he has performed a duty or fulfilled a mission, feeling at the same time perfectly ready to repeat the operation as opportunity presents itself. Other mediums sometimes take the place of the knife, but in any case the man who has inherited this low propensity is impelled by some means to indicate his presence, even to the spitting of tobacco juice on every painted or polished surface he passes by, and the whiter the surface the better is his object attained. He is a nineteenth century survival of the cave-man, and refrains from committing murder only because he has a wholesome regard for the terrors of the law.

The prevalence of crime is among the surest evidences of the savage strain which by its persistency continues to affect the life-blood of civilization. Only by an arousal of the baser passions can deeds of blood and plunder be perpetrated, and that these passions remain so capable of gaining complete mastery, goes to show in how many of us still rankle the aboriginal desires to waylay, to make war, to kill, and to increase our possessions by appropriating those of our neighbors.

In a very summary and imperfect manner I have thus touched upon a few of the social and mental qualities which, as they appear

to me, we have inherited from the long distant past ; but as we are all disposed to do some thinking on our own account, it is inevitable that we should disagree respecting one or more of the positions I have assumed. This, however, is a matter of small consequence ; the main point is that we do not fail to regard our highest moral, social, political, artistic and scientific achievements as intellectual developments which had their beginnings far away back in the stream of time, and these, too, chiefly in that most natural of all instincts, the instinct of self-preservation ; and we should value our acquirements the more and not the less on this account.

We esteem ripened fruit none the less because it retains well-marked evidences of the original bud from which it sprung, and we see no reason to despise an ingenious bit of mechanism on account of its production from crude materials.

That so many of our inherited proclivities bear such strong resemblances to savage ways is not only a proof of what is called the "Descent of Man," but they go to show how exceedingly brief has been his so-called civilized condition as compared with the endurance of his primeval state. The effect of habits practiced during a lifetime cannot be removed in a day, a month, or it may be a year ; neither need it be expected that all traces of customs and usages engendered and maintained during ages in a primitive state of society can be eradicated in the course of a few centuries in more advanced circumstances.

That the time will ever come in the history of our race when every tinge of the old life will be utterly removed is more than doubtful, even if it were desirable—indeed such a condition is inconceivable, for many of the supremest joys and pleasures of our being are inseparably connected with the gratification of tastes and desires engrafted upon our stock when hunting and fishing were necessities of individual, as warfare was of tribal, existence.

Our work is to modify, to refine, to elevate, to direct, and as may be found necessary for the common weal, to suppress old-time instincts.

In other words, civilization should be a process of natural growth—the result of small but steadily supplied increments to our knowledge, as a consequence of racial experiences.

REPORT OF THE GEOLOGICAL SECTION.

For the term ending May, 1899.

The Section submits with pleasure this, their annual report, feeling that a steady onward march has been maintained during the past year.

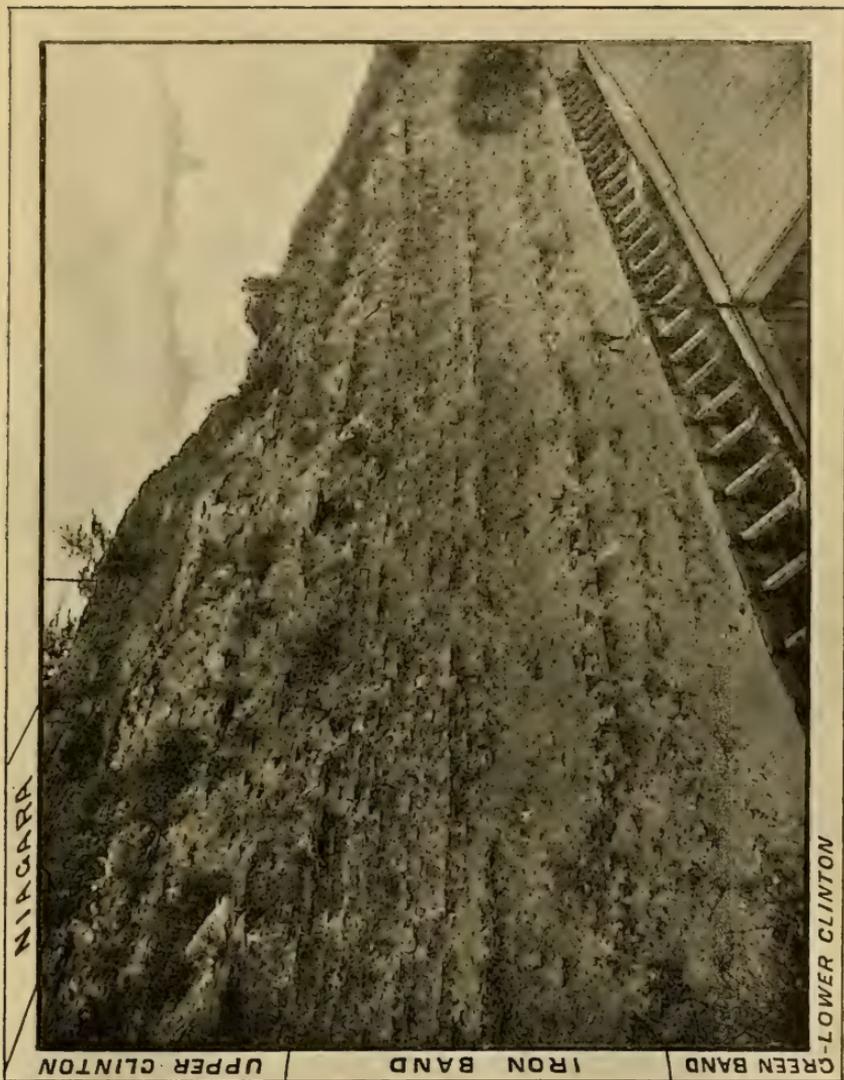
Although the Section cannot announce many new discoveries in this vicinity since our last report, yet it can assure the Association that substantial progress has been made in the collection of specimens, some of which reveal varieties of well-known species, exhibiting peculiarities which might lead the novice to believe that he had discovered a new species, and for which he would, as in duty bound, proceed to add another name to the already over-stocked nomenclature of the family.

Col. C. C. Grant, our indefatigable collector, sent to the late Dr. James Hall, State Geologist for New York, prior to his death, a collection of fossils. Among them was a *Lingula lamellata*, on which Dr. J. Hall discovered the fossilized ova adhering to the shell in precisely the same place as the ovum is deposited by the modern *Lingula*, thereby proving that through the countless ages this species has preserved not only the shape, color and habits of its palaeozoic ancestors, but also the same mode of propagating its species. The specimen was obtained from the Clinton formation here.

During the year many new specimens have been added to the Museum. The crowded condition of the cases does not afford any opportunity to display the newly acquired fossils to advantage.

During the year the Museum has been kept open to the public on Saturday afternoons, so that any persons desiring to avail themselves of the use of specimens in the Museum for comparison or study were free to do so by themselves, or have the assistance of Col. C. C. Grant or Mr. A. E. Walker, if required.

The Section was gratified to learn that the Museum of the Hamilton Association was pronounced by competent authority to be



ROCK EXPOSURE AT HIGH LEVEL RESERVOIR.

superior to anything of like nature in the Queen City of Toronto. When we consider that it is the result of volunteer effort by the lovers of natural history, it is all the more gratifying.

The Section hopes that ere long the necessary accommodation for the proper display of so important a collection will soon come. It is no doubt a reflection upon the citizens of Hamilton, who have so long neglected to evince any interest in a society which has labored so arduously to disseminate a knowledge of the natural history sciences, to which subjects the schools of to-day are directing their special attention.

Papers were read at all the meetings of the Section, three on geological topics and two on malacology. The latter were illustrated by specimens from the excellent collection of shells placed in the Museum by Mrs. Carey, also from the collection of Col. C. C. Grant.

Following are the dates of the meetings and the subjects of the papers read :

Nov. 25, 1898—Palæontological and Geological Notes of Winona and Grimsby, by Col. C. C. Grant.

Dec. 30, 1898—Palæontological and Geological Notes, by Col. C. C. Grant.

Feb. 4, 1899—Palæontological and Geological Notes, by Col. C. C. Grant.

March 31, 1899—Malacology.

April 28, 1899—Malacology.

All of which is respectfully submitted.

A. E. WALKER,
Chairman.

A. T. NEILL,
Secretary.

GEOLOGICAL NOTES.

Read at the opening meeting of the Geological Section, November 25th, 1898.

BY COL. C. C. GRANT.

Although it has been usual at our opening meeting in preceding years to bring to the notice of its members any fresh matter regarding the field geology of the district, I have, however, been requested to defer calling attention for a little while yet, for certain reasons, to this subject. The suppression of the matter is only temporary. The silence is enjoined on the writer's part for a brief period, until necessary arrangements are completed. (The foregoing refers to a recent discovery here of Bog Iron Ore.)

A few years ago a small pond (dry in autumn) was deepened and cleared out for the purpose of holding a sufficient supply of water for the cattle on the farm. In the muddy material thrown aside from the excavation were a few large boulders seemingly, which, on closer examination, proved to be Bog Iron.

From the limited extent of the swampy portion of the field the writer considered it was very doubtful if the deposit could ever be turned to profitable account.

The adjoining land has been cultivated for some time, and the natural depressions on the surface, partly filled in, he was unable to form a clear idea of the original extension of the swamp now drained. Near a slight surface depression a considerable heap of apparently Northern boulders—relics of the great Ice Age—had been noticed years ago. Only recently this heap, on closer examination, proved to be Iron Ore, which had been evidently mistaken for erratic rocks and placed there, as is customary here. About two cart loads of the material is now exposed. A more extensive chain of boggy land has been remarked in a forest adjoining. No doubt this contains the mineral also, yet this cannot be positively stated without its being tested. So we may be content to state there are undoubted indications of Bog Iron existing near Hamilton, close to a good stone road and railway.

I find in the Journal of Proceedings for 1882-83 a paper by a member of the Association, A. T. Freed, on Iron and Steel, in which he alludes to the forges established by the French in Quebec at Three Rivers. Bog iron was used in the foundry at the St. Maurice Forges for a century nearly. In a report to Parliament in March, 1879, he finds it stated: "St. Maurice's Forges, owned by F. McDougall & Sons, Three Rivers; using Bog ore; making a very fine iron with charcoal fuel."

At one period after its discovery about 250 men were employed, and large quantities of pig and bar iron were exported. Almost all the iron axes (or tomahawks) found either in Indian ossuaries or on the surface of ploughed fields in this Province were made at the St. Maurice Forges. The trade mark, you may notice, is a cross within a circle. Mr. Freed mentions when Franquet visited the foundry and forges in 1752, in accordance with instructions from the Intendant of New France (Bigot), the workmen, 180, were employed in stove moulding, and the iron was preferred to the Spanish ore.

WINONA AND GRIMSBY.

During the past summer a shorter time than usual was spent in collecting along the lake shore and at Grimsby. The residences at "the Park" were vacated at an earlier period than was expected. The Cambro-Silurian Shingle on the Beach presented a few fossils (undescribed as yet probably), and others recently found in Canada, but known previously as occurring in Ohio, U. S. A., described and figured in the States Geology by the late Dr. James Hall. One of the best preserved specimens of an "Orthodesma" I have seen was recently obtained by Mr. Bartlett, at Winona, who paid it a visit since I left the camp. The most interesting fossil obtained by the writer then was a large Patelloid shell, bearing a resemblance to a Crania. It is not Phosphates, so can hardly come under The Discindæ. It may perhaps belong to the Order *Atremata* (Beecher) Super family, *Obolacea* (Schuchert). I have never seen anything like it figured. A small portion of the shell is concealed by the matrix, but the shape of the Valva can be readily distinguished and the ornamentation is well defined. Few Cambro-Silurian fossils from Lake Ontario's southern shore at Winona are in better preservation. As a general rule they are difficult to extract there. In the upper

case containing characteristic organic remains from lower Silurian drift, etc., I placed valves of a large *Modiolopsis*. On comparing it with "M. gesnere" Billings (which I thought it might be), it was found to differ in some small matters, and on comparing it with others I found the divergence still wider. It may be a new species, or at least new to Canada. An *Orthoceras*, or rather a fragment of one, was discovered also at Winona, which, if not new, must be very rare in the lake shore drift. In Dr. Nicholson's work, "Palæontology in Ontario," he informs his readers that he recognized "the *Endoceras* of Hall" by the cross striation of the shell. That is not characteristic solely of the Cephalopod. The Winona one is marked in the same way, but the striæ are closer. *Orthoceras Jamesi* is similarly ornamented.

A specimen of *Bucania* (*Bellerophon*) *expansa* Hall (Trenton) was found and placed in the Museum. This lower Silurian Gasteropod is very rare in our local drift between Hamilton and Grimsby. The greater part of the shingle along the lake shore was derived from the Upper Hudson River (Bala) beds; this may account for it. Also a wedge-shaped valve of a *Lamellibranch* (*Lyrodesma post-striata*), probably, the posterior striation not well displayed, so one cannot be positive regarding it. A "*Cypricardites*" (*Lyn. Cyrtodonto*) nearly allied, if not identical, with one described by Billings as occurring in Hudson River beds and in Anticosti, was also obtained, but in poor preservation. Indeed it was difficult to extract any limestone fossils at all at Winona, and I had to regret seeing two or more fine specimens, new to me, coming from the matrix as mere fragments, impossible to restore for description. One, an *Orthoceras*, closely reticulated, had a fragment of the shell adhering to the septæ.

BELLEROPHON EXPANSUS.

This well marked keeled Gasteropod (whose name, Miller states, was pre-occupied by Sowerby) seems rare in the drift of Ontario, and is not named as occurring in "The Trenton" or "Hudson River" rock series of the Province, by Nicholson. Another member of this family group which, perhaps, may be the *Bellerophon bilobata* of Sowerby, was found at Winona. (Without the originals for comparison, it would be rash positively to name specimens solely from description.)

Well preserved organic remains were discovered in some large flags, colored brownish purple, probably Trenton. This band is very fossiliferous, contains a very fine *Cyrtodonto*, resembling *C. Hindi* (Billings), which I failed to extract. The beak and part of the hinge line were concealed, so one could only judge from its general appearance. It would be well to ascertain the occurrence of the bed in situ, for I think it holds two or more fossils which appear to be "new species," in addition to many others rare in the drift here.

GRIMSBY, NIAGARA BEDS AND UPPER CLINTONS.

Before the writer refers to this locality, it may be necessary to state that he understands in some quarters remarks have been made regarding the possibility of a mistake having occurred regarding the horizon of the *Fucoids* in the now abandoned Gibson Quarries. There cannot be the slightest doubt in this matter, however unlike in mineral composition. In the Upper Clinton beds of Hamilton and Grimsby the strata are identical as regards the position of the rocks. The white and mottled sandstones at the latter occupy similar places to the Hamilton Upper Green and Iron Bands. It is also erroneous to suppose the Lower Clintons are not to be found at Grimsby. They are merely partly concealed measures there. The writer noted their occurrence in the ravine at several places, and also the Medina freestone and the capping Grey Band, from which he extracted the *Gasteropod* now in the Geological Survey Office, Ottawa. "It is probably a species of *Halopea*," remarks Prof. Whiteaves.

Very few fossiliferous slabs were displaced since last year, but many well preserved *Fucoids* and Niagara Shale *Polyzoa* were obtained by searching in the debris of the old workings. In a *Pentamerus* layer there, the writer noticed, on splitting it, quite a number of casts, which he considered represented a young stage of growth of the *Pentamerus oblongus* (Sowerby), if they did not represent dwarfed degenerate descendants of that *Brachiopod*. I have since discovered the shell has been figured and described as a variety from the Niagaras, Iowa, U. S. A., as *Pentamerus subrectus*.

In a letter received from the late Dr. James Hall, just a little before his death, after his return from "the Urals," in Russia, in acknowledging the receipt of a communication relative to finding

the Furoid (*Arthropycus*) in the Clinton beds at Grimsby and Hamilton, he states: "You have discovered for the plant a new horizon. Now I want you, if possible, to get a photograph or photographs of the Grimsby rocks referred to in your letter for me, it would be more satisfactory." I furnished Dr. Hall with a few very fine slabs, one presenting on the surface the small *Arthropycus*, which, if not a new species, as the writer thinks, may be looked upon as a variety at least. They occur in distinct beds. This seems important.

THE HAMILTON NIAGARAS.

The local limestones lately presented quite unexpectedly some organic remains whose occurrence may well be recorded in our Proceedings, and which were revealed accidentally under the following circumstances: It was found necessary to break up these beds (used chiefly for building purposes) into small blocks for the city stone crusher. Although usually broken across, they are at times split along the line of bedding. It so happened the *Pentamerus* layer was so treated lately, and the quarryman remarked a very well preserved *Dictyonema* made its appearance on one part which was opened out by the sledge. He was not aware that the other portion had a like impression. I am inclined to think that none of the seven graptolites noted by the writer as occurring in the base of the Niagaras (the old Clinton limestones of Hall) belonged to the *Dictyonemas*, and this was the only one ever noticed in this layer.

In a few days after, on looking over a heap of broken flags prepared for the crusher, I noticed the slab from the same bed with the *coral* on an inner surface, and the one containing quite a number of rather obscure impressions, to which I called attention formerly. Hinge lines and muscular impressions seem wanting, if they should prove to be valves of a Mollusc.

The *Stricklandinia* bed is the second one below the thick limestone. The "Nigger Head," the intermediate layers between this and the base bed, are known to us as "the barren Niagaras" here. True, they were considered unfossiliferous, but they held the gigantic Cephalopod alluded to by Dr. Spencer, F. G. S. And recently a very large valve of a *Stricklandinia* (a new species or

variety probably) was found by a quarryman, while the writer secured a fragment of a still larger "Conularia" than the specimen described and figured in "The Niagara Fossils" of Dr. Spencer. The writer regrets at best it can be looked upon as merely a portion representing the existence of a great free-floating Pteropod still earlier than the time "the Chert beds" were deposited in the Silurian Sea. When I mentioned the discovery of the large well-preserved *Stricklandinia* in the city quarry recently, I stated it reminded me of a specimen in rather indifferent preservation from the adjacent Hancock Quarry. The fossil was not found in situ at the time, so perhaps I erroneously concluded it represented an extremely aged member of the family from the regular *Stricklandinia* limestone layer. On describing the *Brachiopod* to our Chairman, Mr. A. E. Walker, I ascertained he presented to Dr. James Hall, on one of his visits to Hamilton, a *Stricklandinia* also obtained under conditions similar to mine. He noticed the dimensions of the shell were considerably in excess of any he had extracted from the true *Stricklandinia* bed. On reference to Prof. Schuchert's able and interesting work on "The Fossil Brachiopoda, America," I find Hall and Cluke named one from Hamilton, Ont., *Stricklandinia Chapmani*. As we have not seen it figured or described, it is impossible to say whether this is the very large species or another one. The shell described by the above Palæontologists may be added any day to the latest published list in our Proceedings.

The *Pentamerus* bed holds, in addition to the fossils already mentioned, two distinct *Fucoids*, perhaps more. A third one seems rather doubtful. I think in a former paper it was stated the under surface of the layer resting on the upper green Clinton shale presented the appearance of blackened and crushed impressions of a plant, which rarely displays a grooved cylindrical surface. It does not branch like *Buthotrephis*, neither does it produce a tuft of branches like the *Licrophyucus* of Billings. It is difficult to extract a tolerably well preserved specimen in a portable form, owing to the matrix. The writer remarked it may be found also on splitting the block in the interior, and he found such was the case. The flattened stalk was found in several instances. It has lost the bitumenous coloring inside, only possessing a stain-like impression, differing from the remainder of the surroundings. But in two or more cases a

green color, indicating iron (in solution probably), mineralized the plant. The greenish matter is not unusual in similar organic remains in the Niagara Chert beds, as you may see in the *Furoids* here produced. It is so in the Clinton Iron Band also. While a few we possess were admired for their state of preservation by the late Drs. J. Hall and Newberry, they expressed regret that some of the plants described as discovered here had not been retained for our own Museum. For several years the writer has visited, during the collecting season, places where their occurrence had been noted previously; but merely a few were obtainable. The Medina Grey Band, east of the city, has been worked out as a paying quarry. Even the one near the Hamilton main reservoir, which held seven or eight distinct *Furoids* in former times, for years has been abandoned. So we may conclude there is little chance of replacing the plants, etc., of the series which were sent from here formerly.

By examining the heaps of rubbish of the series left by the stone cutters, only a few well-known specimens were found, and nothing new turned up. An imperfect fragment of one of the branching cylindrical *Furoids* mentioned by Dana as occurring in the States, is here represented also. The thread-like form which came under his observation may have been passed unnoticed, but an intermediate is certainly represented in the grey band of Hamilton, which probably has not been described or figured as yet. A small bushy plant was remarked some years since on a slab which had been exposed to weathering for some time before its removal from other, and was afterwards carried away for building purposes. Unfortunately some boys were looking on and saw me put it aside. On returning to extract it with the chisel the following day, I found the young rascals had in the meantime been up to mischief, as usual, and had completely destroyed the specimen, the only one of the kind I ever saw. We have quite a number of *Furoids* about Hamilton which I think have never been described or figured. It is to be regretted this class of organic remains has been greatly neglected. One can merely form an opinion on it from outward general appearance. Many *Furoids* have been forwarded from this to various Museums, but I doubt whether any Palæontologist has described a single specimen yet, except a very fine one from the

Barton water-lime beds, near the Albion mills, now in the Redpath Museum, Montreal, figured and described by Sir W. Dawson.

Many of the *Fucoids* sent away from Hamilton formerly probably cannot be duplicated now.

THE CLINTON SERIES.

Although these beds presented nothing new recently in consequence of the non-removal of the shales since the freestone grey band was worked out, some interesting slabs, loosened by weathering, fell from the rock cutting off the escarpment in rear of the upper reservoir lately. One, a very large flag from the Iron Band, when split revealed an extraordinary number of impressions of single valves of the blue *Lingula*, *L. Clintoni* (*Vanuxem*) to *L. Oblonga*, *Conrad*. There can be little doubt but they represent an assemblage of dead shells, washed up at a time when the Clintons there were slowly undergoing submergence. The ridged-up wave mark of the shallow sea, plainly to be recognized in the layer, is sufficient evidence in proof, where it can be clearly shown that the succeeding upper green band of the Clintons also, which was deposited above it, displays even more pronounced and better examples of wave and ripple marks.

The Museum possesses a very fine slab from the grey band, Medina, displaying this characteristic impression, but we ought to have a larger and better Clinton flag also to show our visitors than the small specimen now in our case.

One may, however, hesitate to place it, even if obtainable, among many of the loose specimens now in our collection, which have been seriously injured by frequent removals from their places. We do not realize, unfortunately, that fossils require as careful handling as the botanist displays in the preservation of his plants. A chip or two knocked from a stone, or a few scratches perhaps added, may appear to be of little consequence in the eyes of men unable to comprehend the importance attached to the preservation of the cup-shaped summit of a coral, for instance, or the apex of a shell. Yet such seemingly small matters lead to correct classification.

The Clinton Iron Band at the upper reservoir here enables us to add *Lingula acutirostra* (Hall) to the list of Hamilton, Ontario,

fossils. It was noticed as occurring also in the upper green band of the series below the Mountain View Hotel formerly, but was not recorded. Independent of the sharp beak which points to a distinct species, as claimed by the United States Palæontologist, it appears to have been colored a deeper blue than *Lingula Clintoni* (*Vanuxem*). I do not think we have yet discovered the true horizon of either this *Brachiopod* or *Lingula glossina perovata*; they are so rare that probably we may infer they were placed accidentally among other species common in the Clinton iron band.

Completely debarred for many years for examining the most interesting portion of the series, viz., the bluff beyond the reservoir, by the action of the Grand Trunk Railway unfortunately, we are unable to procure for the Museum cases any of the rare organic remains, viz., Silurian star fish and colored shells, obtainable there. It has been stated that recently some of our members have not been interfered with while going along or crossing the railway track, so they concluded the rule regarding trespass on the part of naturalists is not now rigidly enforced. It may be so. Speaking personally, I am not at all likely to ascertain if such is the case, since I hold it derogatory in a Naturalist to accept as a favor individually what may be denied to others with similar claims to consideration. In marked contrast to the action of this Company, permit me to state I have been informed at the office of the T., H. & B. Railway that we may freely pursue our researches along that line without hindrance. I doubt if some of our city "dailies," which so bitterly denounced this "Yankee concern" in the interest of its rivals formerly, can now perceive what Company is entitled to thanks on our part for disinterested liberality.

In a Clinton layer, which apparently contained hitherto only *Heliopora fragilis* and *Rhynchonella neglecta*, I was surprised to find recently two new graptolites and numerous Bryozoons resembling *Retepora angulata* in different stages of growth. One of the graptolites was badly broken in extracting it; the other, a young species, was forwarded to the Geological Survey Office, Ottawa, and another from a lower green band of the series. From the latter also I extracted an indifferently preserved large *Lamellibranch*, too imperfect for description in this instance, but placed in the case until such time as a better may be had. In *The Natural History*, New

York, vol. 7, "Palæontology," by James Hall (received from the author some years ago), one sees figured groups of isolated annelid tubes cemented together (*Tentaculites*) and attached usually to other organisms of the Hudson River rocks. It may not be generally known this may be noticed here also. The groups of three cemented tubes are of frequent occurrence on the face of a large red Clinton flag, and also on a green one; but in no instance were they found attached to foreign bodies. It could not have been for want of material, for both flag contain very numerous specimens of *Orthis* (*Rhipedomella*) *Circulus* (Hall), as also a few of *Leptæna* (*Strophomena Rhomboidalis*). It appears strange that the *Tentaculites* of the Clinton here are never discovered cemented to shells or corals. A fine slab containing several characteristic fossils of the rock series was recently placed in an upper case of the Museum, but at best our local collection is sadly deficient, and rare fossils poorly represented, in a great measure owing to the limited extent of the exposure near the city, its abandoned quarries, and the action of the Grand Trunk Railway authorities in prohibiting researches along the track. It must be admitted also that large numbers were sent away from Hamilton before the Museum was finally established. The grass has long since grown over the heaps of shale, removed by the quarrymen to get at the Medina sandstone beds. They were particularly rich in lower Clinton remains, especially after heavy rains.

The discovery of the long curved coral, resembling *Zaphrentis* so low down in the Niagaras, reminds me of the well preserved specimens of *Halysites Catenulatus* (Linn) which I obtained formerly from the long since abandoned quarry, near the reservoir, in a mass of Clinton shale. On mentioning the matter to Mr. A. E. Walker, he informed me he also had secured a specimen of that coral, together with others (*Favosites*) from shales removed by quarry men when uncovering the Medina freestone. His description exactly agreed with the ones found by the writer. The individual corallites were smaller, the meshes of the network differing also somewhat from the coral so abundant in the limestones (*Niagara*) of Anticosti and Ontario. It appeared to be dwarfed by uncongenial surroundings; nothing else but a mere variety. One thing we learn from it, to which the writer already called attention, viz., that Silurian corals could exist and flourish under conditions which would be fatal to our modern reef-builders.

On referring to Dr. Nicholson's "Palæontology of Ontario," the chain pore coral is not recorded as having come under observation except in Niagara limestones. We may therefore add it to the Clinton organisms recently given as Hamilton, Ontario, fossils. We have much to learn yet regarding the Palæontology of the district, and the following fact is well calculated to stimulate further research: In a late communication from the able Palæontologist of the Dominion Geological Survey, in acknowledging the receipt of a small collection of fossils from Hamilton, he mentions it would be desirable to secure for the National Survey office a specimen of a *Cephalopod*, now in the British Museum, named *Trocholites Planor Biformis*, said to be obtained from Trenton (*Conrad*) limestones at Montmorenci, and three were obtained, adds Prof. Whiteaves, from near Grimsby, Ont., by a gentleman from Philadelphia, Mr. Ashmead. The professor indicates the drift on the lake shore at Winona and Grimsby as likely to furnish the specimens required. I think, from the description given, we may safely place it with other drift fossils found here.

During the past summer, while at Winona, on breaking up an exceedingly hard limestone flag, I discovered a few Trenton fossils inside, together with what I then supposed to be a crushed *Pleurotomaria*, which I failed to extract. The receipt of Prof. Whiteaves' communication leads me to recall a Barton *Cephalopod*, *Trochoceras Desplainense* (M. Chesney), now in the Redpath Museum at Montreal. Probably it bore a nearer resemblance to that than to the *Gasteropods*. The hoop-like form is preserved or indicated in both names—*Trocholites* and *Trochoceras*. The imperfect state of preservation may at least be accountable to some extent for the erroneous view at one time entertained. However, I feel satisfied that this, as well as other rare Cambro-silurian fossils, may be yet extracted from the lake shore shingle at Winona and Grimsby, while many of the upper Hudson River ones there, already known, may be found in better preservation than in the portions of the Ancient Lake Iroquois Beach, which recent improvements have placed already beyond the pale of investigation. Yearly we find the field contracted, but outside the city itself there remains to us still a wide extent of country opened up to us by the kind and considerate act of the T., H. & B. Railway authorities. To a certain extent it may be looked upon as

new hunting ground, and we may expect to find that the rock cutting on the line may throw a little light on the eastward extension of our local chert beds, a matter unknown hitherto. Independent of this, we need not feel surprised at discovering in the Niagara shales Crinoids, Star Fishes, Bryozoons, etc, such as occur at Grimsby.

While I was stopping at Winona Park during the past summer, a farmer in the neighborhood requested me to come and see a curious looking sandstone flag which had been brought from the Mountain (the escarpment) beyond. The specimen in question, on examination, proved to be a remarkably fine *Arthropycus*, clearly proving that the Grimsby plant of the upper Clinton beds existed there also, five miles off to the west. No doubt the small *Arthropycus* is represented also. The writer, in forwarding both specimens to the late Dr. Jas. Hall, of Albany, thought the latter was a distinctive species, or it may be a variety. The doctor's fatal illness occurring soon after the transmission of the parcel probably prevented him from corresponding on the subject. That the box containing the *Fucoids*, with other Hamilton fossils, was duly received, is assured.

OUR LOCAL CHERT BEDS

may not be the best material for road metal ; they are, however, almost universally known here as our Macadamizing Niagara beds, inferior to the limestones for this purpose. Where the shales or, in plain terms, the hardened compressed mud has been honestly rejected, they are equal in resistance to pressure to some of the lake gravel sometimes used for the same purpose. On examining several places at the Beach and along the lake shore, I ascertained in many instances that the rounded material was chiefly shale, not derived from limestone pebbles or travelled boulders, as may be supposed. In other places it appeared to be a very fair road metal, inferior no doubt to such as can be obtained from granites, greenstones, etc., found elsewhere, but not to be rejected because such rocks are only found here scattered far apart, the travelled relics of the great Ice Age, which would cost a considerable amount to our City Fathers for conveyance, even if the farmers afforded assistance regarding their removal for city purposes.

However, the writer is more concerned in the Palæontology of the chert beds of the district, and undoubtedly they are exceedingly rich in silurian organic remains, some of which are remarkably well preserved, especially the phosphate shells, Graptolites and Hexactinellid sponges. To the chert in solution which encased them in some cases they owe their preservation. But on the other hand it too often fills in the poriferous surface of the latter, as also the cell mouths of the *Bryozoons*, thereby rendering it impossible to correctly classify the *Fenestellidæ* for example, in accordance with the recent sub-division of the family made by Palæontologists, who chiefly confined investigation to this particular class of fossils.

As regards the general appearance, the Niagara chert *Fenestellidæ* seems more perfect than any the writer has seen figured as yet, the fan-like forms proceeding from a single stock. The cup-shaped ones, like *Fenestella Acmea* (Hall), are well represented. All but the latter are, however, valueless for description in consequence of the concealment of the cell aperture. The *Fenestella Acmea* is rather rare with us, but from its peculiar appearance it cannot be easily mistaken for any other member of the family. The same shape at a like horizon has, however, been remarked in a *Lichenalea*, quite a distinct Bryozoon, perhaps undescribed. It may be a fragment only has been figured, and as such would hardly be recognized from the imperfect specimens under examination. The writer may, perhaps, take an unjustifiable liberty in calling your attention to the subdivision of these Palæozoic Bryozoons by Prof. Simpson, the best living authority on our *sea mosses* or mermaids' laces. I underscore this, for on a previous occasion I was credited quite erroneously through a printer's mistake with the discovery of a "sea moose," which led to some few sarcastic congratulations on the part of enquirers, and probably some unparliamentary language, which could scarcely escape censure by the parsons if introduced here.

A portion of the field near the corporation drain (the chief locality for glaciated chert fossils) was ploughed up in autumn and was expected to produce some rare specimens, only found as yet in these beds here. The *Cranidæ* family, from its great antiquity, is of considerable interest, independent of the *Crania*, possessing the singular property of adapting itself to the object to which it is cemented. Dr. James Hall has figured and described some so

attached from the States. In our local chert beds the flattened lower valve is almost unknown, indeed the writer can only recall one instance where both valves put in an appearance. The ornamentation of the upper (Dorsal) one is usually well preserved, the general features of the species showing no distortion. One looks in vain for indications of attachment to foreign bodies. This holds good also regarding the *Cornulites* and *Tentaculites* of the upper part of the chert or glaciated beds. I can quite understand the possibility of the decay of the objects to which they had been probably attached. Yet the writer is disposed to believe it was not so in very many instances under observation. Although but a short time occurred for collecting fossils from the part of the field adjoining the drain, the Section will find, notwithstanding past researches, the flint flake hunting ground continues unexhausted still, and may well repay a visit in spring, even under unfavorable circumstances. I collected then the greater part of the specimens now produced. A few are new species, probably; others rare or unrecorded as Canadian fossils. You will find among the lot the fragment of an *Orthoceras* retaining the cross striation similar to Hall's *O. Proteiforme*, and corresponding nearly, if not completely, with the description given of *Orthoceras Jamesi* from the Clintons of Ohio (Hall and Whitefield). In the absence of the original *Cephalopod* for comparison, Palæontologists may overlook the minor differences which amateurs are unable to detect, who unfortunately possess little scientific training. Professionals, too, frequently are mistaken, and perhaps we find it harder also to acknowledge mistakes. "Palæontology and Geology are alike progressive," was the remark made to the writer by the late Dr. James Hall, of Albany, "And while you regret your disadvantages as regards the scientific training of a geologist, such was my own case."

Some fine specimens of Hall's *Cladopora* were also found in the old hunting ground, near the corporation drain. One may notice considerable difference of opinion among Palæontologists regarding this family and the *Monticulipora* group. Millar places both among the *Favositidæ*. Nicholson, in "The Palæontology of Ontario," seems inclined to classify the only two species of *Cladopora* he found under the same head; but in the list of fossils of the Province he implies doubt regarding the correctness of the classification.

Professor G. B. Simpson, who made the *Bryozoa* a special study, and who is considered the best authority on that class, includes one or more species of *Monticulipora*, adding, however, "Although in this work they have been placed with the *Bryozoa*, undoubtedly further study and investigation will show that some of the forms at least must be associated with the corals." Lindstrom, Rominger, and other Palæontologists favor classification with the *Palyzoa*, the former pointing out that certain of the *Monticuliperoids* pass through early stages of development of a distinctly *Bryozoan* type. But he may be mistaken, remarks Simpson, for reasons he assigns which we need not follow. It seems clear enough the matter remains unsettled, but it may remind us of what Billings asserted many years ago, viz., that many early organisms appear to have combined in themselves quite distinct features. The writer cannot find in any of the works he consulted the occurrence recorded in *Canadian Niagaras* of two *Gasteropods* recently obtained from the glaciated chert beds, viz., *Platyceras (Acroculea) Niagarensis*—Hall (which has been determined also by our chairman, Mr. A. E. Walker,) and *Platyceras (Acroculea) Angulatum*—Hall. The latter is merely an internal cast or filling of the shell, but we can add both to the list of Niagara fossils from local works. Another *Gasteropod* may be a new species; but unfortunately it is partly concealed and the aperture absent—broken off. It is better to preserve fossils in this condition when they admit of no determination. We cannot tell, but a missing part may turn up at any time quite unexpectedly. The glaciated chert beds presented since our report last published a few specimens of the *Crania* family group, which we felt inclined to consider may prove to be new to science. However, Professor Schuchert states: "This *Brachiopod* assumes not only the form, but nearly in all cases it partakes more or less of the ornamentation of its host." If such be the case—personally the writer is quite satisfied as to its correctness,—we may well hesitate to distinguish one species from another, unless they present themselves, as in the chert beds here, undisturbed. I have to submit also for the inspection of the Section a few species of *Annalids*. They are not found attached to foreign bodies here, as is often the case. The calcareous tubes have been replaced by chert. I don't know whether some have ever been described. The forms differ from ones figured by the late Dr. Jas. Hall.

Here we may be permitted to express our deep regret at the loss science has lately sustained by the death of the great Palæontologist. We are all well aware of the deep interest he took in our local chert beds and their organic remains. He never paid us a visit here without imparting valuable information or offering useful suggestions. "You should never reject even the fragment of a shell until it has been carefully examined," he remarked on one occasion. "I noticed you spoke rather slightly of this imperfect valve, when handing me a more complete one of a similar *Brachiopod*. This fragment is of far more importance, since it displays the muscular impression of the interior while the other does not."

On the doctor's second visit to Hamilton we drove out along the brow of the escarpment to the rock cutting beyond the Reservoir. When passing over the bluff above the railway track I pointed it out as the place where the best colored *Lingulæ* were obtained, as also the Clinton (May Hill) star fishes. He questioned me rather closely regarding the former, and as to what led to their discovery. "Well, Dr. Hall, you may remember," was the reply, "in one of your earlier publications you mentioned you noticed a fragment of a *Brachiopod* in the New York Clinton rocks, which led you to believe that colored *Molluscs* may yet be detected even in the Silurian series. Here we have a complete exposure of the beds from the base of the Niagara to the grey band of the Medinas below, so it seemed quite natural to believe we may find confirmation of that view in our Clinton beds. A portion of a blue *Lingula* embedded in a fragment from the iron band was found, and close beside it a large red flag, of which it formed part. On splitting the latter numerous valves of a bright blue *Lingula* (*Lingula Clintoni*) presented an appearance in the interior; also a pink valve of *Lingula Oblata* lying within an inch of the brightest of the blue ones, while the small circular form of *Lingula Perovata* near an edge of the flag was brown, shading to blue at the apex. The latter is now known as *Glossina Perovata* (Hall). Is it possible these *Brachiopods* possessed in themselves the different coloring matter?" "'Tis a point for investigation," he added, as if thinking to himself.

The writer feels he need not apologize for recording the above anecdotes respecting one he looked upon as the greatest Palæontologist of the age. You may find a man among scientists better

acquainted with some particular branch to which he had devoted special attention, but as a general Palæontologist he had no superior. James Hall, Albany: Royalty never conferred a higher honor than such a name as your own.

FAMILY FENESTELLIDÆ, BY PROF. SIMPSON.

Branches connected by dissepiments Infundibuliform.

- Fenestella—Cells in two ranges separated by Carinæ, or row of nodes.
- Polyporella—Cell aperture in two or three ranges, branches carinated or not.
- Polypora—Cell apertures in three or more ranges, no Carina.
- Fenestralia—Cell apertures in four ranges, Median Carina.
- Fenestrapora—Cell apertures in two ranges, Carina prominent, reverse poriferous.
- Cycloporina—Cell apertures in two ranges, Carinæ with prominent semi-circular projections.
- Hemitypa—Cell apertures in two ranges, Carina prominent, connected by Scalæ meeting midway, Sendo-Carinæ.
- Unitypa—Cell apertures in two ranges, Carinæ prominent, connected by oblique thin plates.
- Isotrypa—Cell apertures in two ranges, Carinæ connected by bars, reverse face poriferous.
- Tectuliporella—Cell apertures in two ranges, Carinæ connected with bars, reverse face not poriferous.
- Tectulipora—Cell apertures in two ranges, branches and dissepiments carinated, Carinæ prominent, expanded at top and coalescing.
- Loculipora—Cells arranged in oval order around fenestulis, branches and dissepiments carinated, Carinæ prominent, expanded at top, coalescing.
- Phyllopora—Cell in two ranges, dissepiments celluliferous.
- Septopora—Cell apertures in two ranges, branches carinated, dissepiments celluliferous.
- Syncladia—Cell apertures in more than two ranges, dissepiments arcuate and celluliferous.

NOTES.

The singular property *Crania* possesses of adapting the shells to the objects upon which they are cemented have always been of much interest. You may well suppose this property adds considerably to our difficulty when endeavoring to compare a valve with one already described and figured. All the specimens found in the glaciated Niagara chert here were upper valves with a single exception, and even that flattened lower ventral valve was unattached like the rest which came under observation. In no instance was a valve contracted, elongated or distorted. Like the *Cornulites*, it is quite possible the *Brachiopods* were cemented to foreign substances which decayed and disappeared. The shells occasionally differ but little in shape from the *Orbiculoidea*, and are not phosphatic. A living one dredged from off the coast of Norway not very many years ago was described. It was stated to be black in color. This corresponds with one in the Clinton series, and was an omission on the writer's part when referring, at a late meeting of the Section, to some rare, little or unknown organic remains of the series. A specimen was placed in the upper case of the Museum, and a second was also obtained at the same place attached to a *Flustra* apparently.

Since our last meeting we forwarded by request to Prof. T. R. Jones, the well-known English Palæontologist, a box of the characteristic Silurian and Cambro-Sil. fossils of the district. A friend of his, Col. Taylor, who kindly conveyed the packages to London, states: "On my arrival in town I called on the Professor, who "expressed himself as charmed with the collection." It contained some slabs from the ancient and modern beaches, with colonies of the minute *Crustacean Leperditia*.

A visitor to the Royal Museum in Ireland mentions that "the "fossils from Hamilton, Ont., are separated, have a place by themselves, and are much admired." Smaller parcels of organic remains from this locality were also forwarded to the Dominion Geological Survey Office, Ottawa, or presented to Hamilton residents.

DISCOVERY OF THE EGGS OF A FOSSIL BRACHIOPOD OVA.

The late Dr. James Hall, State Director of the Geological Survey, New York, in the Report for 1891, at page 267, mentions the discovery of the Ova of *Lingula Lamellata*, now *L. Tæniola*, from Hamilton, Ont. "The palial cavity has been found filled with them," he adds. A German, Prof. Oehlert, detected Ova previously in a middle Devonian Brachiopod, *Stringocephalus*. The Hamilton specimen (Silurian) is from an earlier time, and the discovery is of considerable interest. Dr. Hall remarks: "There are at present no satisfactory means of separating the great majority of fossils passing under the name of *Lingula*. Internal casts bearing muscular and palial impressions quite similar to recent species have been found in rocks as old as the Trenton. Whenever traces of such internal markings are found there seems to be little difficulty in reconciling them with those of the 'living shells.'" In extinct forms the scars were deeper and the shells thicker than in species now extant and more calcareous. The writer regrets he was unable to procure a colored *Lingula (Glossina) Perovata* which Dr. Hall had never seen in New York State, and which seems to be confined to the bluff beyond the Reservoir.



BECKETT MOUNTAIN DRIVE, LOOKING WEST BELOW MRS. GOURLAY'S.



BECKETT MOUNTAIN DRIVE, LOOKING EAST BELOW "BOULDERWOOD,"
SUMMER RESIDENCE OF B. E. CHARLTON, ESQ.

MALACOLÓGY.

Read before the Geological Section, March 31st, 1899.

BY COL. C. C. GRANT.

It may be necessary to explain my reason for retaining the term Univalvé, seldom used for the more modern "Gasteropod." I have heard visitors to the Museum say they possess copies of old works on Conchology, brought from the old country, and in several they may find this term employed without clearly understanding the meaning. That it was an objectionable one may be admitted, but the explanation seems necessary. The Gasteropods are known commonly as land, fresh water, or sea snails, a synonymous term.

It has been suggested, since so many of the modern Mollusca are found fossilized, and the fine collection of Mrs. Carey is here exhibited, many of its admirers might wish the writer to furnish a few additional remarks to the paper published in the Proceedings of the Hamilton Association for the years 1893-94, number X.

Now, since my knowledge of Conchology is extremely limited, I may well hesitate to comply with the request. Hanham and Leslie, who made a particular study of land snails and fresh water snails, are no longer with us to unfold the tale regarding their occupants. And Malachologists (members of the gentle science) would hardly consider a mere collector as holding a recognized place among Conchologists. Bearing this in mind, with considerable reluctance I venture a few remarks which may be of some little assistance in enabling a few of our visitors to classify in a general way the family groups to which their own acquired specimens belong.

On a late occasion a visitor remarked: "Why are shells so unlike as the ones you mention (*Mitres* and *Volutes*) classified in the same family group of *Univalves*?"

The former are a sub-genera of the latter, whose characteristics are, according to a well-known writer on the Mollusca, "A plaited pillar, effuse aperture" (and notched in front may be added). The simple rules of an old Conchologist may not exactly meet the views

of this generation, and while trifling omissions may be noted, we may find this definition fairly accurate of the following :

Cones—Aperture effuse, longitudinal, without teeth.

Cynea (Cowrie)—Aperture effuse, linear longitudinal, toothed on each side, except ovulum, inner lip smooth.

Murex—Aperture with small, straight canal.

Buccinum—Aperture with small canal leaning to the right.

Strombus—Aperture with small canal leaning to the left.

Trochus—Aperture contracted, somewhat square.

Turbo—Aperture contracted and orbicular.

Bulla—Aperture contracted a little and placed obliquely.

Argonauta—With one cell, spiral, involute.

Nautilus—With many cells, passage of connection or syphuncle.

Halyotis—With a row of openings along surface.

Nerita—Under this head the early Conchologists included two distinct families—the *Nerites* (hoof shells), as commonly known, and *Naticas*. The aperture of the former is contracted and semi-orbicular; in the latter it is globular, few whorled, spire small, obtuse, lip acute; a typical shell of each would readily point out the difference. The foregoing are spirals. The *Univalves* without a regular spire are :

Patella—Conic, aperture wide, basin-shaped.

Dentalium, or Tusk Shell—Slender, tapering, open at both ends.

Serpula (a worm, not a mollusc)—Shell hollow, often adhering to foreign bodies, serpentine.

Teredo—Shell thin, penetrating timber.

I would advise any one who intends shell collecting, in the first place to obtain a reliable work, such as "The Manual of the Mollusca," by Woodward. Some changes have been made since an edition was published in the 50's, but it contains a good deal of information. That the plates are not colored is certainly a drawback. Its author found, if he carried out his original intention, it must have made the work too expensive for general purposes. No matter how accurate the outlines of a shell, the writer finds by experience in many cases it is actually impossible to name a specimen correctly from an uncolored plate. Having lately received from Ceylon a collection of *Cones* and *Cowries*, he tried to name a few from the cheap edition of "Tryon's Systematic Conchology," and

failed except in a few cases. The colored edition of the work is very expensive, and probably the Public Library Board considered it was not justified in spending all at once the large sum required for the purchase when completed. In a communication from either the Author or the Publisher, Philadelphia, U. S., it was stated the intention was to publish it by numbers and family groups until completed. If so, perhaps it would have been better to appropriate a small sum annually for the purchase than to expend a trifling amount for the cheaper edition, which proves to be of little value for educational purposes. Ruskin's remark in his famous lecture, "Sesame and Lilies," or "King's Treasures," seems applicable in this case: "No book (especially on Conchology) is worth anything which is not worth much." Although rare shells no longer command the extravagant prices formerly obtained, the modern dealers' profits most certainly must be very great, judging from consignments the writer received from China and Ceylon recently. We have in the Museum case at the entrance three families of the Mollusca universally admired—the *Volutes*, *Cones* and *Cowries*. In the first are included the *Mitres* (about 500 species), which Ward, of Rochester, holds to be a distinct family, not a Subgenera as others suppose. He states they are recognized by an acute apex, well developed spire, and plicate Columella. The type is *Mitra Episcopalis* or *M. Rapalis*, Singapore (*Linneus*) One of the rarest *Volutes* formerly was *Aulica Junonica*. Its selling price was \$200. At present it may be purchased for from \$4 to \$6, according to size, state of preservation, etc.

Voluta Hebrwa was also highly esteemed as a rarity in my younger days. It may be obtained for considerably less now, but I am unable to find the price paid for a very fine specimen in my possession, which may not be represented in Mrs. Carey's collection. I may be mistaken here, since I trust solely to memory in this instance, and a closer investigation may prove the assertion to be quite erroneous. On examining some lists received from the United States, I could not find the *Voluta Imperialis* mentioned. I imagine it must be very expensive. The figure representing the shell leads one to think the Royal name was not by any means ill-suited.

The type of the family is the well-known *Voluta Musica* (from

25 to 75 cents). Its range may well be looked upon as extraordinary—West Indies, Ceylon and New Zealand.

The *Volutidæ* have fossilized representatives in the Eocene rocks. The *Olivæ* (rice shells) now form a distinct family; formerly they were looked upon as *Volutes*. They have also been found in the Eocenes.

The Conidæ family, to which your attention is next called, are obconic shells with a long and narrow aperture, both lips parallel and without teeth. This merely applies to the habitation itself, as many collectors have found to their cost when carelessly handling living cones in shallows, inside coral reefs, in crevices or fissures. Their predatory habit alone may prove the animal's biting powers, if nothing else was needed to satisfy us on this point.

It is not very many years since the *Conus Ammiralis* here produced cost \$25; mine I got for \$3, and it may perhaps be purchased for less now.

Extravagant as the former price may appear to us now, how little it seems beside the sum recorded by Mawe, in the second edition of "Woodward's Conchology," for *Conus Cedo Nulli*, viz., 300 guineas. Tryon alleges this member of the family is not at all so exceedingly rare at present. I noticed since his work was published, a lucky Naturalist, on turning over a detached large piece of coral, was delighted to find no less than four specimens underneath. Even taking into account the reduced prices now obtainable, he must have been hard to please if dissatisfied with his day's work. I wonder if there can be a mistake on the part of the writers regarding this Mollusc—whether they do not confound it with *Conus Gloria Maris*, another of the family for which an Irish peer was offered the same amount. Only two specimens were dredged, I understand, in the Red Sea. One is said to be in France, the other belonged to Lord Montmorris. About 300 distinct species of cones are recognized by recent writers, sub-divided into many groups, which we need not enumerate, since it may seem to some of us unnecessary, and its tendency is not calculated to lead the student to the study of what has been quaintly called "the gentle science."

The knowledge acquired of the sea and its living wonders by the scientific expeditions of Europe and the United States can only be looked upon as yet as sealed books, open to the few alone who

are so fortunate as to possess "Golden Keys." Some pages only of the manuscripts ever reached the general public, but they are of intense interest to naturalists. The Mollusca, acquired by deep sea dredging of the Challenger, etc., may yet be issued in a less expensive form, with specimens correctly figured. The shells themselves so obtained, we need hardly remark, are altogether out of the reach of private individuals.

CYPRÆIDÆ—COWRIES.

These beautifully spotted and enamelled shells have so well defined an aperture that there seems no possibility of mistaking the family. The aperture is narrow, and both ends terminate in canals; the lips toothed at either side. Upwards of 300 species are now living, but many also put in an appearance in a fossilized state even so far back as when the Cretaceous (chalk beds) were deposited eons of ages ago. Perhaps the *Cowries* possess more attraction for ordinary visitors here to the Museum than any of the other family groups in the cases. This may be owing in some measure to the care taken in their selection. Dealers frequently endeavor to palm off what are called "dead shells" (received in large consignments) on people who cannot see they have lost a considerable part of the color, and are much inferior to "living shells," viz., such as are obtained alive by the hand or dredge of the collector.

We must not forget it is only when fully grown that the *Cowries* are furnished with teeth at both sides of the aperture, and that one branch of the family, commonly called the egg or white *Cowry*, is an exception. The teeth of this species is confined to the outer lip, and in the *Ovulum Volva* the canals are considerably prolonged at each end.

Visitors frequently express their surprise when informed that all specimens under this head, with one or two exceptions, are in the natural state, the fresh and bright appearance noticed only shows careful selection on the part of the purchaser.

The *Cypæa Moneta*, or Money Cowrey, is extensively imported from the Indo-Pacific Sea for the purpose of barter with the natives of Africa. No less than 300 tons entered Liverpool in 1849. Nearly half a century ago, as well as I recollect, a foreign Naturalist claimed that he dredged from the north-west of the African coast—

positive proof that Conchologists were quite mistaken in limiting its range to the Indo-Pacific. On investigation it was clearly proved the specimens formed part of the cargo of a vessel which had been wrecked there a few years before the Professor's wonderful discovery.

For educational purposes the author of "The Manual of the Mollusca" recommends the types of the respective families. As a further recommendation he could have added they can be obtained at a moderate price also. In a note he states the *Cypræa Umbilicata* (Tasmania) sold for £30 in 1850; it may be had now for \$6.

The *Orange Cowry* (worn as a badge of a Chieftain in the Friendly Islands) was formerly difficult to obtain and very expensive. It may be so yet. On looking over dealers' lists from the United States I cannot find even a specimen in stock for sale. In arranging a cabinet, some Conchologists think it better to show in pairs the back and aperture of each species. It seems unnecessary as regards either *Volutes* or *Cones*; but in some cases, where the *Cowries* for instance, possess a peculiar orifice, as in the *Ovulum* and *Cypræa pyrum* (Gmel), Algiers, it may be as well to display the coral lips also of the latter. In many succeeding families the suggestion meets with general approval.

Conchology appears to be particularly suitable for ladies. The collections of Mesdames Carey, Charlton and Beasley are here in evidence regarding taste in this direction, and it would be difficult to find shells in better preservation than some of the specimens exhibited in our cases, and their superiority may be attributed to personal selection. I fear, however, many are deterred by the nomenclature from taking greater interest in Malacology (study of shell-fish) by the Latin terms so hard to remember. The difficulty is not so considerable as it is imagined. Respectable dealers attach to each specimen the name and locality. Even if you possess a shell whose name is unknown or forgotten, that may be ascertained generally by a visit to a Museum. Few of us can tell names of species off hand without reference to writings and figures regarding them. The types of each family are few in number and can be had at a trifling cost. These are the keys to the science.

THE MURICES (ROCK SHELLS).

In the back corner of the case, near the entrance, of which

Murex tenui spina is the typical representative (and which may be purchased for half a dollar or less), early attracted the notice of the boldest navigators in existence more than 3,000 years ago, viz., the merchant princes of Tyre. These naturalists of a very early date are credited with the discovery of the famous Tyrian purple dye, by Plancus and Pliny, Roman Historians. The dying vats used by this ancient people were actually rediscovered by Sir W. Wylde half a century ago, when visiting the southern shores of the Mediterranean Sea. He recognized fragments of shells lying at the bottom which had resisted the weathering process for centuries. Historians assert, in addition to the *Purpura*, the dyers used in the vats a *Patella Limpet*. This seems erroneous. Probably the free floating violet was the Mollusc referred to.

The *Ianthina fragilis* is very common. When you handle a living one it exudes from the margin of the mantle a violet-colored fluid, as implied by the name. The shell is so fragile that it seems to have been impossible for Dr. Wylde to discover the smallest fragment in the cauldrons he examined. In a paper published in our Proceedings, No. VII., for the session 1890-91, entitled "The Irish Celts and their Relics," the writer alluded to some experiments made by Sir William, on his return from his travels to Dublin, on the *Purpura brandeis* of Ireland, a shell very closely related to the one he found in fragments, but yet easily recognizable. It seems here unnecessary to assert that while he undoubtedly succeeded in ascertaining that brilliant coloring may be extracted from the slimy creatures, the Royal Tyrian purple color evaded research. One important ingredient was not forthcoming. The ancient dyers probably jealously guarded the secrecy of their trade, no doubt, when they misled the Romans to suppose that the *Petella*, or Limpet, was also employed in the dying process. Stray *Ianthinas* are occasionally picked up on the shores of the south of England after a continuance of southern gales. In the open sea and coral zones they are said to be found in thousands. The aperture, independent of the violet color, is quite sufficient to distinguish them from other *Gasteropods*. Woodward classes the shell with the *Haliotidae*, together with *Plurotomaria* and *Murchisonia* fossilized specimens. We may remark he considers the *Tritons*, the *Ranillas* (frogs), and *Fusidae* (spindles) as belonging to the *Muricidae*. Others

hold the former and latter entitled to the position of distinct families. *Turbinella pyrum*, the sacred shank-shell of the Cingalese, is also a *Murex*.

The *Magilus Antiquus*, of the Mauritius Red Sea, etc., a small Molusc, when young has a strange habit of anchoring itself in living coral. In order to prevent being entombed in the place it has selected by its growth, it prolongs the lips into a tube, and pushes up to the top filling the part it previously occupied with shelly material.

MALACOLOGY—*Continued.*

Read before the Geological Section, April 28th, 1899.

BY COL. C. C. GRANT.

STROMBODÆ (WING SHELLS).

As recent Conchologists have defined this family in accordance with Woodward, while adding an omission, perhaps it may be as well to give the modern definition here, as three at least of its members, unlike in appearance, come under the head lip expanded, deeply notched near canal, operculum claw-shaped. The adult *Pterocera* has the lip produced into claws, thereby differing from *Strombus*, and *Rostellaria* may be added. If we place before a young shell collector the large fountain shell of the Bahamas, or *Strombus pugilis*, together with *Rostellaria curta* and *Pterocera lambis*, China, he may well be puzzled to understand why the three so unlike in appearance came to be classified together. A little reflection shows they have characteristic features in common, when he goes back to the definition of the family.

The *Strombus gigas* of the West Indies is extensively imported into Europe for the manufacture of Cameos, but is said to be inferior to the *Cassidæ*, or Helmet shells, for the purpose. *Casses* are sub-genera of *Buccinidæ*, according to Woodward, who classifies the *Harps* and *Olives* also with the *Whelks* and *Trumpets*. *Fulgar Carica*, of the Atlantic coast, U. S. A., so frequently found in Indian ossuaries as *Wampum*, and *Buccinum undatum* may be considered as types. *Fulgar Canaliculata* (Atlantic) has been found as a fossil in the Miocene. The Claw or Scorpion (*Pterocera*) has several fossilized representatives, even as far back as the Lias and Chalk.

FAMILY OLIVIDÆ.

Whether modern Conchologists are justified or not in advancing these beautiful shells to family distinction is a matter we need not here state. I heard a lady visitor declare they merited any honor that could be conferred on them for their beauty alone,

if for nothing else. *Oliva Porphryna* (the types) is one of the most exquisitely colored shells known, and Mrs. Carey's collection contains some very fine examples from Lower California.

Another type is *Oliva inflata* (Lamark from Singapore). The common name for the former is the "Camp Olive," suggested by the white tent-like markings. It is said by Professor Ward, of Rochester, to resemble a multitude of pale mountain peaks rising from a deep brown mist.

Oliva incrassata is greatly admired also. Ward, of Rochester, a well-known experienced dealer, states: "It is a remarkable fact that *Oliva heatula*, of Panama, occurs also abundantly on the west coast of Africa." Now if there can be no mistake in the matter, it is of considerable importance from a Geological point of view. Darwin mentions in his journal, referring to *Purpura patula*, which is found both on the eastern and western coasts of America: "The dispersion of this coast shell may perhaps have taken place at the time when the channel of the River St. Cruz formed a strait joining the Atlantic and Pacific Oceans." Such a passage as this would probably influence the direction of the Gulf Stream. The author of "The Manual of the Mollusca" remarks: "If it is true that any number of living species are common to the Pacific and Atlantic shores, it becomes probable that some portion of the Isthmus of Darien has been submerged since the Eocene Tertiary period. Any opening of this barrier would allow the equatorial current to pass through into the Pacific; there would be no more Gulf Stream; the climate of Britain from this cause alone might become like that of Newfoundland at the present day."

TURBO (TOP SHELL)—TROCHUS (HOOP SHELL).

In accordance with the views of Woodward—and Mawe about the first quarter of the century,—Professor Ward considers the above are fairly entitled to family distinction. Woodward, on the other hand, includes both as *Turbinide*. It must be admitted there is a slight difference in the apertures, and while *Turbo* possesses a solid calcareous operculum, *Trochus* has a horny multi-spiral one, and is also more conical in shape. The living occupants of the respective shells do not differ essentially. The nacreous lustre of the interior seems common to both. There are two members which

I may have overlooked in the cases (they are very small), known as the *Mineralogist* and *Conchologist*. The former by a process attaches to the outer surface of the shell small pebbles, sand, etc., which it collects; the latter minute molluscs, which it affixes in a similar fashion. They have a hard struggle against many enemies, and perhaps nature has kindly furnished them with this means of concealment.

The top shells are largely represented in a fossilized state from the lower Silurian Age. The rounded aperture of a few personally obtained at Ancaster and from local rocks here at Hamilton, independent of other considerations, led the writer to infer they represented members of the *Litorinidae* (Alga feeding shore shells). When Naturalists, as you may perceive, find so much difficulty in correctly classifying living Molluscs, we need scarcely feel surprised at the still greater difficulties the patient Palæontologist encounters when examining frequently mere casts or impressions of plants which perished eons of ages ago, and who thinks himself fortunate if he discovers, accidentally perhaps, the outlines of the aperture of a *Gasteropod* filled with shale or muddy sediment, with other parts of the shell concealed or embedded in hard limestone, which renders it difficult of extraction in an unbroken slab.

From the mountain limestone in the south of Ireland the writer has frequently obtained a *Gasteropod*, named *Enomphalus pentangulatus* by Sowerby. It is represented by a Devonian form in Ontario and in the calciferous (lower silurian) of Quebec, by *Ophileta Compacta*. The specimen from the Irish carboniferous was described as follows by the late Prof. Salter :

“Shell depressed or discoidal, whorls angular, aperture polygonal, umbilicus very large; operculum shelly, round, multi-spiral.” It seems difficult to understand at first sight the reason why Woodward classified it as “a top shell,” but reflection shows the leading characters.

PYRAMIDELLIDÆ.

“Owing to the circumstance that this family group, as a whole, may be regarded rather as appertaining to past ages than the present epoch,” remarks Professor E. Forbes, Edinburgh, “they present subjects of much interest to the student of extinct Molluscs.” Very

true. They are much more likely to attract attention from Palæontologists than from shell collectors. There is nothing very striking in their general appearance; they are frequently mistaken for Turrets or Screws also. We possess in this Dominion a fair share of fossil representatives from the lower silurian upwards, and Dr. Spencer, F. G. S., recognized Hall's *Loxonemaleda*, U. S. A., as also occurring in the local rocks of Hamilton.

Perhaps it would be better here to produce specimens of the spirals *Turriculetes cerites*, including the fresh water *Potamides* and *Melantias*, also inhabiting fresh water lakes and rivers in the warmer portions of the globe, than wearying my hearers by repeating descriptions not universally accepted. It may be because some minor point was omitted, by original investigation, or who boiled down the knowledge they acquired in a form which conveys all the information needed.

More closely related than the foregoing are the Limpets *Calyptra* (Bonnets) *Fessurellidæ* Key-holes and *Pattellidæ* (rock limpets). Cuming mentions that on the western coast of South America he found one of the latter a foot or 14 inches long, which was used by the natives as a dish. The writer collected half a dozen empty shells of an *Acmea*, a minute form of the family at Anticosti, the brightest known to him, exceedingly pretty. He thinks it must be well described already by Naturalists on this continent, although he has seen it figured. Over 100 species of rock limpets have been found fossilized. Some occur even in Lower Silurians.

The *Metoptoma* (Philips), classified by Woodward under the head of *Patella*, appears to be more closely allied to the branch called *Bonnets*. The late Prof. E. Billings, of the Dominion Geological Survey, figured and described several from Quebec and a few also from the Hudson River rocks, Anticosti. Professor Grey claimed a certain relationship existed between the limpet and coat-of-mail shell (*chiton*). The posterior plate of the latter he considered homologous with *Patella*. The other plates appear like portions of the anterior slope successively detached.

The *Dentalidæ*, tooth shells, are also of much interest to Palæontologists. The ribbed species, *D. Elephantinum*, of the Philipines, is regarded as the type. The family had fossil representatives even so far back as the Palæozoic Age, before the carbon-

iferous forests were converted into mineral coal, used in fires and furnaces to-day. Huxley's description of the shell itself conveys in a few words an excellent picture: "Shell elongated, conical, curved like an elephant's tusk, apex broken off, open at both ends."

CEPHALOPODA.

At the head of the Mollusca (last but not least) we may well place the *Argonitida* and *Nautilus*. Provided with eyes to see, arms to grasp, a parrot-like beak to tear and devour creatures even of a higher classification. There was an age in the far-off history of the globe when these, the fossilized forms, were apparently installed as "the lords of creation," and swarmed in every sea. In what was known to us as "the mineral quarry," on the Barton and Glanford road, now abandoned, I have frequently noticed groups of *Cephalopods* lying flattened across each other as if the shells had been subjected to great pressure. In "The Chain of Life," by Sir W. Dawson, you will find the representation of a Silurian *Cephalopod*, which resembles, except in the air chambers (septa), a specimen seen in Mr. Webber's quarry, near Hamilton, some years since.

There are only five species of the *Nautilus* living at the present time. Upwards of 600 existed formerly. It is difficult to understand what led the old world Naturalists to form such erroneous ideas regarding the habits of the *Nautilus*. Aristotle is credited, I believe, as the first who asserted "that it rises from the deep; spreads its arms and sails; and goes cruising on the surface, propelled by its tentacles, before the wind." Many centuries have passed since then, but in modern universities and colleges on the American continent, in Canada or the United States, I am told you may find not a few still inclined to accept the antiquated views of Naturalists of the olden time. The most reliable statement regarding the *Nautilus* was made by an old Dutch Naturalist, Rumphius, in a work published in 1705 on the Natural History of Amboyna, and the following extract met the approval of the late Sir R. Owen: "When the *Nautilus* floats on the water, he puts out his head and his tentacles and spreads them upon the water, with the poop of the shell above water; at the bottom he creeps in the reverse position, his boat above him, head and tentacles on the ground."

NOTE.—During the different stages of growth the outer margin

of the mantle cements to the growing edges of the shells the pebbles and minute mollusca found attached. The writer was informed by a Conchologist some years ago, in the old country, that in no instance did these closely related shells appropriate for conveyance or concealment their peculiar burthens. Why it should be so appears to be one of the many mysteries of Nature. Ward gives the shell a family name, *Onustida*, and has seen tubes of Annelids, a sponge, and cup coral attached to a *Conchologist*. He considers *Calyptraea fornicata*, Atlantic coast, as a *Bonnet* also.

ACKNOWLEDGMENTS OF GIFTS OF FOSSILS FORWARDED BY THE GEOLOGICAL SECTION.

(A number of these have been received since the close of the session)

GEOLOGICAL SURVEY OF CANADA,
GEORGE M. DAWSON, C.M.G., LL.D., F.R.S., Director.
Museum and Offices, Sussex St., Ottawa.

APRIL 28th, 1899.

To Col. C. C. Grant, Hamilton, Ont.

SIR : I beg to acknowledge the receipt of twenty-one fossils from the Niagara formation of Hamilton and Grimsby, and one fossil from the Clinton formation at Hamilton, as a donation to the Museum, and am instructed by the Director to convey to you his thanks for this mark of your consideration.

I have the honor to be, Sir,

Your obedient servant,

J. F. WHITEAVES,
Assistant Director.

JUNE 14th, 1899.

To Col. C. C. Grant, Hamilton, Ont.

SIR : I beg to acknowledge the receipt of forty-two specimens of fossils from the Niagara and Clinton formations of Ontario, as a donation to the Museum, and am instructed by the Director to convey to you his thanks for this mark of your consideration.

I have the honor to be, Sir,

Your obedient servant,

J. F. WHITEAVES,
Assistant Director.

JULY 29th, 1899.

To Col. C. C. Grant, Hamilton, Ont.

SIR: I beg to acknowledge the receipt of seventy-seven specimens of fossils from the drift at Winona, from the Niagara formation at Hamilton, etc., as a donation to the Museum, and am instructed by the Director to convey to you his thanks for this mark of your consideration.

I have the honor to be, sir,

Your obedient servant,

J. F. WHITEAVES,

Assistant Director.

BRITISH MUSEUM (NATURAL HISTORY.)

Cromwell Road, London, S. W.

JULY 14th, 1899.

*SIR: I am directed by the Trustees of the British Museum to convey to you the expression of their best thanks for the present of a collection of 43 Silurian Fossils from North America, named and localized, consisting of Brachiopods, Cephalopods, Sponges, Fucoids, etc., which you have been pleased to make to them.

I have the honor to be, sir,

Your obedient servant,

E. RAY LANKESTER,

Director.

*This collection was forwarded by Col. C. C. Grant through the kindness of Col. L. Taylor.

INTERNATIONAL LAW.

Read before the Hamilton Association December 8th, 1898.

BY W. A. LOGIE, M. A. LL. B.

Upon being asked by your Secretary to give a paper upon "International Law," I felt some diffidence about the possibility of making such a paper interesting to a mixed audience. However, in the following pages I have endeavored to make it as light as the subject will allow; but the decided cases and illustrations would take up too much of our time, so you will pardon me if the paper is a trifle bald and the plagiarisms numerous. I assume that your Secretary meant me to lecture upon public international law as distinguished from private international law.

Public international law, then, consists in certain rules of conduct which modern civilized states regard as binding on them in their relation with one another with a force resembling that binding the moral person to obey the laws of his country, and which they also regard as being enforceable by appropriate means in case of infringement. International law, then, concerns itself with the affairs of nations, and a sovereign state is an individual with regard to it, just as we are all individuals with relation to our own laws, and just as private law is for the purpose of settling quarrels between individuals, so international law is for the purpose of settling quarrels between nations. A law-suit between individuals now-a-days takes the place of a duel, and the object of international law is that arbitration shall in like manner one day take the place of war.

The loftiest conception of international law is that laid down by Dr. Whewell, namely, that its aim should be to lay down such rules and suggest such measures as might tend to diminish the evils of war, and finally extinguish it among nations. The latter end appears indeed, at this time, impossible of attainment. Notwithstanding the Czar's message of peace, the open scorn with which it has been received, nay, the very preparations for war made by Russia herself show that the time is not yet when the war drums will beat no more and the battle flag be furled.

Let us then turn to the other alternative, namely, the diminishing of the evils of war.

The forces now employed in war are so enormous, the machinery so complicated and delicate (it has been estimated that one charge of powder and shot fired from the 100-ton guns of the present day costs more than one of the large guns with which England's great naval battles were fought at the beginning of the century) that the question of how they should be controlled or diminished by mere literary agency is one which might well interest millions of groaning taxpayers.

War appears to be as old as the race. The Rousseaux school of thinkers would have us believe that the contrary was the case, but the romance of Paul and Virginia to the contrary notwithstanding, it would seem that peace is a comparatively modern invention. International law owes much of its growth to Roman law. The *jus gentium*, or natural law, is still the ground work of international law, and the treaty law of nations, which is the *lex scripta* of nations as opposed to the unwritten law, is built upon this foundation. During the pax Romana, not only did bloodshed practically cease, but the equality of the sexes and the mitigation of slavery appeared, and Christianity itself grew and flourished. Is it, then, too visionary to hope that the pax Britannica which now insures life and liberty to every one beneath the folds of the Union Jack may yet grow into an Anglo-Saxon peace which shall practically be the millenium?

States then, as we have seen, are to be considered as moral persons, capable and free to do right and wrong, and the law of nations consists of general principles of right and justice of a collection of usages, customs and opinions, the growth of civilization and commerce and a code of positive law.

The law of nations, so far as it is founded on the principles of natural justice, is equally binding upon all mankind, but the Christian nations of Europe and their descendants on this Continent by their vast superiority in arts and sciences, commerce and government, and above all by the influence of Christianity, have established a law peculiar to themselves. The term International Law is not an exact one. Law implies a law giver and a punishment—a tribunal capable of enforcing it and coercing those who break it. But there is no common law giver to sovereign states. The mere

term Sovereign State implies one not subject to any superior, and no tribunal has power to bind them by judgments or decrees, or coerce them if transgressors, and international law is only binding on States in the same way that the ten commandments are binding on a moral man.

We notice then, that although there is no penalty attaching to the breach of the law of nations, there has been created a law-abiding sentiment which is the sanction of international law. One of the first points which strikes the student is the principle of state sovereignty; this implies that it is nobody's vassal, but it also implies more, that it is entitled to do within its dominions whatever act it may think advisable to make it prosperous and strong, may adopt any means it pleases for its defence, may follow any commercial system it thinks most likely to promote its interest.

Before the recognition of this principle of state sovereignty, no act was more liable to cause war between nations than the erection of fortresses or the adoption of a hostile tariff, but since its acceptance as a principle of international law it follows that it is no concern of ours whether, for example, the United States adopts a Dingley Tariff or passes an Alien Labor Law, though these measures do not tend to promote friendliness between adjoining nations, because they are essentially measures which a sovereign state may adopt to further its interests. So, too, the defences at Halifax or Esquimaux are no concern of the United States Congress, they concern only the integrity of British possessions in America. So well established, indeed, is this principle, and so healthy its growth, that the mother country has freely allowed us to exercise a privilege once grudgingly conceded to independent states, namely to place a duty on goods manufactured in Great Britain.

Another rule of international law is that a sovereign state has unlimited power to occupy unappropriated territory. This is a very fertile source of dispute. We have seen war clouds form and disperse with such startling rapidity in the last few years that we have had this rule impressed upon us with a force which none other has attained.

Discovery used to be sufficient to found a valid claim of title, but now-a-days something more is required.

A cairn of stones erected by a Rhodes, or a flag planted by a

Kitchener, is now regarded as a good source of title. A question which affected the title to a great portion of the Dominion of Canada was founded on discovery, and seemed at first to be merely a dispute between rival fur companies.

Captain Gray, from whom the Americans claim title to a large portion of our North-west Territories and British Columbia, was the uncommissioned agent of a fur company, while Captain Vancouver, upon whose discoveries the British claim was based, assumed possession when he heard of Gray's doings. This question was settled by the treaty of Washington.

Granted, however, discovery and occupation, what area of land is affected by these acts? Questions of this kind are arising every day in Africa, where it is not the malarial coast settlement that is the bone of contention, but the trade of the rich Hinterland. It seems now to be generally admitted that the occupation of the coast carries with it a right to the whole territory drained by the rivers which empty their waters within its lines. This is the British claim to-day in China. "Spheres of influence" is the term used, and to-day the whole of China is practically partitioned between Russia and Great Britain, Germany and France. So far I have spoken only of jurisdiction over land. Let us now look at sovereign rights over water.

States claim sovereign authority over portions of seas, over lakes and rivers, and over the vessels belonging to them or their subjects. One of the most bitterly disputed questions of international law was the question of the *Mare Clausum*, or the *Mare Liberum*, sea open to all or under the dominion of a particular power.

It would be beyond the scope of a paper of this kind to trace the growth of the law on this point. Britain claimed jurisdiction from the North Sea to the Bay of Biscay. As early as the reign of King John, the ordinance of Hastings enacted that "if a lieutenant of the King do encounter upon the sea any ships that will not strike or veil their bonnets at his commandment, he will fight against them, take them, and forfeit their goods."

The Adriatic, the Gulf of Genoa, the North Sea, and the Baltic were, until recently, all closed and under authority, and no later than the other day do we hear of the United States claiming Behring Sea

as a *Mare Clausum*, a proposition which the Paris Board of Arbitration happily vetoed. The tendency in modern times seems to be towards the open sea.

Certain portions, however, of the sea are still subject to territorial jurisdiction; *e.g.*, we hear of the three-mile limit. This was the distance which formerly was considered the limit of effective gun fire, and was accordingly assumed to be a harbor; so land in a state covered with water is subject to territorial rights, *e.g.*, rivers and lakes; but where, as often happens, a river of great length, like the Rhine and formerly the Mississippi, passes through the territory of several states, each of those states has a right of navigation to the sea. This point is at present aptly exemplified by the dispute between the United States and ourselves with regard to the Stikine River, which empties into the Pacific in United States territory, upon which, even if we did not possess treaty rights of navigation, we would be entitled to navigate our ships to give us access to the Yukon district.

So, too, the St. Lawrence. In 1828 Great Britain, as owner of the territory near the mouth, claimed the right to close the St. Lawrence at pleasure, but the controversy ended in 1854 in much the same way as the disputes about the passage down the Rhine, and the principles then laid down were subsequently applied to the South American Rivers, the Parana, the Uruguay and the Amazon, each riparian owner assenting to the rights of the other.

Turning to the rights of States over their vessels, we find that a fiction of international law so dear to lawyers meets us. It is that a man in a foreign country or a ship in foreign waters is conceived as still within the limits of the State to which he or she belongs. This fiction has been the cause of many a slave regaining his freedom after the abolition of slavery by Great Britain, for, when once he placed his foot on a British ship he was on British territory, with all the might of the British Empire at his back, and it became the duty of the captain of that ship to place him in some spot where he would not again be reduced to slavery.

This doctrine of extritorial jurisdiction originally applied only to men-of-war, but in 1812 an extension to private ships was claimed by the United States. The war of 1814 between Great Britain and the United States arose by reason of British ships searching United

States vessels for men of British nationality. This right was stoutly denied by the United States, and although the question was not definitely settled by that war, it will not probably arise again, as Great Britain has abandoned the system of impressing men for the navy.

An interesting phase of the relation of sovereignty to the territory of a state is found in the law which relates to the person of a sovereign while within foreign territory. In his capacity of a sovereign, he is free from all local jurisdiction so long as he is there. He cannot be proceeded against either in ordinary or extraordinary civil or criminal courts ; he is exempted from taxes ; he is not subjected to police or other administrative regulation ; his house cannot be entered by the authority of the state in which he is, and the members of his suite enjoy the same personal immunity as himself. If he commits acts against the safety or good order of the community, or permits them to be done by his attendants, the state can only expel him from his territory, putting him under such restraint as is necessary to do this. If a crime is committed by a member of his suite, the accused person cannot be tried and punished. Criminals belonging to his suite must be sent home to be tried, and civil actions must be equally reserved from the home courts. A sovereign, however, cannot protect an accused person, not a member of his suite, who takes refuge from the pursuit of the local authority. They cannot enter his house, but he is bound to surrender the refugee, and a refusal to give him up would justify the authorities in expelling the sovereign and in preventing the accused by force from being carried off in his retinue.

Sometimes, however, a sovereign has a double personality, that is to say, he may be for some purposes in the position of a private individual. Thus, if he enters the military service of a foreign country, he submits himself to its authority in his capacity of a military officer, and if he travels incognito he may be treated as the private individual he appears to be. Diplomatic agents possess a somewhat similar immunity.

Military forces entering the territory of a foreign state in amity with that to which they belong, either when crossing to and fro between the main part of their country and an isolated piece of it, or as allies, are also immune, but in these cases it is usual to con-

clude conventions, specifying the line of road to be followed and regulating their transit so as to make it as little onerous as possible to the population among which they are. A similar immunity is extended to ships of war and public ships of state. Merchant vessels lying in the ports of a foreign state enjoy a qualified immunity.

An interesting branch of sovereignty in relation to the subjects of a state is afforded by questions of naturalization. In Germany, Austria, Sweden, Norway and Switzerland, nationality follows parentage alone, and all these states claim the children of their subjects wherever they may be born. Other countries, while regarding the children of an alien, as an alien, give him the right, on attaining his majority, of electing to be a citizen of the country in which he resides. Except in the United States, the nationality of a wife is merged in that of her husband, so that when a woman marries a foreigner she loses her own nationality and acquires his, and a subsequent change of nationality on his part carries with it a like change on her side. By the exceptional practice of the United States a native woman marrying a foreigner remains a subject of her own state, though an alien woman marrying an American citizen becomes herself naturalized.

We may now consider maritime belligerency. The elements are simple. When two states go to war the ships, public and private of each, are so many chattels, and the capture of them is regulated by the same principles as the seizure on land of moveables by soldiers.

Prize courts are established to decide whether a ship is taken into possession of the enemy, as possession is the key-stone of the right to confiscate. This leads us to the consideration of neutrals and their goods.

The plenipotentiaries at Paris fixed certain principles, of which we heard much in the recent war with Spain. They are as follows :

1. Privateering is abolished.
2. A neutral flag covers enemy's goods, except those contraband of war.
3. Neutral goods, except contraband of war, are not liable to capture under the enemy's flags, and
4. Blockades, to be binding, must be effective.

The net result was free ships make free goods, but the converse that enemy's ships make enemy's goods was not adopted.

The United States was not a party to this declaration, but following the Christian tendency of the nation it did not adopt in the late war the system of privateering, which has rightly been considered by civilized nations only another name for piracy.

So many questions arose about the American filibustering expeditions prior to the recent war with Spain that it will be interesting to look at the cases in which the use of neutral territory by a belligerent forms a subject of complaint. There can be no question that had Spain been in a condition to fight she would have declared war long before the war actually broke out, by reason of acts in breach of neutrality, and she would unquestionably have been justified by international law, for one of the great questions is that a neutral State cannot allow its territory to become a scene of hostile operations to the disadvantage of one of two belligerents. An example of a filibustering expedition was the Fenian incursion into Canada, for which Great Britain was entitled to claim compensation, but refrained.

So, too, we see the operation of this rule when the United States fleet was ordered by the British Government to leave Hong Kong on the outbreak of the recent war, the rule being that supplies can only be meted out by neutrals to belligerents in accordance with the necessities in each case; but the law even goes further, and the intent of acts innocent separately, but culpable when combined, are within the neutral jurisdiction.

In accordance with this view it was contended on the part of the United States before the tribunal of arbitration at Geneva that the Alabama and Georgia, two vessels in the Confederate service, were in effect armed within British jurisdiction. The Alabama left Liverpool wholly unarmed on July 29th, 1862, and received her guns and ammunition at Terceira, partly from a vessel which cleared a fortnight later from Liverpool for Nassau, in the Bahamas, and partly from another vessel which started from London with a clearance for Demarara. In like manner the Georgia cleared from Glasgow for China and received her armament off the French coast from the vessel which sailed from New Haven, in Sussex. These acts, innocent separately, rendered Great Britain liable for the huge

damages done by the Alabama to the Northern commerce during the war of secession. England has also retained for many years on her statute books a foreign enlistment act, and she has recently strengthened its provisions. This act prevents the fitting out of warlike expeditions in Great Britain or her colonies to be used against powers with which Great Britain is at peace. It was under the provisions of this act that the Jamieson Raiders were tried and punished. Thus we see that from the rudimentary propositions of international law, which contemplate no other relations than those of war and peace, in which if hostilities broke out between two states, every other was an ally or an enemy. A third attitude has become recognized as possible and legitimate, namely, that of neutral.

Contraband of war was not covered by the declaration of Paris, nor was the case of ships endeavoring to obtain entrance to a blockaded port. This branch of international law is both complex and difficult, and much of its difficulty arises from the question as to what is or is not contraband of war. Indeed the test of what is contraband is not yet settled, but it may be generally stated that things which are *only* used for war are contraband, and things which are *both* useful for war *and* for peace may be *declared* contraband ; e.g., coal was declared contraband by Great Britain in the recent war with Spain.

Let us now turn to the mitigation of war. The humane tendency of the present age cannot be denied. Take the case of the treatment of the wounded and the prisoners. At first they were tortured, then killed, as in a Roman triumph ; then in mediaeval times there appears to have been rather ignorance and carelessness than actual cruelty ; but it is only in modern times that friend and foe alike receive the care of the surgeon and the comfort of the hospital.

One reason of this humane tendency is that neutrals check belligerents. Manuals of rules and usages for the use of officers in the field have been compiled by England, Germany and France. The poisoning of water and food is absolutely forbidden, but the stoppage of supplies is still recognized. The use of poisoned weapons, or weapons calculated to produce unnecessary pain, e.g., a bursting bullet, is prohibited. Still nations verge on the rules laid

down in the declaration of St. Petersburg in 1868, and the Dum Dum bullet now used by British troops, with its softened point, very nearly trespasses upon the forbidden ground. The history of red-hot shot, and even of our familiar bayonet, is too long to be set out here, but the wonder is that torpedoes, *et hoc genus omne*, has not been met with harsher criticism than they have. Presently we shall hear of a declaration pronouncing illegal the recent alleged invention of Tesla, who proposes to launch a stream of electricity against the enemy's fleet which shall render forever useless the employment of iron-clads. The general rule then of modern warfare is that the mode of carrying on the war shall cause no greater harm to the enemy than the necessity requires for bringing him to time.

The Geneva convention of 1864 is the farthest as well as the most recent point of advance reached by a convention of nations, unless, indeed, the conference to be held at The Hague results in some definite scheme of arbitration to mitigate the sufferings of war. Space will not permit me to say much about prisoners and the mode in which captured enemies receive quarter, nor can I do more than touch upon spies, though a chapter might be written upon the fine distinction between ordinary spies, double spies, spies of distinction, and spies by compulsion, and the measure of punishment awarded to each. Suffice it to say that it is legitimate to employ spies, but to be a spy is regarded as dishonorable, and if caught he may be punished with the ignominious death of hanging.

A strong inclination was shown by the Germans during the war of 1870 to treat as spies persons passing over the German lines in balloons, but the essence of secrecy or disguise was not here present, and accordingly we find that their treatment as spies was forbidden in the proposed declaration of Brussels, and that their right to be treated as prisoners of war is affirmed in the French official manual for the use of military officers. War balloons proved such a disastrous failure at the seige of Santiago that their use will probably be now confined to making observation out of reach of the enemy's fire.

The mitigation of war also appears in the treatment of the innocent inhabitants of belligerent towns. Formerly they were put to death irrespective of sex or age; nowadays such a course would raise a storm of indignation, and we were accordingly somewhat amused by the terror of the American seaport towns which, though

without fortifications, feared that they would be bombarded by a hostile Spanish fleet. This fear was, of course, groundless.

Disputes between nations can be amicably settled either by direct agreement between the parties, by agreement under the mediation of another power, or by reference to arbitration. When two states refer a disputed matter to arbitration, the scope and conditions of the reference are usually settled by a treaty, and rules and principles are laid down upon which the arbitrators are to proceed. There are two measures falling short of war which it is permissible to take, namely, retorsion and reprisal. Retorsion consists in treating the subjects of the state giving provocation in an identical or closely analogous way with that in which the subjects of the state using retorsion are treated. Thus if the productions of Canada are discouraged or kept out of the United States by differential import duties, it is an act of retorsion to put on similar duties on United States goods coming into Canada; so our Alien Labor law is an exact copy *mutatis mutandis* with that of the United States. Reprisals are resorted to when a specific wrong has been committed, and they consist in the seizure and confiscation of property belonging to the offending state, or its subjects, by way of compensation in value for the wrong; or it may consist in suspending the operation of treaties. Thus, for example, when Holland, in 1780, repudiated the treaty obligation under which she lay to succor England when attacked, the British Government exercised reprisals by suspending the commercial treaties between Holland and Great Britain. Such measures, however, are *prima facie* acts of war and are resorted to to throw the onus of declaring war on the party first offending. A very common form of reprisal is an embargo of such ships belonging to the offending states as may be lying in the ports of the state making the reprisal. A recent case, combining seizure and embargo, is that of England against the two Sicillies in 1839. The justification of reprisals is that they are the means of avoiding the graver alternative of war. Another means of constraint short of war is called a pacific blockade, the first instance of which occurred in 1827, when the coasts of Greece were blockaded by the English, French and Russian fleets, while still professing to be at peace with Turkey.

When all means of preserving peace have failed, the right to

commence hostilities immediately accrues. We all read last summer of the discussion which took place with reference to the declaration of war between Spain and the United States. It was then discussed at great length whether the seizure of Spanish vessels, the handing in of the passports of the resident ambassadors of both countries, was a sufficient declaration of war; but the conclusions arrived at by the jurists of the present century is that it is not necessary that notice must be given to an enemy before entering upon war, although the war of 1870 was commenced by a declaration handed to Count Bismarck by the French Charge d'Affaires; and in 1877, between Russia and Turkey, a formal dispatch was handed to the Turkish Charge d'Affaires at St. Petersburg.

We may now consider the end of wars. Treaties of peace put an end to the war and absolutely abolish the subject of it. We are now hearing daily of the negotiations between Spain and America in Paris. When these are concluded the cause of the war will have been put to an end. An armistice is a sort of partial truce. A peace is always preceded by an armistice, and an armistice by a suspension of arms, which is only a shorter armistice. I cannot enlarge upon the many forms of truces, cartels, safe conducts, passports, safe guards, etc., as the time approaches when I must close; but this paper would be incomplete were I not to mention some of the proposals to abate war. War is irreconcilable with Christianity, its belief and practices. The Prince of Peace has forbidden war, and Christians therefore earnestly desire arbitration as a means of settling disputes. Nations, however, like individuals, are singularly human, and where their view of disputed points clashes with the view of another nation, pride, more than real interest, often brings about war. We have had an example of this in the recent Fashoda incident. The want of coercive power is the chief drawback, though there are others which interfere with this end and distinguishes international arbitrations from private ones. An example of this lack of power was evident in the Behring Sea dispute when, although compensation was ordered to be paid to the owners of captured sealers, some four years ago, it is only to-day that the money is being paid over, and that more through a change in sentiment than for any other reason. About twelve years ago an eminent Frenchman, De Molinair, published a proposal for what he called a league of

neutral powers. His theory was that neutrals, though not always the same, are, when combined, irresistible ; and his proposition was that the outbreak of war between any two powers should be a *casus belli* as regards the rest, and to embody this principle in a treaty. This scheme, perhaps because it was too ambitious, failed to command the attention it deserved. The combination of the three Emperors, the dual alliance, are all efforts in the same direction. War has often been compared to a huge conflagration, and like it. Eventually De Molinair's plan of isolation may bring with it the millennium, when men shall beat their swords into plow-shares and their spears into pruning-hooks.

BIOLOGICAL REPORT FOR THE SESSION

1898-1899.

The work of the Biological Section has been almost wholly confined to botany during the last session. A few new species have been added to our list, but, with the necessary time at the disposal of our more active members, much could be accomplished in the study of forms scarcely known to us. The past winter, owing to the very light snowfall, has been an exceptionally severe one throughout Ontario and adjoining provinces and states, many cultivated trees, shrubs and herbaceous perennials, usually considered hardy, succumbing to the abnormal conditions. Wild plants also seem to have suffered to some extent, *Cypripedium acaula*, for instance, being comparatively scarce compared with the number noted in 1898. Toads, so commonly found in our gardens and under electric lamps on the streets, seem almost to have disappeared. A few young ones only have been seen at edges of pools. Have the adults perished from frost?

The additions to local flora are :

- Draba verna*—L.
- Viola cucullata*—Ait.
- “ *populifolia*—Greene.
- “ *Dicksonii*—Greene.
- “ *vagula*—Greene.
- Stellaria graminea*—L.

Convolvulus spithamæus—L. The plant listed by us under this title is, according to Dr. Greene, *Convolvulus stans*—Michx.

Nasturtium sylvestre—R. Br. This plant, which can be found in low meadows near the town of Dundas, taken and listed about 20 years ago by J. M. Buchan, has recently been collected at Ball's Mills, Lincoln Co., Ont., but it can scarcely be considered “new to Canada.”

J. M. DICKSON,
Chairman,

H. S. MOORE,
Secretary.

SOME NEW VIOLETS.

BY J. M. DICKSON.

For some years it has been strongly impressed upon field workers that the title *Viola palmata* var. *cucullata*, as generally applied, covered a somewhat wide diversity of forms, but not having access to specialists, or monographs covering the genus, we were compelled to allow several seemingly distinct forms of acaulescent violets to remain under this extremely variable variety. Desiring more light, we sent several specimens to Mr. J. M. Macoun, Assistant Naturalist, Geological Survey, Ottawa, who forwarded the material to Dr. E. L. Greene, Professor of Botany at the Catholic University, Washington, D. C., U. S. From the plants collected at Hamilton and at Ottawa by Mr. Macoun, Dr. Greene has described at least eight distinct species, seven of which are new.

The Hamilton species, so far as known to the writer, are :

**Viola cucullata*, Ait. ; Greene, *Pittonia*, Vol. III., 143.

"This is a very glabrous plant, of tender and succulent herbage, decidedly cucullate leaves, light green in color, flowers very pale blue, the petals with a spot of darker violet just above the white basal part or claw. The cleistogamous flowers are borne on greatly elongated very slender peduncles which are strictly erect, both the growing and full grown ovaries being a half-foot or more above ground among the leaf-blades. The capsules are very long and quite prismatic, *i. e.*, of equal thickness from one end to the other, and distinctly though obtusely trigonous." Common in bog meadows.

**Viola populifolia*, Greene ; *Pittonia*, Vol. III., 337.

"An acaulescent blue-flowered woodland violet akin to *V. cuspidata*, but smaller, the petioles of the early leaves densely villous-hirsute, the blade from broad-cordate in the very earliest and smallest, to deltoid or deltoid-reniform in those accompanying the

*Illustrated by J. M. Macoun in "Notes on Some Ottawa Violets."

petaliferous flowers, notably broader than long, both surfaces, but more conspicuously the lower, hirsute-pubescent, especially along the veins: corollas large, rather light blue, all the petals broad and obtuse, the odd one like the others but a little longer; sepals of the petaliferous flowers oblong, obtuse, hispidulous below, especially the auricles: apetalous flowers of summer and autumn very short-peduncled and horizontal or partly buried, but the peduncles slender; sepals small, glabrous; pods triquetrous-ovoid, finely dotted, 4 or 5 lines long: late foliage nearly glabrous, but rather fleshy." Newly cleared ground near Brown's wharf.

Viola Dicksonii, Greene; *Pittonia*, Vol. IV., 65.

"Allied to *V. cuspidata*, but the herbage light-green, the pubescence more sparse and hispidulous, the petaliferous flowers on nearly terete peduncles about equalling the leaves and bibracteolate near the base: sepals lanceolate, either naked or ciliolate: corolla about $\frac{3}{4}$ inch long, of a fine lavender-blue, the paired petals, especially the two uppermost, obovate-rhomboidal, the laterals white at base and strongly bearded with indistinctly clavellate hairs, the keel-petal shorter and narrower than the others, more or less conduplicate or convolute especially at apex, white at base, and purple-veined above the white: summer foliage less broad in proportion to its length than in *V. cuspidata* and more apt to be cucullate: apetalous flowers on short but nearly or altogether hypogeous peduncles."

Viola vagula, Greene; *Pittonia*, Vol. IV., 67.

"Dark-green glabrous rather notably fleshy herbage; leaves at time of petaliferous flowering about an inch in diameter, somewhat deltoid-cordate, the length equalling or surpassing the breadth, the margin lightly crenate: peduncles surpassing the leaves, obscurely angled or semiterete, bibracteolate in about the middle, the rather obtuse bractlets with a few obscure glandular teeth: sepals oblong, obtuse: corolla nearly an inch in diameter, the breadth commonly greater than the length; petals deep violet, at base darkly venulose on a white ground, all obovate-spatulate, obtuse or notched, the odd one especially broad and often obcordate, the pair next to it bearing each a dense tuft of rather long and slender not in the least clavellate hairs; style not prolonged beyond the anthers; apetalous

summer flowers aerial, but their peduncles short and more or less horizontal ; their capsules short and thick, not dotted.

We have no doubt but that this list would be extended if the necessary time could be spared for more careful examination of our flora.

TRILLIUM GRANDIFLORUM, Salisb.

A few years ago several green-flowered Trilliums were observed growing in a flat piece of woods on the banks of the Waterdown Creek, near this city. To see if they were persistent and not merely sports of a season, I visited the locality during the latter part of May, 1897, and, upon a close inspection, found several remarkable forms not previously noted. Some of these may be described as below :—

1st. Several with white edgings and markings on sepals. The most remarkable of these had one sepal green, one half green and half white and the third pure white, while both sepals and petals were inserted in a distinct spiral on the axis ; the leaves were normal.

2nd. Leaves and sepals normal. Petals marked with green lines or bands toward the base.

3rd. Leaves and sepals normal. Petals green, with a narrow white margin.

4th. Leaves distinctly petiolate. Petioles one to three inches long ; sepals white, with a green stripe down the midrib. Petals narrowed, lanceolate, white, with broad green band in centre, running from base, and terminating near the apex.

5th. Leaves as in No. 4. Sepals normal. Petals obovate. Apiculate long clawed, with broad green centres and white margins.

6th. Leaves ovate, long acuminate, petioled. Petioles ascending, widely spreading, seven inches long, inserted about two inches above the root stock and six or seven inches below the flower. Sepals normal. Petals green, with white margins.

All the flowers seem to be perfect, some having a sterile filament, which might be due to accident.

THE STUDY OF MUSHROOMS.

Read before the Hamilton Association, May 4th, 1899.

BY W. A. CHILD, PH.B., M. A.

In presenting a paper on Mushrooms to this Association, I do not do so with any thought of bringing forward new scientific knowledge, or of presenting any facts that cannot be found in many books on the subject; I only wish to call your attention to a branch of Biology that has been much neglected. If I can excite a little interest in the subject, and induce a few observers to direct their attention to it, I will have attained my end. I wish also to call your attention to the practical value of the study.

How many tons or hundred of tons of the finest food go to waste every year simply for ignorance of its value? No spot is too worthless to produce its harvest of fungi—on rubbish heaps, manure piles, roads, lawns, meadows, pastures, waste fields, woods and swamps—everywhere nature produces these her greatest delicacies, which man in his ignorance despises. Some of the finest mushrooms grow in coal bins and along the sides of railroad tracks. The brakemen and section men take great delight in kicking them. I think no railroad man ever passes a clump of Coprini without bestowing a kick upon it, and the pleasure thus afforded (I believe it is a great and genuine pleasure) seems to be the only good this really delicious mushroom does.

I know of a village near Toronto where, a few years ago, the people were in the greatest distress on account of the financial depression and the collapse of a recent land boom. Many of these people were living from day to day mostly on hope, and often were in great want. All around them were growing in great abundance tons of the finest food equal to the best of meat. There were many kinds of mushroom, and some of the gigantic puff balls as big as a man's head. At current prices in Toronto many families could have made a good living by collecting and selling these, but this would have presupposed a knowledge of their value on the part

of Toronto people, which unfortunately did not exist. These poor people could have themselves subsisted on this bounty of nature, but they too were afraid to touch them, though I daresay if they had run across a deadly *Amanita* they would have eaten it without hesitation, because it resembled the common meadow mushroom.

We are told that on the Continent of Europe the people understand the value of mushrooms much better. In many sections they form one of the principal articles of diet to the peasants; in fact they dry and preserve for winter the summer's abundance. Many of the *Boletus* family are thus dried, including, I believe, some that are generally considered poisonous in this country, and are so rated in our books.

Badham states that in parts of Italy they had a Government inspector of fungi at the market places, but the mushrooms that he rejected were those in common use in England, while he passed as being beyond suspicion many that are considered deadly in that country. However this may be, it is certain that the prevailing ideas on the subject of mushrooms would be very laughable if they were not so vexatious. Many times, while gathering some particularly attractive clump of the inky mushroom, I have been greeted by the ubiquitous small boy with the remark: "Say, Mister, them's toadstools!" "I know it." "You ain't goin' to eat 'em, are you?" "Yes." "They'll kill you, sure."

Of all vegetable foods the fungi approach nearest to the animal foods. As animals live on plants or other animals—that is, taking already prepared organic tissues and reworking them for their own use, or storing them up for future consumption—so fungi use the organic matter already prepared for them. Sometimes they get this in the shape of rotten wood, or grass, or sometimes as manure. In this respect they take the same place as animals in nature's economy, and likewise the tissues of fungi are like the flesh of animals in the amount of nitrogeneous matter they contain. Rollrausch & Siegel (as quoted by Taylor) state the nitrogeneous values of different foods as follows: Protein calculated for 100 parts of bread, 8.03; of oatmeal, 9.74; of barley bread, 6.39; of leguminous fruits, 27.05; of potatoes, 4.85; of mushrooms, 33.0.

From a scientific point of view this subject must be particularly interesting. I know of no branch of natural science in which there

is such an opening for original work. Every day new species are being found, or species known in Europe are being, for the first time, found on this continent. Think of the excitement of a botanist that discovered a new species of flower. He would think that such a find rewarded him amply for years of labor.

The whole study of mycology is in a state of chaos. There is room for a great deal of profitable work in finding new fungi, and in more correctly classifying those already found. Years of good work might be spent on each of a great many different genera. The classification of well-known fungi is being continually changed as a result of further investigation.

I know of no complete works on the fungi of this continent or of this district. We depend for systematic classification almost entirely on European authorities.

The mushrooms of this country are nearly identical with those of Europe, so that European works on the subject apply to our specimens more nearly than we would have expected. But there are differences, and descriptions of mushrooms in Europe require revision to cover the same species here.

The father of the study of mycology in Europe was Elias Fries, who published his great work in Latin in 1874. Probably the next best work on the subject is Stevenson's *British Fungi*, 1886, which is based largely on Fries. Berkeley has also written a useful book on the subject, which is widely known.

We are indebted to Mr. Worthington Smith for a key to the classification of the *Hymenomycetes*. The old genus *Agaricus* is generally made to include a great number of sub-genera. The tendency is now, I believe, to elevate these sub-genera to the standing of genera. In this I understand that *Saccardo* is taking the lead. Many mushrooms that were formerly called separate species are now called only varieties, and the old classifications are being changed in many other ways. In this country I know of no complete systematic classification. We have a great many books giving descriptions of a great many different species.

Mr. Peck, of the University of New York, has published, perhaps, the most valuable work on the subject, which is unfortunately out of print. (I have here a copy that I obtained through the courtesy of Mr. Griswold, the Law Librarian at Albany.)

Mr. C. G. Lloyd, of Cincinnati, is doing very valuable work. His pamphlet on the *Volvae* is, I think, the very best work on the subject. He is publishing a series of photographs of mushrooms that is a valuable aid to all students of the subject. Mr. Knox, of Cleveland, is publishing a series of lithographs, colored by hand, in water colors, that is in many respects the best series of drawings of fungi that I have seen.

The Latin word *Fungus* has been adopted to apply to the whole of that class of cryptogams to which mushrooms belong. *Fungus* has by some dreary-minded scoffers been derived from *Funus* (a funeral), but we indignantly reject this derivation as only proceeding from a diseased imagination.

Mushroom is probably derived from the French *Mousseron*, the name used to designate the *Agaricus Prunulus*, a particularly delicious species. *Mousseron* from *Mousse Moss*, so named because it seldom grows in moss.

Much study has been applied to the etymology of Toadstool. One favorite derivation is from the German *Tod* (death) and *Stuhl* (chair)—a most suitable and picturesque origin for the word, all the more attractive that it is probably not the true etymology. How narrow and unscientific must be the mind of one who would reject such an etymology simply because it was not the real history of a word! Then there is "toad" and "stool." A chair for toads! Who ever saw a toad sitting on a toadstool now-a-days? Yet if this derivation be the correct one, there must at one time have been a species of toad that used such a chair. Now, if we accept this derivation, we prove the survival of the hardy species of toads that needed no chairs, and so add one more unassailable link to the chain of evidence of the survival of the fittest.

And there is yet another consideration. Everyone has seen the fairy rings of mushrooms—the *Marasmius Oreades* (they are very numerous on the golf grounds). Now, it is understood that the fairies dance within these rings while the fairy spectators sit perched upon the surrounding mushrooms. Among these mushrooms, but generally a little outside, like chairs drawn into the background, are poisonous toadstools; on these the toads must sit, a little withdrawn from the society circle, on the mushrooms of the fairy ring. The beauty of this derivation is that it establishes the existence of fairies, a point that I always wanted settled.

As these two derivations are totally different and inconsistent with each other, we unhesitatingly adopt them both, to show that we have no narrow prejudices.

When one speaks of mushrooms, the first question always is : "How can you tell the edible from the poisonous mushrooms?" The answer is simple: there is no rule to distinguish them. It is necessary to know each species before eating any quantity of it. You should know the edible species just as you would know an apple or a potato. We hear many rules to distinguish the wholesome from the poisonous, but I think they would all exclude many of the best species, and many such rules would include some of the deadly poisonous ones. I repeat you must know each species before eating largely of it. The deadly *Amanita* is one of the most attractive looking of all the mushrooms ; it has no bad odor or taste. There are no bad effects immediately following the eating of it, but in about twelve hours its poison begins to work, and then it is often too late for an antidote. Atropine is supposed to be an antidote for this poison, but I have no ambition to eat any of the *Amanita* for the sake of testing its efficacy.

I believe I am correct in saying that by far the greatest number of mushrooms are edible, or at least not poisonous. There are some that are so tough that they are obviously unfitted for food. Some are acrid or nauseous to taste. I believe that the great majority of the species that are not edible are not at all dangerous. They might produce a slight indigestion, but nothing more.

Fully half of the species, although described botanically, have not been tested as to their food value, and all considered dangerous because unknown. It is, however, quite feasible to try them without danger. After, of course, eliminating the species that are known to be poisonous, an unknown variety may be tested; if not disagreeable to the taste a small quantity may be eaten. After waiting twelve hours, if there are no bad results, a larger quantity could be tried. I have often tested mushrooms this way without any bad effects. Most of the poisonous mushrooms grow in the woods, and the greater part of the mushrooms growing in the open air are edible.

As this has no pretence of being a scientific paper, I will not attempt to describe the classification of mushrooms, except to say that the gill-bearing mushrooms are generally divided into classes,

according to the color of their spores. This is a very convenient classification, and the color of the spores seem to be a much more distinctive feature than the colors in flowering plants.

I will describe a few of the commonest species.

AMANITA—Of all the gill-bearing mushrooms, the Amanita may be taken as a type. They are among the most beautiful, the most shapely and the most typical. They include some of the best of the edible, and alas! they include also the most deadly poisonous.

The spores and gills are white.

The most distinctive feature of the genus is the volva or sack. This is a membrane that covers the whole mushroom at first, as the shell covers the young chicken. As the pileus (or top) expands this membrane tears in two, leaving a few patches generally adhered to the pileus, but often falling off later. The part of the volva left in the ground incloses the end of the stem like a cup. This is the most noticeable characteristic of the genus, although in some species it is inconspicuous or almost wanting. This cup is generally left in the ground when the mushroom is pulled up so that nothing is left to distinguish it from such edible species as the *Lepiota Naucinoïdes*.

The *Amanita Phalloïdes* and its variety the *Amanita Verna* are well called the "destroying angels."

They are among the most beautiful of mushrooms and by far the most deadly. I believe the great majority of cases of mushroom poisoning is due to this species. The bad character of this one mushroom has cast suspicion on all the mushroom family.

The *Amanita Muscaria*, or *Fly* mushroom is also poisonous, but not so deadly as its malevolent sister the *Verna*. It has a beautiful scarlet or orange cap with a somewhat sticky cuticle. It is very showy. The name comes from the fact that it has been used as a fly poison. In Siberia the natives use it to produce intoxication. The result of eating a small quantity of it is similar to that produced by an excess of alcoholic drink, and the Siberian natives become very dissipated with the use of it. Fortunately it is rare around Hamilton, or else those who know where to find it wish to keep the knowledge to themselves, a theory not at all in keeping with the well known convivial character of Hamiltonians.

We now come to the King (or I should say, more correctly), the Emperor of Mushrooms, the *Amanita Caesarea*.

It is dressed in royal scarlet or orange, and has always moved in the best circles, having associated with the Roman Emperors thousands of years ago. This was probably the species referred to as the *Boletus*, although this name is now applied to one of the *Polyporei*.

When the good Agrippina wished to make way with her husband Claudius, it was this mushroom, prepared by the skillful *Locusta*, that was given him. Nero called it the food of the gods, for had not the Senate declared Claudius a god. Perhaps it was on account of its relationship with the deadly *Verna* that this species was so dear to the Roman Empress.

The Emperor Jovian is also said, by some, to have been killed by eating mushrooms; possibly he mistook a *Verna* for the *Caeserea*.

Subgenus Lepiota is characterized more especially by a cuticle torn into fringes, somewhat as in the *Coprinus Comatus*. The cuticle is concrete with the substance of the pileus and is not like the volva of the *Amanita* that leaves loose patches of skin on the upper surface of the pileus.

In the *Lepiota* there is no volva. The ring is generally loose and slips up and down on the stem. The stem is generally bulbous and has a hollow in the center stuffed with loose fibres. Spores white. Stem distinct in a socket; gills free. The type of this subgenus is the *Lepiota-Procera*. This is, I think, one of the most beautiful and graceful of all the mushrooms. It is called the umbrella mushroom or parasol mushroom, and it resembles wonderfully a miniature parasol covered with rows of delicate lace fringe right to the top and hanging from the margin. The center is slightly raised or umbonate, and dark brown with the unbroken cuticle that is torn away from the pileus to make the fringes below. The stem is mottled with brown, bulbous and with a large loose ring. On being bruised this fungus turns from white to an orange or rust color. I found a basket full at one time which were a cream white when picked, but the jarring of carrying them home in the basket turned them nearly all to a bright orange color. When cooked they become reddish brown; they had quite a distinct flavor, different from most other mushrooms.

Lepiota Naucinoides is quite different from the *Procera*. It has no scales or fringes on the pileus. A loose ring, bulbous stem,

stuffed, distinct from the pileus, to which it is attached with a sort of socket. Cuticle smooth, like kid, and the color of a biscuit. This looks almost the same as the common meadow mushroom, except that the gills are a creamy or pinkish white, and the spores are white, never purple or brown. This species is very common on our lawn and in the fields around Hamilton.

Stevenson describes a species similar to this in England, *Ag. Lepiota Naucinus*. It seems to be nearly the same, except that the cuticle brakes into granules, and the ring is described as tender. Taylor states that some of the American species have a slight granulation. The difference is probably one of those slight differences that characterize members of the same species on different sides of the ocean.

I have always avoided the *Naucinoïdes* on account of its resemblance to the *Amanita Verna*, and I have counselled others to avoid it for that reason. The most notable difference is that the *Verna* has a volva and the *Naucinoïdes* has not, but as the volva is generally left in the ground when the *Verna* is gathered, this is not to be depended upon as a distinguishing mark if mushrooms are picked by any one but an expert. The *Verna* grows in the woods and the *Naucinoïdes* in the open, but as they may meet on common ground at the edge of a wood, this also is not to be depended on.

The *Verna* being the most deadly of all the fungi, I have rejected all that resemble it, unless I could see them growing and gather them myself, though I am aware that many people eat the *Naucinoïdes*, taking it for the common meadow mushroom. They know nothing about the deadly *Amanita*. It is only their good luck that saves them. The same people would look with horror on a *Coprin* or a puff ball, and would think it sudden and sure death, although these could not possibly be mistaken for any poisonous species.

Coprinus—One of the commonest genus is the *Coprinus*. It is also one of the most useful to know, comprizing as it does, several esculent species that are easily distinguished.

The distinctive feature of this genus is that these mushrooms have dark spores, and after a few days exposure they turn to ink, and run away leaving only a black spot where they had been.

I had this well illustrated about a year ago. Some one kindly

brought me a species (new to me) for examination. After cutting off the stem I laid it, gills down, in a box to take the color of the spores. I forgot it next day, and when I did come to look at it, I found only a black smudge where once a mushroom had been. Clearly it was a *Coprinus*. One of our commonest fungi is the *Coprinus Canatus*, or shaggy, maned mushroom. It is common on our lawns and boulevards, and it thrives equally in lanes and vacant fields and pastures. The pileus is about the shape and size of an egg. Stem white and fibrous, and somewhat bulbous below. The ring slight and easily separated. Gills at first greyish white then becoming black, as it runs away in ink. The cuticle tears away from the pileus in delicate lace-like fringes, brown outside and showing the white substance of the pileus beneath.

It grows on decaying wood or manure, and is a common ornament on our lawns. What flower could be more graceful than this oval pileus with its delicate lacework.

Although few people know that this mushroom is edible, consumers esteem it among the very best.

Coprinus Atramentarius, or Inky Mushroom, is a plebeian fungus, but notwithstanding its democratic instincts, I esteem it among the best. It grows on rotten wood in old coal bins, and on the railroad tracks. It might be called the railroad mushroom, as it has a peculiar fondness for railroad tracks, just outside the rail, where the oil drops from the axle boxes. Among oil, coal and general blackness it particularly flourishes. It is often found on our lawns, but then it is pale and crowded together as if ashamed of being out of its proper place. Around factories and railroads it most rejoices. I have found enough for a fine meal in the Toronto Union Station. Beside a rail, in the opening left for the wheel flange, the poor fungi were vainly seeking room for their proper development between a three inch plank and an eighty pound steel rail.

The *Atramintarius* is totally devoid of a sense of humor; to see a bunch of these mushrooms smashing their soft bodies in a vain endeavor to lift a steel rail is fairly laughable, but they never learn better. These mushrooms are easily distinguished, and impossible to mistake for any other species. They have a drab pileus and gills when young, and as they grow old the edge of the pileus expands, splits and drops its inky fluid. No ring, but a distinct

mark on the stem where the pileus separates from it on expanding. The cuticle will not peel off, and is moist, or rather slimy—stem stout and fibrous.

These mushrooms come up so thickly crowded that they press each other all out of shape, so that they are frequently triangular, square or octagon, some grow under others, so that they are in one dense mass.

ANNUAL REPORT OF THE PHOTOGRAPHIC SECTION OF THE HAMILTON ASSOCIATION, 1898-99.

During the past year this section has met 16 times, and 11 members have been added to the roll.

A new electric projecting lantern was purchased from Thompson, Boston, and was used for the first time on May, 31, 1898, when the Hamilton Canadian Interchange set of slides was shown. The lantern proved very satisfactory, giving a strong white light; and as the intensity of the light can be varied to suit the density of the slide being used, very good results can be obtained.

An enlarging camera with electric light and 10-inch condenser has been fitted up in the dark room. This apparatus has been very popular among the members, and some creditable work has been produced with it.

For some time the members of the section have been agitating for better dark room accommodation, and a committee was appointed to consider ways and means to attain some improvement. If this were remedied, and a larger and better fitted dark room constructed, it would be a great boon to the members of the section, and would certainly benefit the Association materially and financially.

The American Interchange sets of slides have been shown at intervals through the winter months. These exhibitions have been entirely free of charge, and, as there is considerable expense incurred by the section in connection with these open meetings, it is hoped that the Association will see its way to help on the work financially by voting a liberal grant to the Photographic Section.

All the open meetings have been well attended and much appreciated, and the section feels gratified that so many members of the other sections of the Association have attended the meetings.

All the sets of slides shown this season have been above the average, both in technique and in artistic quality.

An additional interest was added to these exhibitions by the

criticism given by J. S. Gordon, to whom the section is much indebted for kindly advice and hints given whenever wanted.

An exhibition of the members' work was given at the opening of the Hamilton Association, which was very highly appreciated. The section will endeavor to make this an annual feature.

An illustrated lecture on "The Cathedrals of England" was given under the auspices of the Photographic Section by Mr. Pearce. The lecture was well attended, every available seat being occupied, and an interesting and enjoyable evening was spent.

The section is also indebted to Mr. A. M. Cunningham, who has always been ready to lend a helping hand, and who, on several occasions, gave interesting and instructive demonstrations.

J. M. EASTWOOD,

Chairman.

J. R. HEDDLE,

Secretary.

DONATIONS TO THE HAMILTON ASSOCIATION
MUSEUM, SESSION OF 1898 TO 1899.

The head of a large sturgeon. The sturgeon and gar pike of the Canadian Lakes are living representatives of the ancient Ganoids. Donor, Col. C. C. Grant.

A singular stone arrow point, made out of cliff stone to the south of the City of Hamilton. It is the only specimen from that kind of stone the donor (Col. C. C. Grant) has ever seen or known to be found.

Specimen of carborundum, lately produced and placed on the market for grinding wheels and other purposes, the same as emery and corundum. Donor, Mr. S. Briggs.

Specimen of salt, from Mrs. S. E. Carry.

Mrs. Carry's and other friends' large collection of shells, corals, etc., prove very attractive.

Donation from Mr. A. E. Walker to the Geological collection is as follows :

STROMATOPORIDÆ.

GUELPH FORMATION.

Cœnostroma (Eloraence)	- - - -	At Durham.
Stromatora (Substriatella)	- - - -	“
New Specimen (not named)	- - - -	“
Clathrodictyræ (Ostiolatum)	- - - -	“
Stromatopora (Mammillata)	- - - -	“
Clathrodictyra (Fastigatum)	- - - -	“
Cœnostroma (Galtence)	- - - -	“
Syringastroma (Columnare)	- - - -	“

NIAGARA.

Stromatopora (Antigua)	- - - -	At Thorold.
Cœnostroma (Botryoideum)	- - - -	At Hamilton.
Cœnostroma (Constellatum)	- - - -	“
Clathrodictyon (Vasiculatum)	- - - -	“
Caunopora (Walkereri)	- - - -	“

DEVONIAN.

Stromatopora (Granulater)	- - - - -	At Hagersville.
Cœnostroma (Densum)	- - - - -	At Sandwich.
One not named	- - - - -	At London.
Cœnostroma (Pustuliferum)	- - - - -	At Hagersville.
Stromatira (Substriatella)	- - - - -	At Marble Head.

TRENTON.

Stromatocerium (Rugosum)	- - - - -	At Trenton.
Strephochetus	- - - - -	At Simcoe.
Stromatopora (Pappilatta)	- - - - -	"
Beatricea (Undulata)	- - - - -	Anticosti.

(This species is placed by S. A. Miller with these forms.)

Each one of these forms has been highly polished, so that the structure can be distinctly seen.

The Museum has been kept open every Saturday afternoon from half-past 2 to 5 o'clock throughout the year, and a large number of friends from all parts of the Province have visited it, also a great number of the city school pupils.

ALEX GAVILLER,
Curator.

HAMILTON ASSOCIATION.

Statement of Receipts and Disbursements for the year ending May, 1899.

RECEIPTS.

Cash balance, 1898.....	\$ 67 20
Government Grant.....	400 00
Members' subscriptions.....	98 00
Horticultural Society Rent.....	11 00
Wentworth Historical Society Rent.....	1 50
Gas Company (refund).....	48
	<hr/>
	\$578 18

DISBURSEMENTS.

Rent of Museum.....	\$105 50
Rent of Dark Room, Photographic Section.....	12 00
Caretaker (9 months).....	31 50
Caretaker, extra help, etc.....	12 15
Insurance.....	20 00
Gas Accounts.....	14 04
Competition Prize, Botanical Section.....	5 00
Printing.....	8 25
Postage and Stationery.....	20 24
Journal and Proceedings.....	133 75
Grant to Photographic Section.....	59 70
Sundry Accounts.....	8 20
	<hr/>
	\$430 33
Balance on hand.....	147 85
	<hr/>
	\$578 18

We have examined the vouchers and found them correct.

H. S. MOORE,	} <i>Auditors,</i>
F. HANSEL,	

REPORT OF THE CORRESPONDING SECRETARY FOR
THE SESSION OF 1898-1899.

To the Officers and Members of the Hamilton Association :

Your Corresponding Secretary for the year 1898-1899 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."

THOMAS MORRIS, JR.

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 Science	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 Eth- nology	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.
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(4) South America.

The Royal Agricultural and Commercial Society of British Guiana.....	Georgetown.
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II.—EUROPE.

(1) Great Britain and Ireland.

England.

British 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.
 Trencschin Scientific Society Trencschin.

(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 Gesell-
 schaft 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.....Capetown.

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.

LIST OF MEMBERS

OF THE HAMILTON ASSOCIATION.

HONORARY.

- 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.
 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 Spencer, J. W., B. Sc., Ph. D., F. G. S., Savannah, Ga.
 1882 Lawson, A. C., M. A., California.
 1884 Bull, Rev. Geo. A., M. A., Niagara Falls South.
 1885 Froot, T., Sudbury.
 1889 Yates, Wm., Hatchley.
 1889 Kennedy, Wm., Austin, Tex.
 1891 Hanham, A. W., Quebec.
 1891 Woolverton, L., M. A., Grimsby.

LIFE.

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

ORDINARY.

- Alexander, A., F. S. Sc.
Aldous, J. E. P., B. A.
Adam, Jno.
Aitcheson, W. J.
Appleton, L. G.
Ballard, W. H., M. A.
Ballard, John F.
Baby, W. A. D.
Baker, A. H.
Bale, F. J.
Baldwin, T. O.
Barton, Geo.
Beasley, Thos.
Beasley, Mrs. Thos.
Beckett, H.
Bertram, Jas. B.
Bicknell, H. H.
Birrell, Wm.
Black, Geo.
Briggs, Samuel.
Burkholder, J. G. Y.
Burns, J. M.
Charlton, B. E.
Campbell, D. J.
Campbell, Robt.
Clark, D., D. D. S.
Crawford, J. T., B. A.
Crawford, A.
Childs, W. A., M. A.
Clappison, Fred. P.
Coburn, H. P.
Cummer, Albert.
Cummings, S., M. D.
Davidson, Mrs. M.
Dickson, J. M.
Eastwood, John M.
Eager, F. O.
Edwards, W. H.
Elliott, W. H., B. A.
Fearman, F. W.
Fearman, R. C.
Findlay, W. F.
Gadsby, J.
Gaviller, Alex.
Gaviller, E. A., M. D.
Garrett, A.
Graham, C. O.
Grant, W. J.
Grant, A. R.
Greene, Joseph
Grossman, Julius
Hansel, Franklin, D. D. S.
Heddle, J. R.
Hemming, A. H. H., O. S. A.
Herriman, W. C., M. D.
Holcroft, C. J.
Hore, J. G.
Husband, Geo.
Jones, C. J.
Lancefield, R. T.
Land, J. H.
Lee, Lyman, B. A.
Lees, Geo.
Leaney, C. A.
Leggat, Matthew
Linger, Jesse
Logan, W. F.
Logan, W. McG., M. A.
Lottridge, Murray
Marshall, Wm.
Mills, Edwin
Mitchell, W. M.

- Morgan, S. A., B. A., D. Paed.
Moodie, J. R.
Moodie, Jas.
Moore, H. S.
Morris, Thos., Jr.
Mullin, Arch.
McIlwraith, Thos.
McInnes, Hon. Donald
McLagan, Alex.
McLaren, Col. Hy.
McKenzie, Ian
McKenzie, A. M.
McPherson, F. F., B. A.
Neill, A. T.
Pothier, C. A.
Pottenger, John
Patterson, P.
Powis, A.
Randell, D.
Reynolds, T. W., M. D.
Roach, Geo.
Robertson, R. A.
Robinson, W. A.
Rutherford, Geo.
Sanford, Hon. W. E.
Schuler, J.
Scriven, P. L.
Sero, J. O. Brant
Souter, D. A.
Strathy, Stuart
Thompson, R. A., B. A.
Thompson, W. C.
Toye, Walter
Trigge, H. H.
Tuckett, Geo. E.
Turnbull, A. C.
Turnbull, J. D.
Turner, J. B., B. A.
Tyrrell, J. B., C. E.
Vernon, Elias, M. D.
Walker, A. E.
Wallace, W.
White, Wm.
Wilson, T.
Wilson, Wm.
Witton, H. B.
Witton, H. B., Jr., B. A.
Witton, W.
Woddell, J. E.
Young, J. M.



THE LATE REV. WM. ORMISTON, D. D., LL.D.

Obituary.

The late Rev. Wm. Ormiston, D. D., LL.D.

DR. ORMISTON, whose death took place in April last, was one of the earliest Presidents of our Association. He became Pastor of the Central Presbyterian Church of this city in 1857, and was a prominent factor in the religious, intellectual and scientific life of the city until 1870, when he removed to New York, where he entered upon that distinguished career which made his name a household word all over this continent.

Previous to coming to Hamilton he had been for 4 years Mathematical Master and Lecturer in Natural Philosophy and Chemistry at the Normal School, Toronto. We are not surprised, therefore, to find that, as soon as he settled in this city, he connected himself with the Hamilton Association and took a very active interest in its welfare, and contributed in no small degree to its success.

He had all the necessary qualifications for this. His versatile scholarship and scientific tastes, combined with his strong natural character and pure sympathy, revealed themselves in the scientific or literary meeting as well as in his pulpit ministrations. He was pre-eminently a man of genial manner, and all his utterances in the meetings of the Association, while marked by logical force, emphasis and fervor, were nevertheless gentle withal.

He was an Honorary Member of the Association, and contributed a paper on "The Natural History of California" after his removal to California in 1890, he having to resign his charge in New York in that year on account of ill-health. The greater portion of the late years of his life has been spent in California, where he died about the end of March this year.

Though so few of the present members of this Association had the pleasure of his friendship, yet we mourn his loss, for it is the breaking of another link, uniting us of the present with the past eminent men who founded and sent down to us our organization with the inspiration of their names and deeds.



THE LATE JOHN ALEXANDER MULLIN, M. D.

Obituary.

John Alexander Mullin, M. D.,

a past Vice-President of the Hamilton Association, died February the 21st, 1899. Dr. Mullin was born June 10th, 1835, in the City of New York, U. S., but his parents, in his early childhood, removed to Upper Canada, and settled on an uncleared farm in the vicinity of Hamilton. His early youth was spent on his father's farm, and after the necessary preparatory training at the common and grammar schools of that day, it was decided that he should study medicine under the well known Dr. Rolph. That decision was carried into effect, and young Mullin, under Dr. Rolph's tuition, graduated in medicine at Victoria University College in 1859, and the next year became a licentiate of the Ontario Medical faculty. After professional hospital experience in New York, he entered on the practice of medicine in Hamilton, where he had a large clientage, and where he died. For nearly thirty years he was an active medical advisor of the Canada Life Assurance Company, a position of trust and responsibility.

In his youth Dr. Mullin imbibed a love for literature, which nothing in after years impaired, but which waxed fresher and more vigorous to the end of life. Assiduously devoted to the exacting duties of his profession, he strove to keep abreast of the biological discoveries of the time, and watched with keenness those modern experiments which have thrown light on the life history of microscopic organisms.

Dr. Mullin was endowed with an acute intellect, and a sincere sympathetic nature which endeared him to a large circle of friends. Tolerant of the opinions of others, he was not indifferent to maintenance of his own convictions, which by tongue and pen he had the faculty to expound and defend with fluency, precision, and grace.

OFFICERS FOR 1899-1900.



President.

T. W. REYNOLDS, M. D.

1st Vice-President.

A. E. WALKER.

2nd Vice-President.

J. M. DICKSON.

Corresponding Secretary.

THOS. MORRIS, Jr.

Recording Secretary.

S. A. MORGAN, B. A., D. PÆD.

Treasurer.

P. L. SCRIVEN.

Curator.

ALEX. GAVILLER.

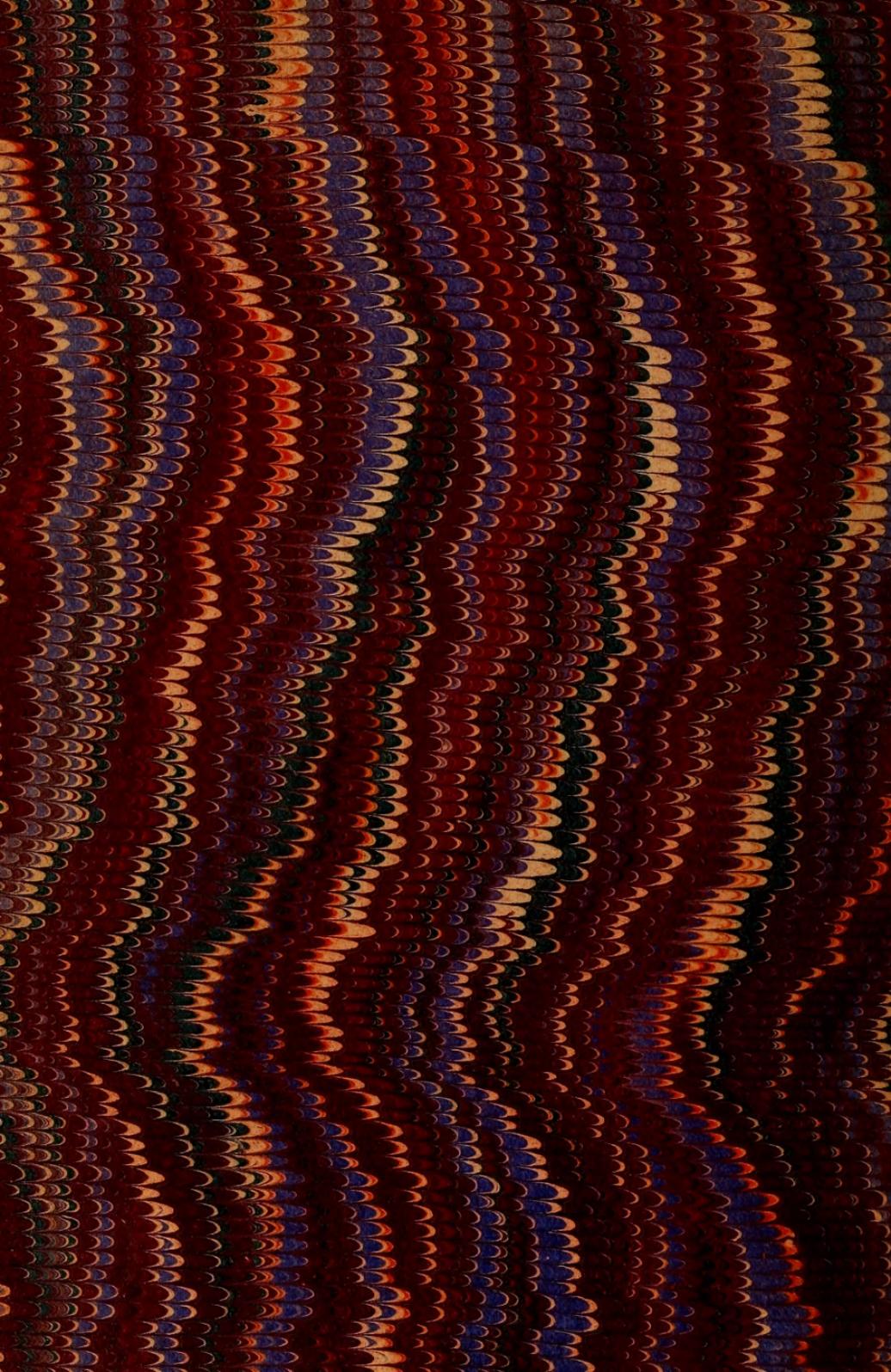
Council.

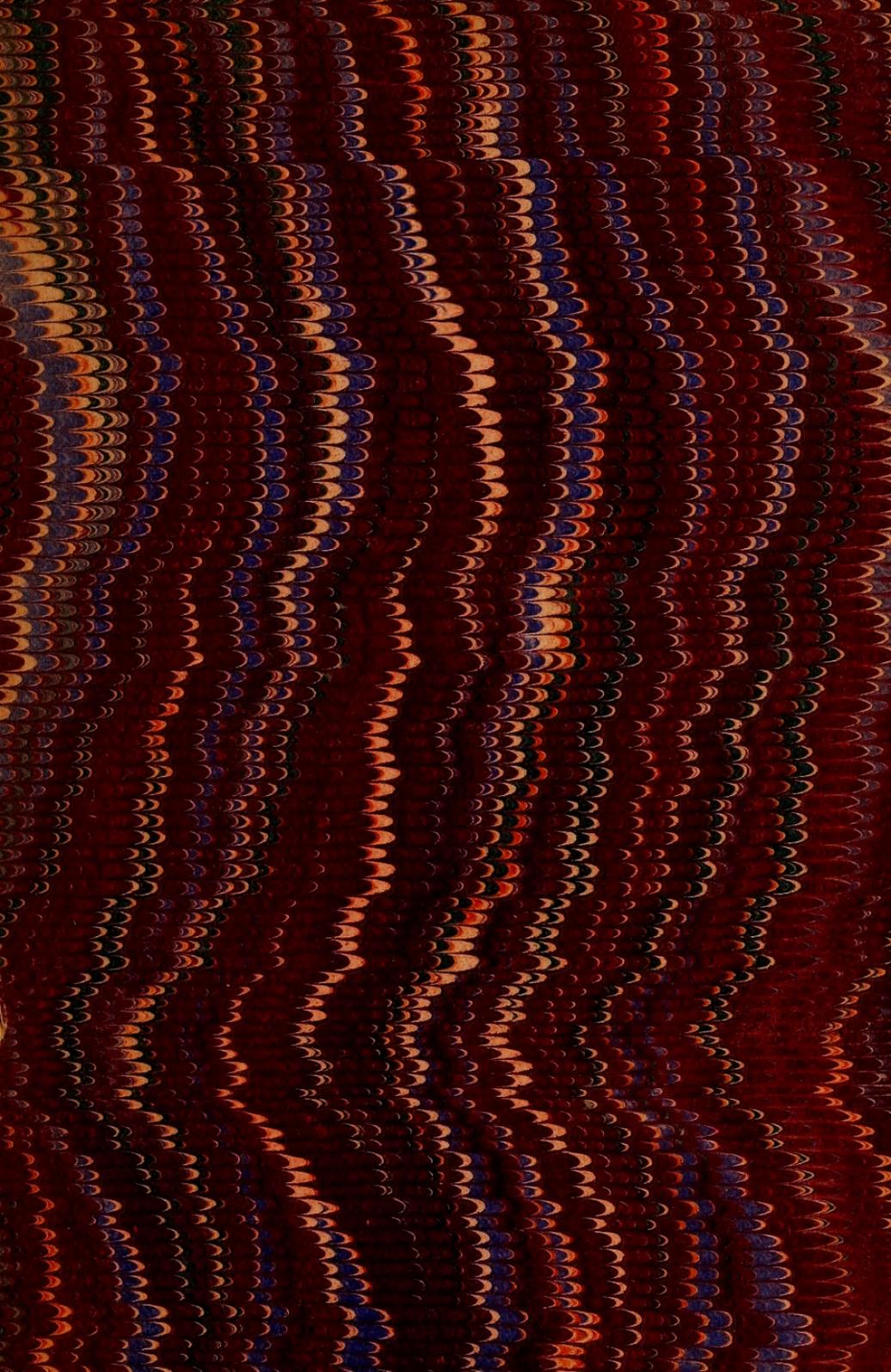
W. H. ELLIOTT, B. A. WM. C. HERRIMAN, M. D.
ROBT. CAMPBELL. W. A. CHILDS, M. A.
W. A. ROBINSON.

Auditors.

H. S. MOORE.

F. HANSEL, D. D. S.





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