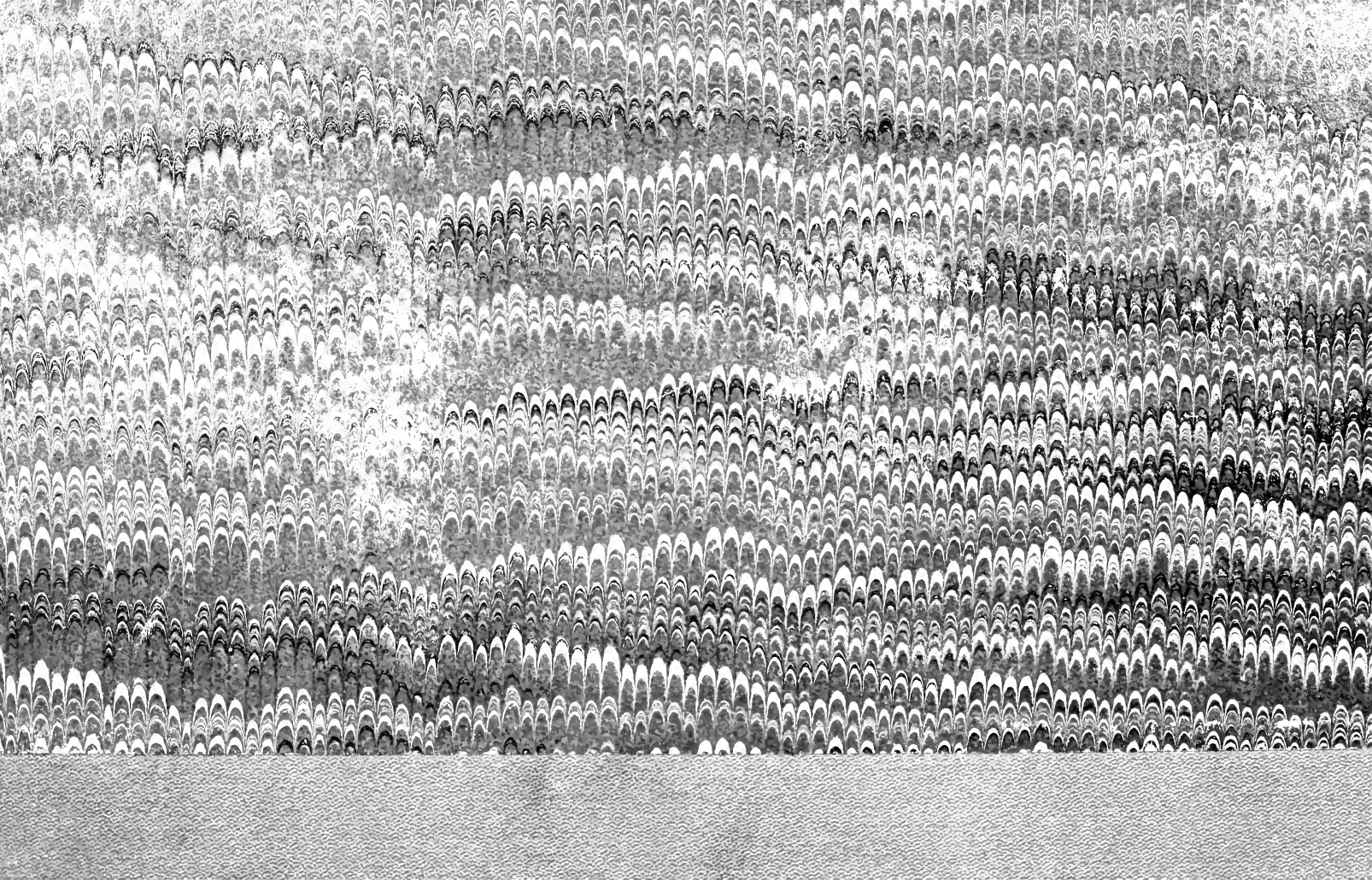

BULLETIN

OF THE

ESSEX INSTITUTE,

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BULLETIN

OF THE

ESSEX INSTITUTE.

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TUESDAY, DEC. 14, 1880.

MEMORIAL TO JONES VERY.

THE memorial meeting to commemorate the life and services to literature of our distinguished townsman, Rev. Jones Very, the poet, was held in the rooms of the Essex Institute this evening. The meeting was called to order by the President, Dr. Henry Wheatland, who said:

This is a special meeting, called at the request of several members. The object was stated in the call.

A visitor to Ship Rock in Peabody, the famous bowlder now owned by the Essex Institute, should he extend his ramble, on some pleasant summer's day, farther along the brook, half a mile or so, to Cedar Pond, he will observe the ruins of an old cellar with stones scattered around covered with vines, a few moss-covered apple trees in the midst of a growth of oaks and pines, the old well now covered with a stone, and the road long discontinued and overgrown with woods and shrubbery, scarcely discernible. Here Bridget Very, at an early period in our history, with her two sons and a daughter settled, and with strong hands and brave hearts cleared the land and made for

themselves a home; and for several generations members of this family cultivated these acres, until a desire for a change or otherwise prompted them to remove elsewhere.

Similar indications may be noticed, in rambles through the woods in this vicinity, of a previous occupancy by some of the old settlers; the depression in the earth, vine-covered rocks scattered around, and a few plants that follow in the footsteps of man, still linger and seem to flourish amidst those indigenous to the soil. The construction of new roads, and the discontinuance of some of the old, probably necessitated this change. It is not our intention this evening to give a sketch of the family,— this has been done, in part at least, by other hands,— but to present to your consideration several communications, verbal and written, commemorative of the life and service to literature of a descendant, who was a fellow-townsman and one whose familiar form we had long been accustomed to see in our streets and at the meetings and gatherings of the Institute; though dead, his works survive and will long keep his memory green.

REMARKS OF MR. ANDREWS.

The PRESIDENT then introduced Mr. William P. Andrews, who spoke of the familiarity of the audience with Mr. Very's personal appearance, recalling the many occasions upon which they had seen him enter the hall in which they then were, and modestly seat himself at the feet of men greatly his inferiors in intellectual and spiritual attainment. A remark of Mr. Charles T. Brooks was alluded to, to the effect that Mr. Very's townsmen had seen him so often they had become perfectly familiar with the *stalk*, but extremely few knew the beauty of the flower. Mr. Andrews expressed the hope that something

of its fragrance might have escaped, as it were, into the paper he then read on the "Life and Spiritual Experience of Jones Very, the Poet."

The status of Salem as an entry port for East India merchandise at the time of Mr. Very's birth, on the 28th of August, A. D., 1813, was briefly referred to, and a tribute paid to the worth and intelligence of her shipmasters.

Some account of "Capt." Jones Very, the poet's father, was then given, and of his mother, Lydia Very, a daughter of "Capt." Very's uncle, Samuel Very, who like his nephew commanded one of the vessels sailing from Salem. Mention was also made of the poet's brother, the Rev. Washington Very, his sisters Miss Frances E. and Lydia L. A. Very; and of the interesting fact that "Capt." Very himself and all the members of his family were fond of verse-making, some of which had shown decided literary talent.

The facts of Mr. Very's early life were then rehearsed; his voyages to Russia and New Orleans with his father when a lad of nine or ten years of age; his father's death, which occurred in December, 1824, and young Jones's provident care of the family. His service as store boy in an auction room was then spoken of; his gravity of demeanor, and his faithfulness to the duties devolving upon him in a distasteful occupation. His intense love of literature was related, and the means by which he obtained the books he needed to fit him for college, in the course of the business in which he was engaged. It was then stated that Mr. Very prepared himself with great rapidity and thoroughness, and entered Harvard College in the last term of the sophomore year, 1834. It was said that Mr. Very was unusually mature at this time, and that his most intimate associations were mainly among the older residents of Cambridge and the instructors, all of whom esteemed him highly. He graduated in 1836, next the

head of his class, and was appointed a tutor in Greek, studying meanwhile at the Divinity school, whence he never formally graduated, owing to ill health, but returned to Salem in 1838. He was, however, duly licensed as a preacher by the Cambridge Association in 1843.

Accounts of persons then studying in Cambridge were given, showing the deep impression of mental and spiritual power which Mr. Very made on all with whom he came in contact; and the great rapidity and fluency with which his noblest sonnets were produced (mostly at this time) were alluded to.

The warm and personal friendship existing between Mr. Very and Mr. Emerson, R. H. Dana, the poet, and other distinguished men, and the exalted opinion they then had of his worth as a man, and of his "extraordinary" merit as a poet, were then shown by copious extracts from letters written about or to Mr. Very by the gentlemen named, including an account of Mr. Emerson's assistance in the preparation of the little volume of "Essays and Poems by Jones Very," published by Little & Brown, at Mr. Emerson's personal solicitation in 1839.

The unique state of great spiritual exaltation under which Mr. Very produced this work was then detailed at length; from accounts given at the time by Rev. Dr. Channing, Mr. Emerson, Rev. Dr. Clarke, Miss Elizabeth P. Peabody, and others, showing that Mr. Very's mental powers were stimulated to great activity, by his belief that he had surrendered his own will to the will of God, and become a passive instrument of the Divine Spirit. That Mr. Very had not lost his reason, as was at the time alleged by persons unacquainted with him, was amply proved from the same sources; all the persons named uniting in pronouncing him profoundly and even exceptionally sane.

His religious convictions were illustrated by frequent

and extended extracts from Mr. Very's own poetry, some of which was also quoted at length, to exhibit his intense and absorbing love of Nature, both for her own sake and as a Divine Interpreter to man.

The prose essays, included in this early volume, were spoken of as having great merit, and as being distinguished by much of the melodious movement which marks the lyric quality of Mr. Very's verse, for which latter, Bryant, Emerson, Dana, and many other excellent judges have predicted an immortality. It was suggested that Mr. Very's writings had lent a spiritual and personal interest to the scenery about Salem, which would prove a worthy complement to the historic and romantic pageantry with which his friend Hawthorne's brilliant imagination had already filled its streets.

A warm tribute to Mr. Very's worth as a man was quoted from a personal letter by Rev. R. C. Waterston, his life-long friend, and the fact of his death at Salem on the 8th of May, A. D., 1880, related.

Mr. Andrews concluded by remarking that though all that was mortal of Jones Very had ceased from life, his work had hardly yet begun its mission. His poetry would long remain a gushing brooklet, bringing cheer and refreshment to many weary lives. His gentle spirit still sheds its benediction upon all who were fortunate enough to know him; an influence that will remain unforgotten, while his favorite the Windflower blooms with a "meek, confiding grace," that fitly typifies his spirit, or his kinsfolk the columbines still nod and beckon from their "craggy hill."

MR. SILSBEE'S REMARKS.

Mr. Edward A. Silsbee, being called upon, spoke substantially as follows:

I intend to speak only as to Mr. Very's literary excellence and place. Single as he was in his own literature, I would be as single in the purpose and end of these remarks, and with some variety of illustration,— to talk about poetry with Mr. Very as text.

The American loves the superlative. Amid endless surroundings, it is easy to see why. His language stretches after a reality which is ever fleeing before him. He lives in the midst of boundlessness and his words labor after its conceptions. By a natural sympathy, limitless vistas, physical and intellectual, slip into the atmosphere of his mind. Words of unbounded meaning alone fit his emotions. The continent swells in his speech. He is the most unfettered creature ever put upon the earth, the last heir of time, he believes the final. If I follow the national bent of sweeping assertion and emphatic statement, I shall only be patriotic and very natural.

Cut off from the past which is poetry, we become imitative. Our intellectual home is England or the old world, stretching back through literature and life to antiquity and the bible. We have none of it. We are raw, we are digging the foundation of a new civilization to correct and abolish the errors of the old. There is no superstructure yet. We have just begun. We are imperfect germs sloughed off to manure the future. Everything is tentative here, inchoate.

Our people are impressible, have an artistic temperament more than the English. They are poetic, romantic, we are not. Nothing in our bare, mercantile life, just scratching the continent, yet makes us so. No associations disturb the dream of the merchant's life. The mind of America is mercantile perforce; how can it be otherwise? There is no variety in class, history or

power. The continent subdues man. Nature is too vast, the temptation too great. Civilization is practical. No race ever had such well-being and opportunity. We have a temperament outrunning our genius yet, but it will come. Our heads, our types, prefigure a bigger man than we are, and a more delicate woman. Genius, delicacy, rareness, we shall have them. The world has not labored in vain and travailed for five thousand years to produce us, to have us a failure. Robustness we must get and fibre. My theory is mixture of stock to give it to us; German mind and Irish temperament, with Anglo-Saxon character as base.

I say to English people the greatest thing they have done is to produce America, and so it is. If the genius in poetry is not transmitted here, the genius in the sister arts seems likely to come. We shall probably be great in art,—architecture, music, painting,—before we are in poetry or prose. Architecture has the greatest future; an immense field is here, endless wealth and enterprise, such as created Athens, Rome, Florence, Venice. The religious impulse is wanting which did the greatest things; civil and humane motives may supply its place. There is a religion of humanity, one side of religion, use and beneficence.

We can wait for literature. It will be the better for the waiting. The American nature is not knit yet, as Burke remarked a hundred years ago, nor the character formed. We are thinned-out English needing enrichment. This is shown in poetry, a sensitive proof; it is not sustained, masculine as the English is, nor is criticism. It stumbles and falls away from the points it reaches. For the fitting America, literature, art, life, we shall have to wait. They could not come now, and better not. We are building slowly, barely laying the founda-

tion, money fiends let loose in a continent. Puritan intensity goes to trade. The American hero is a rich man. Formerly it was "King" Hooper in Marblehead and Derby here. Now it is Vanderbilt and Stewart in New York, and Bonanza kings on the Pacific. They sway the continent and shake the markets of the world. A curious thing it is, the richest men are not Americans — of English stock — Astor, Girard, Vanderbilt, Stewart, Mackay. We are beaten in our own field. The richest man in the world is a Jew. We devote more talent to getting money than any people, but we spend it more freely, and are less mercenary than Europeans. We are generous and live on a scale they don't know. The American is ashamed of economy. He thinks it belittles him. He is barbarous.

The influence of materialism here is great and undue, because it is a new country, as is commonly recognized. There is no tradition, no past, no romance,—that is all in Europe, speaking broadly. It is not worth while to go on sentimentally about this, or to make it too much capital in trade as literary men do sometimes, James for example. Hawthorne took note of it. Emerson has fought it all his life. Irving made much of the old world.

With this enormous weight of material civilization to contend against, we can fly to nature as Very did instinctively. Look at our chequer-board cities and absence of all past. The past is as needful to man as the future. We destroy it as soon as we make it. We have to seek it in Europe, which is to us what Greece was to Rome, the source of the more æsthetic culture and refinement. The past never tempers our lives or appeals to our imaginations. It is the future. Everything is painfully new and does us harm, makes us material. We are carted off and dumped down into every new

state we form. We are incessantly thinned out to fill up the West. The seaboard is a sieve.

The Ohio New Englander is greater than his ancestor, the best type of American, midway east and west. He is more in the mould of Washington. The centre has shifted westward. The only great man New England produced, world-wide man, was Franklin. He had to be hurried out of New England before he was of age. It is impossible to conceive of Franklin having grown up, been bred, and filling out his career in Boston — the most antique man we have had, a pagan as big as Goethe. New England is the indispensable influence, not the basis.

With all our vastness, we are colonial, provincial; crude for that very reason; too widespread to ripen and grow mature on our own ground and by our own figtree. We cannot be at home in three thousand miles of continent and in forty states, each sovereign. It is like loving a parish. There cannot be more than a certain number of brothers and sisters. You cannot fold the human race to your bosom, though the Mormons stretch things in this way I suppose.

The whole American poetry is not equal to one great English poet, and would not be missed if lost to-morrow. Not to speak of Chaucer, Spenser and the whole great roll, we have no Wordsworth, Byron, Shelley, Keats, Scott, Coleridge, Dryden, Gray, Pope, Thompson nor Moore, — not a man to set beside them. Our poetry is in a hopeless minor key, has pleasing notes, no new harmony; has never displayed a new phase of imaginative feeling and an accompanying freshness of form, the poet's own. It is not a great part of literature, hardly a brick to put into the edifice of English poetic literature, we think not one. He is a poet who stands for something distinctively his own and cannot be missed in English lit-

erature. Now Very in his fine way comes as near to this as anybody. It is but a note, a very little note, but it is a note contributed to English literature.

Our poets bear the same relation to universal literature that English art bears to universal art. We need not be startled therefore; all English art is not equal to one old master, in painting or in music. They are absolutely without great genius in music and painting. Why these gifts are given to nations who shall explain? Why the Spaniards alone are like the English for underived genius, —Don Quixote, the ballads, Calderon?

Our poets never strike the note of passion, of fire, except rhetorically, they have enough of that. It is sophomoric. The class books were full of it when I was a boy, and how we tore the passion to tatters and emphasized it! Rhetoric is a stage as natural as measles. The West is grossly afflicted this way. We are saved by comparative old age. The American eagle has a bold flight, but is a vapid bird. How we delighted in this:

> "There's a fierce gray bird with a bending beak,
> And an angry eye, and a startling shriek."

Or in this:

> "At midnight in his guarded tent
> The Turk was dreaming of the hour."

Still better:

> "Aye, tear her tattered ensign down
> Long has it waved on high."

This is rhetorical inspiration, not poetic passion. It is as different from poetic passion as the singing voice from the natural. Natural feeling we have enough of, no race has more or so much. In no race is there such humanity. The American is the sweetest man in the world through the influence of woman, the family relations, which lie at the root of character. The English are brutal, the French

selfish, the German stolid and coarse. We are gentle and refined beyond any European precedent and owe it to republicanism and the sex. This alone makes up for heaps of poetry and art, and what a basis of civilization!

They are never lifted and lost, our poets, never moved to the centre, the passion is never torn out of them as it is in Wordsworth, Cowper, men of calm temperament. They are never wrought upon till the fire flies as sparks from living coal. We have no ode nor elegy, except Emerson's "Threnody" be one, yet if I am right it has not the passion of sentiment. From Chaucer down, the English have been susceptible of exclamations. We have not one, only rhetorical such as I have quoted. This rhetorical stage is natural to a young people with nature at hand to inflate them and stretch their note to bursting.

Our poets survey nature without ecstasy. They have never had the fine frenzy. When one will write a soul-stirring lyric to the bobolink, such as the English poets have written to the skylark, or be touched by one great feature of nature and celebrate it in immortal verse, I will believe in American poetry. The piece coming nearest to English writing in this kind seems to me Bryant's "Water Fowl," which has grace and distinction if not passion. "Wilt thou not visit me" of our own poet has something of the same note.

Our poets make literary capital out of nature, catalogue her. Why they are so barren in emotion, according to Taine's manner of accounting for such phenomena and characteristics, is not far to seek perhaps,—Puritanism and a new land. Civilization is a very complex affair and depends on the past as on the future. Our past is in Europe. We are violently cut off from it. It is our intellectual birthright. Our intellectual home is there. Hence crudity, commonplace here, which is colonial and

natural. We are not allowed to grow old, to mature. We sift into the continent and sag, and drift and settle westward. We are shifty and Arab-like and not attached much to place. The mind itself is just as little at anchor. Too scattered are we to grow old or keep each other in countenance. Fifty million is a thin plaster of population for a continent, one Liverpool and Manchester extending to the Pacific. The wonder is we are as intelligent, refined and civilized as we are. We are digging and planting the continent and putting in the iron nerves of railroads. That is our function. Commonplace in literature suffices, something easily read as you run. We have time for nothing else. Newspapers are our literature, thin pabulum, but better than nothing for busy millions.

Nature is the cathedral of the future and Wordsworth and Very are its prophets. Byron got this note from Wordsworth. Wordsworth is the John the Baptist to some faith to be, which the world is building up. He certainly builded better than he knew. This sentiment for nature is our great refuge from all actuality and every other lack we suffer from. It is the modern education of mankind, and we have it here. It is a new sense which can dispense with the picturesque and romantic. It is forming literature, art, life and creed.

Solitary rapture with nature such as Very felt, fortifies the soul against materialism in this dense commercial air, and is the tonic of every man's life. It is our compensation for history and association. We are swept off into a vortex of activity if we do not cultivate it.

Who would be old here must strain after it. We must be green and promising, and widespread and familiar and superficial, for the benefit of the many. Everything is an average as yet, and better it should be so than stately

colleges and an antique civilization. We are sowing the continent with common schools, which is better than all the efflorescence of civilization impossible in a new land. Our education is one of life, civil, religious, industrial; that of Germany one of books alone.

We have got to find other sources of inspiration than the world has hitherto had. America is a horde of people as like as cotton cloth and about as interesting, and as long as the governing impulse and dominant atmosphere are trade it will be so. We worship mediocrity, live in a heaven of commonplace. Faculty we believe will move mountains, not faith. Smartness is our inspiration.

We have great natural feeling in this country, an unspoilt, spontaneous and youthful nature, trustful; our manners are founded on trust, the English on mistrust, convention. We have every quality of youth, its plastic nature, its buoyancy, its looking forward, its confidence, generosity and vigor. The English on the contrary are mature in every respect of analogy, egotistical where we are vain, a thinner fault; the Chinese of Europe, unchanging, insular. We are superficial, half-trained, achieve everything by an heroic audacity. We have no reverence, bear no intimidation, suffer from no infatuation, are cramped by no superstition in religion, nature or man. The English guard their rank as the Asiatics worship the Mogul. We have outgrown the superstition of rank, that sacred symbol, that social fetter and chain. We have the superstition of rich men instead. Dukes and kings are what Warwick Castle and the Tower of London are to us, picturesque antiquities. Our people crowd to see them, but they take care not to stay in England for the sake of basking in their smile. You cannot mix oil and water, democracy and aristocracy will not fuse in a common mixture or mould. We go to the continent to air our wealth.

Very's sensibility is what makes him; devout sensibility. It has never been excelled, perhaps never equalled. He is as near to God as anybody ever was. Fra Angelico is the only man with a gift of beauty who is like him. Mystics do not always have it. These two men are artists superadded. Puritanism did not admit of art. It chilled the blood. It had a sterner task. Milton struck his roots into Elizabethan soil. Thirty years later he would not have been Milton.

Very is the least indebted, the most underived. When a poet is a poet in grain, as he was, and such winnowed fine grain, we can dispense with the flourishes. One alive to the essence and atmosphere of genius feels it the moment one reads him. One noble man, Whittier, is an instance of purely literary style, diction. Very, not an atom.

His verse is gentle like the pattering of rain, purling of brooks, or chirping of robins,—voices of nature, unconscious, as pure, as sweet. A perfect inner voice in literature, not a thought of effect. His pieces write themselves, are produced through him by the spirit. He would return from this communion and write them,—unique in our literature, secondary and derivative as it is. He is phenomenal, a psychologic study. The transcendental wave which lifted, left him, and he never after came to his own.

A little literary gift is a wonder here and the writer generally has a cheap alliterative name. The country is full of small fry like white bait. We are children tickled with a straw. Talent shines provincially because we are all provincial, the whole country and nothing more so than New England, this little peninsula jutting out into the Atlantic and longing to join the mother country again and be tucked under her apron strings. Older nations know what genius is, we believe smartness is genius, as

the French do taste. The ornament is taken for the temple. Very was the temple, no ornament, its living walls.

The trouble with us as a people is that, like a novice trying his hand at an art, we think too much of the accomplishment. We strain after effect. The English have got beyond this, come through, and are fairly lodged in maturity. Good breeding has got into literature; ornament, emphasis is bad form. Repose is cultivated with knowledge and strength. Science has disciplined the world to the fact, and literature has had to drop some of its airs and vail some of its graces. We want reality having had enough of show.

Picturesqueness vanished with gothic and the middle age, but it remained for us to build a New York and Philadelphia, and call streets 74th St. and 600th St. We shall soon be called 7,000 ourselves and 9906 or a 1,000,007th. At last the American people will live in one hotel stretched from Boston to San Francisco with a bar room underneath. They will be born without legs and move in horse cars.

Coming home one hears buzzed in one's ears forever the rich man of the neighborhood. Once it was Girard and Astor, now Vanderbilt and Stewart. In Germany it was Goethe and Schiller when you went in and when you came out, now Bismark or Moltke. In England, Gladstone, Dizzy, the Queen. In France some distinguished man, statesman or literary. The Englishman lives to be somebody socially, the German to know, the American to get, the Frenchman to enjoy. Nothing will ever correct this rude addiction for a hundred years or more till the continent fills in, settles down. The time will come when it will be a vulgar thing to be rich. It is now, and America is vulgar at this hour in consequence, and mate-

rial through that. What a protest is such a nature as Very's against all this!

Everything is done to order here. Mankind are turned out themselves, million-peopled cities and soldiers' monuments out of hand. Briefness is our eternity and antiquity. We want a short cut to heaven itself. We shall breathe by machinery at last and travel by lightning, no time to think, stock-quotations will be our poetry. The future lies between three people, the Chinaman, Jew and Yankee. I think the Jew will be the last man and that his nose will be projected on Jupiter.

One day some rich man will buy out the Vatican, and the Pyramids, perhaps the Pope himself, and bring them over here, and they will be lost on the way. A woman offered to buy the *Arc de Triomphe* the other day, which if not true is *ben trovato*. We delight in bigness. Our minds are figures and might be set down in a ledger tomorrow. The countenance is commercial, shrewdness ground in, no openness, expression screwed into a cold sharpness, knit, concentrated, eyes like gimlets, a shut thin mouth, strait lips, an air like nails driven into you or files drawn over your nose, money eaten, digested and cropping out, no sensibility permitted or fraternity, still less sentiment, a living on the points of a carding machine, no craving for sympathy, self-sufficing, and yet with this terrible arraignment the best natured and most generous man in the world, too easy natured to be good. Coming from Europe we seem like dried specimens prepared for an herbarium, in summer especially, with dusters on and banged-in hats. The revulsion is painful from the easy European who enjoys life with all his cramped opportunity.

Where our scant population is, there will be another Europe with many capitals and emulation and variety of

type, taste and endeavor. Now it is all trade; what would England have been all Manchester and Liverpool? We need something to temper us. Where is it to come from? It is an embryonic country here in its oldest phase. The humanities will come hereafter. We cannot concentrate. We are always flying off at the handle. We keep green, raw-boned, unformed.

In New England we have what has never been seen in the world before, devout free thinking. The English have come to it through science, the French through scorn, the Germans through metaphysics. The Germans have deepened the thought of the world though their character is not equal to their mind, nor is their literature based on it, but has grown up in a late and sophisticated age out of a literary class. They are intellectually free though politically bound and for that very reason, having no harmoniously developed life, social, commercial, and civic, all classes mixed and coöperating, are prone to the coarsest atheism, or sanctimonious, as in the French war. The French are socially free and equal though religiously bound and now working out of despotism. The English how socially bound!—and we by trade, and in a sense both, religiously. England is a preserve of gentlemen, this the country of mankind. Our greatest production is public characters which are the most straightforward, the best the world has seen, Washington, Franklin, Lincoln, the saviour of democracy. We cannot be diplomatic in this young land. The American is transparent and has taught the world simplicity, cured it of tortuousness, artificiality and stiltedness.

For passion let me quote Wordsworth's lines on "London Bridge," the commonest sight in the world, but memorably impressive. Who but a great poet could have

given voice to the universal sentiment, stamping forever into language what had floated in men's minds from the beginning. Poets are the mouthpieces of mankind, their utterances become the common coin. Shelley has nobly set forth this in the Defence of Poetry, the function of his art to elevate mankind to pedestals from which wider and wider horizons are viewed and glimpses of the end.

Wordsworth, after describing the aspect of the mighty city at this unusual hour, works himself into a high key and is caught up into a tumult of emotion; the words burn under him:

> "Dear God! The very houses seem asleep;
> And all this mighty heart is lying still."

So at Venice a like universal pathos is given voice to in these memorable lines. Venice is at his feet, a past London, a splendid vision midway east and west in the sea, once so great, now in decay. Says the poet:

> "Men are we, and must grieve when even the shade
> Of that which once was great has pass'd away."

Wordsworth is as quotable for high emotions as Pope for sententious point. The one is the poet of the feelings the other of the understanding. Pope to Wordsworth is as varnish to oil painting. But he anticipated modern liberality and emancipation, a catholic in protestant England. He fills no need of the heart, nor does he satisfy any craving of the imagination.

Byron is memorable for passion. In one outburst he writes lines worthy to be inscribed over modern times for comprehensiveness and felicity, having every characteristic of the most consummate art without the consciousness of it, so different from and so superior to Tennyson;

showing too how rhetoric may be married to verse when the man is great enough:

"Come, and compare
Column or idol-dwellings, Goth or Greek,
With Nature's realms of worship, earth or air,
Nor fix on fond abodes to circumscribe thy pray'r."

And again:

"And not a breath crept through the rosy air,
And yet the forest leaves seemed stirred with prayer."

Shelley with his pale fire leads the way like a disembodied soul as he is fleeing through space, fleeting through verse as the wind sighs through Eolian harps, or wanders over the sea engraving it with an emotion like its own, as tremulous, as vast; susceptible like a spirit, possessed with divine fire and frenzy of love; most sensitive, above all writers gifted with sympathetic versification, which is his own; the organ of modern times, its one note of sensibility; meeting nature in her fastnesses, and exploring the human intellect through and through, haunting it. The "Hymn to Intellectual Beauty," Nature has woven it about herself as the worm buries itself in its own cocoon till it is lost from sight. The elements themselves write for Shelley; and every emotion lends its aid, and flying impulse, and craving momentary vein. He is subtle and natural.

No poet has such lyrical fire in our tongue, soul all aflame; he takes hold of us vitally. All young men now in this emancipated era, growing on to meet Shelley, worship him. Who combines intellectuality and sensibility like him, voice as he is of progress, poet forever of enchanting melancholy, poetic tender melancholy, sadness which is holy,—the old poets touch it demurely, coquettishly,—with ravishing grace, delicacy, penetration? Honor to the English race! showing how wide they are,

the race of common sense, the successful race of mankind, from whom you would as soon expect poetry *a priori*, as you would a flower from the cactus, thorny shrub.

He was so near to Nature, he screamed in her ear; she heard him and gave him her pass key, as so many orthodox people think they have it to heaven, they are so intimate with the Almighty; yet so dull is our New England, with all its goodness and propriety, in this respect of sensibility, grace and harmony, he has been called no poet. Of course not to those who have no passion and what comes from it, the burning marl of verse and white heat of inspiration. Arnold, who is an intellectual poet, speaks in like terms of Shelley, who distances them all by his ignis fatuus light which they in vain attempt to follow. Shelley's intensity and passion are illustrated, *passim*:—"Julian and Maddalo," "Epipsychidion," "The Zucca," "Time," "Mazenghi," "Adonais," "Constantia," "Prometheus Unbound,"—especially the passage in Palgrave's "Golden Treasury" entitled, "Hymn to the Spirit of Nature."

In Tennyson, the embroidery covers the design and sticks out. It is stiff with ornament. He fingers the instrument too much, jews-harp poetry, tickling the ear, a dancing master posing for Apollo: dainty at all hazards, cloying, effeminate, tricks, all resources of poetic effect exhausted. It is all plum pudding, "slick and slab," smooth, a besetting verbalness, refrains, alliterations, every artifice, thought and feeling overlaid with clothes and finery of style, a stifling artificiality in which we breathe with difficulty and sigh for fresh air, hothouse style, not a natural note, never a masculine simplicity. The art comes before the matter. In the great realms of English verse, a dandy. What the old conceitists were,

mannered. The style never grows clear. With the finest touches possible, the richest expression and freshest, an intimacy with Nature almost his own, she never gave *him* her pass key. He is always a pretty boy playing with her ringlets, never a full grown man. Such exquisite things as he has done, such jewelry of literature, such honest sentiment, such extensive knowledge, such wide sympathy, such mouthpiece and mirror of the times, never its leader, such snatches and rhymes, such verbal felicity, such graces like a girl, such searching and reach of sentiment, delicacy, color, such an iridescent fancy, feeling for his art, such a figure coming on the top of all time in poetry and knitting its yarn and web and holding the skein to the light, all marred by lack of manliness in style—*le style c'est l'homme*—of fibre, largeness, passion and breadth:—a flute-like note, not a trumpet tone, never a transparency to the God within and never a pure mirror to the universe without. The note was lost with the last great generation, the instrument broken, the edifice cast down, and we are gleaning the ruins, or developing the dispensation and have not exhausted its teaching. Nature will not give us another revelation just now. She is waiting for us to assimilate the last.

The "In Memoriam" is overwrought, no spontaneity, making capital out of its grief, preaching about it, and curiously probing it, mosaic, Cellini work compared to true sculpture, embroidery to painting, no perspective, freshness, subordinating workmanship to growth, process to organism, ingenious, ornate. The "Idylls of the King" are strained, artificial in atmosphere. Byron is a god through large and lifting passion, so are Keats, Shelley, Wordsworth in inspiration if not in form,—all were healthful then; Scott, Coleridge, Campbell, Moore, each in his kind, all divinities and possessed. They were rounded

men. It was a great era and formative. They were pure in art, what the great masters were to later men; Titian, Angelo, Raphael, to the derivative artists who succeeded them. Since the beginning of the century all is aftermath. Genius then leaped from its scabbard, nature was laid bare, a volcanic flame shot from the central heart.

Gray with his Elegy captivated us and with his Bard spoiled us. He was a model. He brought the old world and every tender and poetic association to our door in a rough and colorless time. The inspiration of the Elegy and what makes it memorable in English literature and in all literature are the hour and the scene. Like old Italian painting, Perugino or Lo Spagna, it sanctifies the time. He has made the subject his own and written of it as no other poet has done, with a wealth of sentiment and a beauty of illustration that redeem the last century, barren as it was in sensibility. The Elegy would make it memorable if nothing else were left. Especially does it affect the English race who love nature and are near to her, and our people who must borrow their sentiment for we have created none of our own.

Burke did for the prose what Gray did for the poetry, gave the perfected model, but Dr. Johnson's sesquipedalians took us more. He became the parent of the prolific American rhetoric. Gray came near to us through association with the sweetest rural things, the twilight hour, the old world, which we never saw but read of in books, from the primer to the bible. Johnson with his didacticism struck a responsive chord, and shaped American taste.

Gray has one burst, the only one I know in him. He is the hinge, the pivot, the half-way house, the sign-post between old and new. Deriving through Pope, Dryden,

Cowley, profiting by their ordering of the language, he finished it in verse as Burke did in prose. With him the door was closed for half a century. Burke did not take us. We did not have genius. Gray says:

> "The meanest floweret of the vale
> The simplest note that swells the gale,
> The common sun, the air, the skies,
> To him are opening Paradise."

This ought to apply to every day, and in a rightly constituted mind it does. Nature to a lover is never indifferent, the darkest day or roughest or most slovenly that ever was. One loves one's existence every day of one's life and nature is a part of it. The language has scarcely had a new note since, but has gone on, on the lines he traced. It came to its maturity then, its majority, and a language cannot have two lives. Much more passion and sensibility have been wrought into verse, the changes rung. Gray was cold, formal, limited, cramped by his century; but a classic, a completion, an era, a departure. Shelley prolonged the note, Byron sounded bugle notes, trumpet tones. Coleridge wove subtle harmonies, the finest ear since Milton. Tennyson, Browning, Swinbourne, have wrung something out by screwing, pinching, squeezing and stretching the language; twisting and turning it inside out and upside down. Shelley's was a matchless lyrical fire, kindled on the altar of a soul aflame. Byron is his own "exulting and abounding river." Ruskin has domesticated the coloring of poetry in prose, but he is full of a calculated literary emotion. Carlyle has fired the tongue with epic prose, picturesque intensity. It thinks too much of itself, not of its subject, for a great style. Men came down from their pedestals after the opening generation of the century and were too conscious to be great.

Poets describe themselves in their verse. Milton "builds the lofty rhyme," Wordsworth has "the accomplishment of verse," Byron is "the exulting and abounding river," Shelley pours his verse "in profuse strains of unpremeditated art," "like light dissolved in star showers thrown," and his poetry

> "Round western isles with incense blossoms bright,
> Lingering, suspends the soul in its voluptuous flight."

Shelley has passages of passion in the poems referred to, very memorable in English verse, bringing in more sensitively the soul, the whole being, than any other writer, so that the lines tremble with their own emotion, and the whole ocean sags in the style and ebbs and flows and edges irresistibly, or sweeps with its incommunicable wave; and the verse is as the sands and the snow, moulded by the winds and waves, moulded and wrought. The breeze quivers in the lines. The whole scene is mirrored in his powerful style and penetrating feeling. Language vibrates under his touch as reeds quiver in the wind, or the waves beat the sea. The dense sweep of the verse and liquid note are as if Nature's own hand were on the strings. It is one with nature, she is poured into it as into a mould. This is sympathetic versification and it is greater than imitative harmony. It paints the picture broadly in the feeling not in the eye, subjective, emotional, and who would not have such an eye to see with? He opens a window in the soul from which the world is as created anew.

Emerson's poetry is bare of sentiment, romance, association; too mainly intellectual. There is no "lyrical cry," no sense of continuity and music in it, the careless running line where versification trips off with the soul upon its back, free as the winds,—too serious. Perfect as the Humble Bee is in sympathetic drone and buzz,

and finely imitative as the Snow Storm, a sustained note of style, the form is mostly old English, Marvel and Herrick, and others of the time of surprises and the golden ore of poetry. Emerson has no song in him, no feeling in proportion to thought and acute perceptions. Feeling is the mortar of poetry without which its edifice does not rise. It is the string on which its beads, for religion or beauty, are strung. It is Milton's "passion."

Shelley is the deepest-breathed of modern poets. He empties his nature into his verse. He lends you his soul to see with. His matter is not rich, but his manner and scope are unlimited.

Emerson is a string of brilliances not fused. Too tense, too much strain. We miss the connecting link, the subtle alchemy of emotion, grace, unconsciousness. Coruscation, astonishment suffice not. We wish to be appealed to in the heart, converted not amazed. We are let up into high regions and pure, too rare for verse. Speculation is not poetry.

Emerson is the pithiest writer that ever lived. His works are strewn with thoughts like blackberries. This is the old English way of Bacon and others. He is a graft taken out of England two centuries and a half ago with New England relish added, the best Englishman living because countryman at this hour of Andrew Marvel, Milton, and the like. But he is too intellectual for poetry. New England generally is, and too moral. Everything is crushed into apothegm, pithy, condensed, neat, felicitous. This is not the manner of inspiration, or of a very dry kind; poetry is primarily feeling; all art is, as religion itself. Homer, the father of poetry, is not great for thought, nor Burns. Great art is in simple lines of infinite complexity like nature herself.

Swinbourne has been adding a swing, a verbal note.

Poe was a mechanic, nothing more in poetry, tintinnabulation, and showed our quality which is ingenuity, invention, not imagination. Poe was what Copley was in painting. Walt Whitman seems to have the ore unsmelted, to be a symptom not a fulfilment. He has the largest criticism we have had here it seems. Browning is as rugged as Tennyson is sweet. Foils to each other, they fly apart into extremes. They shine by opposites. Browning is a Velasquez, by all means masculine; Tennyson, Murillo. Both Browning and Emerson, avoiding commonplace, run to the farthest limit of obscurity and terseness.

We are insisting upon literary form while treating of one who was innocent of its attractions, who drew his inspiration from beneath, behind, above and beyond literature, from the spirit itself, far away in the soul where no ambition comes, but only lowliness, humility and seeking.

The following letters were then read by Rev. Geo. H. Hosmer.

JAMAICA PLAIN, MASS., DEC. 10, 1880.

MY DEAR SIR:

I have delayed answering you in hope that I might be able to come to your meeting, but I find it will not be in my power to do so.

I have had a great respect for Mr. Very: first, for his profound and sincere religious convictions, secondly, for his genuine vein of poetry. So much of our religion is more or less outward,—a religion of outward conventions, outward rituals, outward beliefs, outward profession and experience,—that it is an immense help sometimes to meet with a man to whom religion is a central life, which would be the same if there should be no other religious man in the world beside himself. And such was the religion of Jones Very.

His poetry was equally genuine,—original in this best sense, that it originated in his own soul, and was not borrowed nor copied. It was very unequal, as all natural products are apt to be; but I think there are

a few of his poems that will last with those of George Herbert and Henry Vaughan. His poetic vein was a slender rill, but pure, clear, coming from a deep source, and like that of Siloa that flowed

"Fast by the oracle of God."

Very sincerely yours,
JAMES FREEMAN CLARKE.

BOSTON, 71 CHESTER SQ., DEC. 13, 1880.

DEAR SIR:

With sincere thanks to the Essex Institute for their kind invitation to be present at the Memorial Meeting in honor of Jones Very, while I regret that it will be out of my power to be with you on this interesting occasion, I heartily rejoice that you are to pay this merited tribute to a man of such true excellence and exalted genius.

Modest as he was, and shrinking from observation, there might naturally have been many who did not fully appreciate his real worth.

We find that such men as Emerson, Bryant and Dana, recognized him as a truly gifted man of genius, one set apart by Heaven and endowed with the faculty divine, whose soul was kindled with celestial fire, and whose words would have immortality. With each year this conviction has been extended through wider and wider circles. The beauty, the sweetness, the depth of what he has written have been more universally felt.

There was nothing about him meretricious. His words come from the very heart of Nature, breathing her harmonies and partaking of her inmost spirit.

I knew Very intimately during his college life, and while he was at the Divinity School in Cambridge. He was ever one, who, in the language of Milton, "beheld the bright countenance of truth, in the quiet and still air of delightful studies." He was a thorough classical scholar, an able and acceptable teacher, a profound lover of Milton and Shakespeare, a man of individual research and thought, a man of simple manners, pure and delicate tastes, and of noble character.

His fondness for Nature was intense. The stars above and the flowers below were an unfailing delight. They were a sacred companionship; while

"With an eye made quiet by the power
"Of harmony, and the deep power of joy,
"*He saw into the life of things.*"

He so reverenced and loved Nature, that he seemed to become one with her. Her will became his will, and his utterance was her voice.

I knew Jones Very while he wrote the sonnets which have since awakened wide attention. He often came to my room and conversed with me, and I have now a number of these remarkable productions in his handwriting, as they were written. His mind was like a harp string from which the passing wind brings melody. He associated the Divine Mind with all the marvels and mysteries and laws of Nature. So that when her loveliness, her harmonies touched and inspired him, to him it was the breath of Heaven and the inspiration of God. His belief was with Emerson.

"As there is no screen or ceiling between our heads and the infinite heavens, so is there no bar or wall in the soul where man, the effect, ceases, and God, the cause, begins. The walls are taken away. We lie open on one side to the deeps of spiritual nature, to all the attributes of God."

He accepted the great truth of the Scripture in respect to the Divine Mind, that "in Him we move and live, and have our being."

He held with Channing, that "the man of genius, if a devout man, thanks God for the influxes of mental illumination, as peculiar communications of His intellectual energy, and prays that he may be more and more open for the reception of these heavenly gifts."

Jones Very, when I best knew him, lived habitually on a high level of spiritual life. He had entered what Bunyan describes as the country of Beulah whose air is very sweet and pleasant.

He seemed to dwell within sight of the Celestial City, on the very borders of Heaven, in that land where the shining ones commonly walk. Can we wonder that he felt that God was with him?

With this feeling Jones Very wrote. With devout mind he communed with the Infinite One, and from the Supreme Intelligence he felt that there came to him an influx of a higher thought and life.

His faith was the faith of Milton, who declares that he sought what he should write "*by devout prayer to that Eternal Spirit, who can enrich with all utterance and knowledge, and send out his seraphim with the hallowed fire of his altar, to touch and purify the lips of whom he pleases.*"

But I fear I may be saying too much, though I know you will only make use of that which you feel to be best adapted to your purpose.

Knowing that you have able minds to add interest and value to this occasion, I feel sure that you will make it memorable.

With the highest regard,

Very truly yours,

R. C. WATERSTON.

MEMBERS OF THE ESSEX INSTITUTE, FRIENDS AND FELLOW-TOWNSMEN:

I am very sorry that I cannot be with you in person; if I had been, I should have tried to say to you what I am now saying from this paper.

I can only hope that this expression of my feeling of love, gratitude and veneration, even though I contribute nothing new towards a proper and full estimate of the man, his life, his spirit and his writings, will in some way help to make more vivid the general reflection of his peculiar personality, even as every, the least, drop of the dew or of the ocean goes to intensify the glow of the sun's imaged light.

Of Jones Very's boyhood and school-days I have no special reminiscences. I recall only his quiet and dignified demeanor, his slender figure, a kind of emblem of uprightness, his sweet smile, and in general the respect and esteem with which he inspired his companions. I remember how he looked far better than what he said. During my college life, I began to see the initials J. V. affixed to pieces of poetry in our Salem papers, such as the lines to my old favorite "The Columbine," and particularly was I impressed with his majestic hymn at the dedication of our new stone church on Essex street. Meanwhile those wonderful sonnets of his had begun to make their appearance, than which it seemed to me and does still, that nothing finer in that department (or at least in this special portion of it) had been done by any writer in our language, and which seemed to me to place Very as a sonneteer up by the side of Wordsworth, Keats, Blanco White, Elizabeth Browning, and Shakespeare.

About this time (I am now speaking of the very last part of my Cambridge life when I was a Divinity student, and Very was an undergraduate), I used to hear of the peculiar friendship Professor Channing had for him, and of the long and earnest discussions they had about Shakespeare, and particularly Hamlet, as darkly revealing Shakespeare's personality, which Jones was then trying so hard to express, and of which he has embodied his idea in one of the essays of the little volume of prose and verse that came out under the supervision of some admiring friends in 1839.

After this time, having taken up my abode as preacher in another state, I used to meet Very only rarely, not always once in a year, when I visited my native place, but when I met him, the first thing that impressed me was always that peculiar sweet smile which I remembered of old. Now and then I enjoyed a walk with him, which, by his leading, would always be to the pastures. Of his conversation at such times, what I remember the most prominently, is the way in which he would stop, after expressing some thought about nature, man or God, that he seemed to fear might appear commonplace from

its simplicity, and then turning round and fixing upon you an earnest look, as if he would show by his piercing glance that there was a depth in his thought concealed from superficial minds by its very transparency. There was something in his manner at such times that I find quite indescribable, but it was very impressive. If I should walk these fields to-day (as I often do in spirit), I should always feel that he was walking by my side, and testing unconsciously my sense of the depth of meaning hidden under our familiar phrases, by his extraordinary manner of pressing homely truths upon the attention.

Speaking of these walks in the pastures, leads me, by a natural transition which will presently appear, to say a word of our friend as a preacher. I think I never heard him but once, and that it was, if I remember rightly, at the East Church. As I recall his face and manner in the pulpit and the drift of his discourse, I am strongly reminded of the look and natural religion of Greenwood; and the beautiful photograph of Very which lies before me, so singularly expressive of saintly simplicity and unselfish translucency to the soul of goodness, brings Greenwood still more strikingly to my remembrance. And I recall the description given of his ideal preacher in the "Task" beginning, "I would describe him simple, grave, sincere."

But the fact I was going simply to recall was, that among all the numerous sermons I have heard from my boyhood in Salem, that was the only one in which I ever heard any reference to the beauty and glory of our old town pastures, upon which Jones dwelt with great enthusiasm.

As preacher, however, I suppose he never would have brought himself by his manner sufficiently *en rapport* with the mass of hearers.

Not that he was wanting in geniality. He had a fondness at once for flowers — those children of Nature — and for children — those flowers of Humanity.

And in closing this imperfect paper, I may apply to our beloved friend, as true in the spirit with regard to him, the beautiful lines of the German poet Uhland, on the "*Death of a Country Pastor.*"

> "If to departed spirits Heaven e'er grants
> Leave to revisit these their earthly haunts,
> Not in the moony night wilt thou return,
> When only sorrow wakes to weep and yearn;
> No! when a summer morning greets the view,
> When not a cloud-speck stains the expanse of blue,
> When high the golden harvest rears its head,
> All intertwined with flowers of blue and red,—
> Then wilt thou through the fields walk as erewhile,
> And greet the reapers with a pleasant smile."

CHARLES T. BROOKS.

NEWPORT, DEC. 11, 1880.

BOSTON, 25 BRIMMER ST., DEC. 14, 1880.

MY DEAR SIR:

I reluctantly find myself unable to attend the meeting of the Essex Institute this evening, which is to be devoted to a commemoration of Jones Very. There would have been a special pleasure in sharing in the tribute of respect and honor which all of us his fellow-townspeople owe to the memory of one who has signally illustrated the honorable name of old Salem by his pure fame, and whose character is so perfectly mirrored in his exquisite verse. My own earliest recollections of Mr. Very go back to the years closely following the publication of that early volume of "Poems and Essays" which still stands alone among the choice flowers of American genius; and the poet then seemed, as he always continued, to be one from another world, a pure spirit, veiled from intimate human converse by his intent communion with higher thoughts, yet descending therefrom to put aside the veil of shy reserve for some word or look, which revealed the inner nature of the man himself. There was always the same courtesy of a soul rarely gentle and refined, whether as I first remember him, he was showing some kindness to a child, or in later years in his greeting of a younger brother in the profession which he dearly loved; and one always felt that in seeing him we entertained an angel, hardly unawares.

His fame as a poet is secure; the highest point of spiritual feeling and expression has been reached in his most perfect poems; and he will not be forgotten among those singers of Christian mysticism, who form a class apart and go down through the generations with singing-robes of white and with the light of Divine Contemplation in their eyes.

Such a genius as his and that of Hawthorne would seem to show that out of the Puritan ancestry and the conditions of our old town, the rarest and most delicate blooms of sentiment and spiritual life may spring. I have sometimes thought in meeting Mr. Very in search of the earliest flowers of our rocky pastures, that his own spirit and writings might fitly be compared to the blossoms he was seeking, springing up like the columbine or the houstonia, which nestle close to our gray ledges, with an ethereal beauty more vivid by contrast, and seeming as much akin to the serene sky which bends over them as they do to the earth out of which they spring.

I should have been particularly interested in listening to Mr. Andrews' study of Mr. Very's genius, and am confident that that and the whole commemoration will worthily manifest the true and deep feeling in which the man and his poetry are enshrined, in all who know them. What President Walker said of another rarely refined

and sensitive spirit may be applied to Mr. Very and to what he wrote: "He was as pure as a mountain spring."

With regard,

Very truly yours,

HENRY W. FOOTE.

MILTON, MASS., DEC. 13, 1880.

MY DEAR SIR:

I thank you for letting me know about the Jones Very Memorial Meeting to-morrow. No fear but he will live, whether we talk about him or not.

Every spring will bring its fresh memorials, as the robin comes back to whistle the note so dear to his ear, and the columbine still holds the words of blessing which he dropped into its radiant cup.

How can we doubt that some of his sonnets will be more valued two hundred years hence, than they are to-day?

Nor will the traditions of his visible presence among you soon vanish. Amid all the competitions and strifes, the vain tossings and envyings which were vexing the multitude around him, he calmly walked on from year to year, like an impersonation of "the still, small voice."

It is easy to believe that he has now found a sphere more delicately attuned to his sensitive, loving, and devout nature. Even in this world, his conscientiousness and his vivid sympathies sometimes overmastered his inherent reserve.

Forty-four years ago, as our Greek tutor in Cambridge, this shy student was the ideal instructor. When others were entrenching themselves behind the dignities of their office, or, trying to forget in their comfortable homes, the irksome routine of their work, this man was singling out among the freshmen those with whom he might take long walks, whom he could visit at their rooms, and who would call upon him. The class was so small that it was not hard for him, gradually, to get acquainted with us all.

He was none the less a Grecian, for being a child-like Christian. In the spirit of his Divine Master, he gave himself to his pupils.

The best evidence that what he said and did was not in vain is the hearty, loving testimony which our surviving classmates, forty years later, as they met together in the hilarity of a class supper, rendered to his memory. He came in among us then, invisibly, and, like the gentle breathings of an Æolian harp, his pleadings in behalf of purity and uprightness seemed to make themselves heard again, as one after another attested his individual sense of obligation to Jones Very.

Had you been there to listen you would have said: What benefactor can compare with him, who touches the springs of character?

What new avenues of service for a spirit like his must now be opening!

But I forbear longer to encroach upon your time, although the theme is so beguiling, and remain,

My dear sir,
Most truly yours,
WILL. ORNE WHITE.

TRENTON, NEW YORK, DEC. 13, 1880.

MY DEAR SIR:

I read in the Christian Register of last week, that it is proposed to hold a meeting of the Essex Institute to-morrow evening, to commemorate the life and literary services of Jones Very. Though I have no claim to be ranked among the "distinguished gentlemen," who are expected to be presented by letter or in person, I cannot refrain from coming, even uninvited, to lay my slight tribute, by letter, at the disposal of those who have charge of this meeting. Different voices, if sincere, may add something to the interest of the occasion.

I esteem it a very great privilege to have known such a man as Jones Very. I am proud of being his townsman; and it is one of my great regrets that I did not know him more. And yet perhaps I should rather say, that I regret not to have *seen* him more — not to have been oftener in his spiritual atmosphere. For he was to me a perpetual lesson of *unworldliness*, and this world seemed to exist for him only as the prelude and interpreter of a better world. He was continually (though all unconsciously) preaching to me, how little one really needs of those things which are summed up in the phrase "modern civilization." In the anchoret's cell — still more, in the lonely forest or seaside, — he would have found enough to feed his spirit. He was truly the "voice of one crying in the wilderness." The very opposite of the nineteenth century, he was here to show that man does not live by bread alone. A special lover of *sonnets* as I am, Milton's and Wordsworth's alone can in my judgment be put in the same rank with his; and even theirs do not lift me into so high a sphere as his. He writes to me, like one who never borrowed, or needed to borrow; but who "spake as the spirit gave him utterance." I pretend to no power of literary criticism — I can only say what he was, and is, to me. Another evidence has been given us of the life which is Eternal. He must be strangely made, who can think of such a personality as having become extinct, because invisible. To doubt immortality in his case would be justified only by Atheism. But I try in vain to satisfy myself with any estimate of his literary or spiritual excellence.

He is beyond my measurement. I can only say I loved him, and honored him, and esteem it one of the bright anticipations of the coming Life, that I shall meet him again.

Very truly yours,

WM. SILSBEE.

CHRIST CHURCH RECTORY,
RIVERDALE, NEW YORK CITY, DEC. 9, 1880.

MY DEAR SIR:

The papers from Salem inform me, that a Meeting of the Essex Institute is to be held on Tuesday evening next, commemorative of the life and the service to literature of your late townsman, the Rev. Jones Very.

I wish that upon an occasion, alike honoring the memory of that gentle yet strong soul and the Institute itself, I could be with you. To have known Jones Very, as I knew him, not alone while a resident of the old City by the Sea, but long years before, I count a benediction.

Your notice of the meeting, in its terms, furnishes a text,— not for a sermon,— but for more than either my opportunity or my ability would dictate in the way of loving remembrance, no less than of real appreciation "of the life" of Jones Very and "of his service to literature." The terms of the notice are most happy. In *his* instance there was *a life*. They who knew him best, knew also, *what* and *how good* it was. There was also "*a service.*" Some of Jones Very's sonnets are worthy of a place in the highest classification of that form of poetry. I do not say that he should have lived away from Salem. I think he loved old "Naumkeag" with a child's love; but had he been transplanted, I am not sure that the "Lake Country" of Wordsworth and Southey might not have been as fitting a home and framework for his musings and "poetic outcome," as for the bards who have immortalized the region and themselves.

I can never forget Jones Very. I have walked with him and talked with him; been instructed by his word and realized in his gentleness, purity, and yet manly strength, much that is most exemplary and might well be coveted, without violence to the commandments. His lines, on one of the Psalms, paraphrasing the words "When will Thou come to me," are worthy of any poet.

Believe me in great haste,

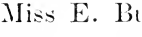
Sincerely yours,

GEO. D. WILDES.

Also letters were received from Ralph W. Emerson, Andrew P. Peabody, D. D., Edwin M. Stone, and Col. T. W. Higginson, expressing their interest in the subject of the meeting, and the high estimation in which the writers held Mr. Very, both as a man and a poet of unusual excellence.

MONDAY, JANUARY 3, 1881.

A social gathering of the members and their families was held this evening. The rooms were opened at 7.30 P. M. Various illustrated volumes from the art and the centennial departments were placed on tables in different parts of the hall for examination. Dr. George A. Perkins, in one of the alcoves, had his microscope, and exhibited many fine and well-prepared specimens. Appropriate remarks were made by Prof. E. S. Morse, Vice President D. B. Hagar, and Rev. De Witt S. Clark of the Tabernacle Church, interspersed with vocal music under the direction of Mr. John C. Chadwick; the persons taking part were Miss E. Buffington Kehew (soprano), Mrs. C. R. Washburn (contralto), Messrs. Murdock Macpherson (tenor), Fred M. Cate (baritone), John C. Chadwick (bass), and Mr. Charles A. Clark (pianist). The music was good and very enjoyable. After a simple repast at 9 P. M., and an hour spent in social conversation, the company gradually withdrew.



TUESDAY, JANUARY 11, 1881.

A winter field meeting was held this day at Chebacco Ponds. A new departure was made by this meeting, the first probably of the kind in this country.

The day was all that could be desired, the weather mild, the sleighing excellent. The party left Plummer Hall, Salem, in two large boat sleighs driven by veteran whips. A genuine old fashioned New England sleigh ride was enjoyed, and on entering the woods in Essex, there were some fine touches of winter landscape. Shortly after midday the party arrived at the Chebacco House, the place of meeting. The botanists rambled about the borders of the ponds (which were thickly frozen), and collected specimens of various woody plants and branches of trees and shrubs, showing buds, shoots, etc., for examination at the afternoon session which was held in the large hall, soon after partaking of an excellent dinner which was served at one o'clock.

Vice President F. W. Putnam, in the absence of the President, called the meeting to order with a few remarks on the general character of winter life and the great interest that its study has for those who investigate the many ways in which life, during our cold winter, in its many forms, is protected and continued. He gave a few illustrations from the lower animals, particularly of the humble bees. He then stated that a field meeting in winter was a novel thing, and he believed this was the first one that has been held in this country; and as the Essex Institute was ever in the advance in all such movements, he was glad that the conception of such a meeting, by the members of the Institute, had resulted in this gathering. Without detaining the members with further general remarks, he said, he should now call on Prof. E. S. Morse to address the meeting on such subjects as the occasion suggested.

Prof. Morse first alluded to the method of protection

of the eggs of the cankerworm and other insects in winter; and then taking the snow and ice as his special subject, he gave an account of the formation of glaciers, the moraines and glacial currents, and the great results of the glacial action on the surface of New England. The movements of the glaciers were accurately described, trending from north to south, as showing the immense distances over which bodies taken up in the glacial drift are carried.

In closing, Prof. Morse alluded to the existence of man during the glacial period, and the important discovery made by Dr. C. C. Abbott of Trenton, N. J., of stone implements in the gravel at Trenton.

In response to the call of the chairman, Dr. C. C. Abbott, who was present by invitation, gave a brief notice of the discovery of the chipped-stone implements in the gravel, and the condition under which they were found.

He said this was his first field meeting, and it was evident that a winter field meeting could be carried on as successfully as a summer one, and he was very glad to be present.

The chairman alluded to the very recent discovery at Wakefield, Mass., of chipped-stone implements of the same character as those found in the Trenton gravel, and of the great probability of their discovery, in place in the gravel, and called upon the members of the Institute to look with care at every cut through a gravel hill, with the anticipation of making the important discovery of a palæolithic implement.

He then called upon Mr. John Robinson of Salem, the botanist of the Institute.

Mr. John Robinson exhibited a number of twigs of trees of various kinds, showing the condition of the buds during winter. After a few special remarks on the specimens collected during the morning, he read the following paper on

OUR TREES IN WINTER.

The winter condition of our deciduous trees is for them a matter of necessity. They are bare and rigid at this season of the year from force of circumstances, and not because it would be impossible for them to be otherwise, were they placed under different influences.

There was a period, previous to the last glacial epoch, in the geologic history of our earth, when what is now the perpetually frozen north was covered by a luxuriant vegetation, and the present temperate region of North America, including our own New England, possessed a sub-tropical flora. Then the winter was not the cold, snowy season we are all familiar with, but there was at most, only a season of rest for the trees and herbs which covered this portion of the earth.

Countless ages of time changed that old geological climate, by slowly freezing out, at the north, the forest of the former period. As the cold wave continued its course southward, the plants of the northern region were forced before it, far beyond the limits of the present temperate flora, but they were permitted to return as the cold wave receded, and to re-occupy the positions in which we find them about us to-day. It would be impossible that, throughout all these great changes, any plant could be so constructed as to conform itself to them without becoming greatly changed in character itself.

Plants are in this respect unlike animals; they cannot move out of the way of unfavorable influences; hence,

they must vary, and individually adapt themselves to the changes of climate and surroundings, or perish.

For numberless generations, plants have been slowly adapting themselves to their appropriate places. Natural selection and the survival of the fittest forms, for the positions they are to occupy, have placed on the earth's surface, the exact species in the exact positions best suited for their development. In different climates and in different situations, the particular variety too, of the species that can best sustain the local conditions to which it must be subjected, is found.

This is illustrated very clearly by some of our own forest trees. One of the most widely distributed of North American Coniferæ, and one little changed in appearance, is the Red Cedar. This tree is found as far north as latitude 50°, and south to the Gulf of Mexico. It extends also from the Atlantic to the Pacific in some portions of our continent. At its northern limit it is only a shrub; on our own sterile hills, it becomes a rugged tree and is of no little economic value for many purposes; while in the warmer climate of Florida, the same species is confined to the swamps, and from it is obtained the clear, soft wood, used the world over in the manufacture of the best lead pencils.

Many of the trees, familiar in our woods, become towards the Arctic circle mere shrubs, as, for example, the Birches, the June-berry, and the Spruce. Others of our native flora, which here in New England are but shrubs, under more favorable influences in a warmer climate, become forest trees. Among such are the Chinquapin Oak and the Magnolia.

Among the trees having naturally a rather extended distribution, and one of recent introduction into New England, is the Douglas Spruce. This tree is a native of

western North America. It is common from British Columbia to Mexico, extending east into the Rocky mountains of Colorado, whence it has been introduced here.

Each of these trees and shrubs, of which we have been speaking, is known to be of the same species over the whole area of its distribution, even in widely different climates. Yet, gradually, in each and every climate, a different constitution has been developed in the particular individuals of each species which are there found. This has been proved by practical experiments.

Children inherit the characteristics of their parents, and even the seeds of trees carry with them and perpetuate the constitutions, delicate or strong, that the region, in which they were produced, developed in the parent plants.

The climate of the Pacific states is wholly unlike that of New England, being, on account of the influence of the "black current" of the Pacific ocean, more like that of western Europe. The climate of the Colorado region, in which the Douglas Spruce grows, is not essentially different from our own eastern climate. The seeds of the Douglas Spruce, from this Rocky mountain region, produce trees which are as hardy here in New England, as the Cedars on our hillsides; while plants raised from the seeds of the same tree, growing in the milder, moister climate of the Pacific states, fail entirely to adapt themselves to our New England climate, as do all the trees with hardly an exception, from the region west of the Rocky mountains.[1]

The temperature of the New England states is so variable, and the extremes of midsummer and midwinter are of such wide range, that plants must make some special

[1] This has been previously presented in a paper by the writer, read at the meeting of the Mass. State Board of Agriculture, held in Southboro, Dec., 1880.

provision for these changes. This they do in several ways. The herbaceous plants retire below the surface of the ground, and maintain life in their roots which are filled with nutriment ready for a rapid growth in spring; or, they store up a similar starchy material in bulbs or in tubers. These three classes of herbaceous plants are represented respectively by the Golden Rods, the Lilies, and the Ground Nut.

In summer too, our ponds are in many cases partly filled with a floating or half submerged vegetation. In winter they are bare on the surface, and the water is clear often to a great depth; all the vegetation having sunk to the bottom, there to contribute to the rich ooze which forms the floor of most of our ponds for the protection of the thick roots, winter buds and seeds, which are rapidly to fill the ponds with vegetation as the next summer advances. All these plants are protected from sudden changes of temperature by being below the surface of the earth, and they are often farther provided with a mantle of snow.

The woody plants, however, cannot avail themselves of this privilege. They cannot retire beneath the surface to reappear in spring. They must find other ways to withstand the cold. They must hibernate within their own coverings.

As this present flora was slowly distributed and crept from point to point as the ice receded, in the last great geological change, only such trees could maintain a foothold, as were well provided against extremes of temperature. By the continual weeding out of weaker individuals, and the strengthening of stronger, we have left to-day the grand result of this work of nature through the countless years that these plants have been adapting themselves to our particular climate.

In protecting themselves against the cold of winter, all trees have not followed blindly the same rule; they have not imitated a leader in fashionable winter clothing, but each species for itself has quietly gone to work to select the best method at hand to provide itself against the cold, and has increased or decreased such protection as circumstances required.

We have trees capable of shedding their foliage at the approach of winter, as do the Maples and Ashes. We have trees capable of retaining their foliage for several years, as do the Pines and Spruces. We have trees producing flower buds in the fall, ready to open at the first trace of warm spring sunshine, before leaf action is required to perfect them, as the Birches and Alders. We have trees producing flowers so late, that the leaf action is absolutely necessary to develop these flowers, as the Catalpa and Tulip tree. We have trees which, during the autumn, protect the next year's half-formed leaves by surrounding them with thick scales, as in the Hickory; and often still more securely, by covering over the outer scales with a coat of varnish, as in the Horse Chestnut. In contrast to these, are trees whose winter buds are bare, the outer leaves or bracts being unprotected by any covering, as in the Garden Lilac. This is very noticeable in the flower buds of *Cornus florida*, where the showy white of the so-called flower is formed by the rapidly growing bud scales, which all winter have been fully exposed to the cold, while protecting the true flower buds which they enclosed. These latter forms of buds are so largely filled with solid matter, and so devoid of water, that they are incapable of being injured by cold while in the winter state.

How often, during the winter we hear the question asked,— Does the sap in plants freeze? This subject has been before the public for a long time, but it is chiefly

discussed from the horticultural rather than from a strictly scientific point of view. It is a subject which even the most eminent botanist finds difficult to explain in a simple and satisfactory manner.

We often hear the woodman settle this question of freezing or not freezing, by asserting that when the trees are cut in winter the chips fly off frozen solid. A writer in a horticultural journal, not long since, sought to prove that the sap in trees became frozen in winter, by stating that the Lime trees on Boston Common froze until the trunk cracked open sufficiently to permit the insertion of his hand to a considerable depth into the trunks of several of these trees. This habit of opening upon the side of the trunk, during extremely cold weather, is common among Lime trees and some other species. Neither of these illustrations, however, proves that the sap freezes.

An examination of thin slices of any plant, under the microscope, shows it to be composed entirely of cells; the woody tissue of trees and their bark being formed by the union of cells into tubes which are densely packed together.

The only portion of the trunk of the tree, which may be considered as living, is that thin layer of cells, less in many cases perhaps than one millimetre in thickness, which lies between the bark and the older wood of the tree. In the botanies this is called the cambium layer. It is chiefly through this layer of cells, that the juices of the tree are to be passed and repassed, which process we call the flow of the sap. Among the cells of this layer are formed the new cells, which are added either to the outer layer of wood, and form the circle of growth for the year, or to the inner surface of the bark, forcing apart its older outer surface, which by the continued pressure becomes broken and rifted as the tree grows.

If the living cells of plants froze, as we accept the term, they would burst in the manner a bottle of water bursts when frozen; but the process of freezing in plants is conducted upon a different plan.

The water before it freezes is discharged from the cells, and the crystals of ice are formed not in the cells, but outside of them, often however, tearing the tissues of the plant. This happens to nearly every annual or herbaceous plant. To-day, the great Castor-oil Beans and Cannas of our gardens are a magnificent mass of living foliage. A night frost comes, and to-morrow their leaves hang limp and lifeless. This is because the cells of which they are composed were all, or nearly all, living cells and gorged with water.

In freezing, the cells of the tissues of the plants were suddenly deprived of the water they contained, and the cells were killed either by the continued cold, or in case of a thaw, by being unable to reabsorb, with sufficient rapidity, the water of which they were deprived by the cold.

How is it, then, that the living cells of the trees are enabled to withstand cold very much more severe than that which kills the annuals of our gardens and fields?

If we cut across the trunk of any of our forest trees, we notice numerous rings, which, if counted, tell accurately the age of the tree. Favorable and unfavorable seasons may be detected by the width of these rings. In tropical countries, the rings of growth are less distinct, and in some trees quite imperceptible. This is because, in our climate, the tree, as winter approaches, prepares itself by filling the living cells with mucilaginous matter, and by withdrawing from them the water, so that these cells do not freeze, as we use the word.

In making this preparation for winter, the wood cells

formed late in the year become smaller and more densely packed together, forming quite a contrast to the coarser cell structure of summer growth. It is these lines of close-grained wood cells that enable us so easily to count the years of the life of the tree, and their absence in trees grown in tropical countries, that makes it difficult to determine their age.

As the cold becomes intense, the quantity of water in the cells diminishes. Driven from the cells, it may perhaps be frozen in crystals in some portions of the tree, or even find its way toward the heart wood. In either case, being deprived of the water, the wood contracts, and the tree breaks open as the Lime trees do on Boston Common, the crack being widest of course where the greatest contraction takes place, namely, in the newer sap wood on the outside next the bark. Or in trees having close-grained wood, the trunk may not crack open, but if the tree is cut, frozen chips will show the presence of water. That the old wood of trees contains water in large quantities, and that it may remain in seemingly dry wood for years, every one familiar with an old fashioned open wood fire well knows.

It is the absence of water in the living cells that renders the twigs of trees so brittle in winter, and the reverse condition which makes them so pliant in summer. We cannot, therefore, say strictly that the sap in plants freezes. Authorities seem agreed upon this, and also that the greater the cold the denser the solid contents of the cells left after the water has been driven out; hence, their increased ability to withstand the cold.

The greatest danger to frozen plants arises from the liability of a sudden thaw. If the thaw is gradual, the water is slowly absorbed back again into the cells which gave it up, but if the thaw is very sudden, the cells of

the plant are overtasked, and failing to absorb the water rapidly enough, are killed. This may be illustrated by the common Pelargoniums, or the Rose Geraniums, which, if thawed slowly, may be completely restored to life after being frozen quite hard; but if thawed rapidly, they are killed by the process.

The buds and young branches of our trees will also, in their dry winter state, withstand the most intense cold; but exposed to even a slight frost, after they are filled with sap in spring and growth has commenced, they are at once killed.

Our New England trees are divided into two very distinct classes: the evergreen and deciduous, divisions which are very nearly natural ones. The evergreens are nearly all Conifers, the exceptions being the Laurel, and some shrubs in the Heath family, one or two Hollies, and a few others, not conspicuous trees. The deciduous trees are nearly all Exogens, the exceptions being among the introduced species, and one shrubby, or vine-like Smilax. The leaves on the Pines and Spruces often remain on the tree three or four years, and are generally shed as the tree begins to grow in the summer. These leaves are needle-like, and very thick in proportion to their width. They become so dense in structure when fully grown, that they are capable of containing but little water, although when first formed in the spring, they are often very succulent. Our New England Conifers are, by many persons, considered very sombre in appearance, but if not too thickly distributed, they certainly add a variety to our winter landscape. Their absence would be a decided loss; and in the morning after a quiet fall of damp snow, as the sun shines over them, their beauty makes one almost forgive fate for having placed him in this half-arctic New England climate.

If the Conifers survive the winter uninjured, with their leaves *on*, it is because these leaves are almost destitute of water, so very thick, and at the same time offer so little resistance to the winds.

The Laurels and Andromedas, although their leaves are broader, follow the example of the Conifers as far as possible, and being low shrubs, they are protected by the high trees, among which they often grow.

Few, however, among our woody plants, are Conifers, or evergreens of other sorts. They are mostly trees or shrubs, having in summer broad leaves, and belong to the great class previously mentioned, the Exogens, among which are all of our hard wood trees.

But the majority of our Exogens cannot conveniently have, in summer, a broad expanse of leaves, and then contract or solidify this great leaf surface at once for winter. Thick leaves are too expensive to make for one season's use only. Then too, with such a sail set to the wintry blast, as would be presented by almost every tree, hardly one would pass through the winter without sustaining serious damage; but tattered and torn, they would be sorry objects to greet the opening of spring. These trees, therefore, must furnish themselves with a clothing of cheap leaves, which they can afford to cast off at the end of the season, to be replaced in the spring by a new suit, quickly made for immediate use.

The exploded idea, that the highly colored leaves of our New England woods in autumn are the work of early frosts, still lingers in the minds of some, reluctant to give up the old tradition. That an early frost is an injury to them, there is no doubt.

It arrests the life of the leaf prematurely. It prevents the leaf from performing its last offices in a satisfactory manner. It even may prevent the little bud that is being

formed for the next season's work from attaining perfection. It prevents the scar which is left from being perfectly healed over; and, finally, it prevents the leaf from becoming brightly colored, but instead, the frost withers it at once.

The leaf, left to finish up its work, commences at the proper time as the season advances, to deposit at the base of the leaf stem, a corky layer, which separates the leaf from the ducts or tubes, which had previously connected it with the living cells of the branches and trunk of the tree, and thence with the roots. It is now that the autumn sun ripens the materials deposited in the leaves, and produces the beautiful tints which are the charm of our New England autumn, and for which we are indebted entirely to our own native trees; those of foreign introduction, being mostly but brown or dull-colored objects at the season, when our native species are clothed in their gorgeous raiment.

As previously indicated, under different influences, the same species of trees may not always present the two phases, leafy and leafless, with which we are familiar. An evolution has undoubtedly gone on in previous time, and is still proceeding, by which evergreen trees have become deciduous. There are some trees and shrubs which possess an evergreen foliage in their natural habitat, or rather in the region where they attain their greatest perfection, but which in a colder climate become deciduous. This is the case with the Willow Oak (*Quercus Phellos*) which at the south retains its foliage until the new growth has commenced, while at Philadelphia it is regularly deciduous in autumn. There are Honeysuckles of the same habit under similar influences. Darwin speaks of the Turkish Oak (*Quercus cerris*), which by its varieties may be arranged as evergreen, sub-evergreen, and de-

ciduous. The *Magnolia glauca* is deciduous at Gloucester, but retains its leaves throughout the winter at the south. The Apple is an evergreen tree at Madeira, and the Rhododendrons, of which the hardier varieties are grown in New England, although they do not lose all their leaves annually, they persist only three or four years at the most, while in England and at the south, they often remain upon the plant seven or eight years. This is certainly suggestive that the great preponderance of deciduous trees in our climate is not the work of mere chance, but is the result of ages of slow adaptation to the unavoidable influences which surrounded their ancestors.

To one not familiar with our native trees, to recognize them in winter seems a difficult task. The wood-cutter best knows them at this season of the year, and his knowledge is chiefly derived from the appearance of the trunk of the tree, or of the wood after it has been cut.

There are many persons who have an excellent knowledge of our herbaceous wild flowers, who are absolutely ignorant of the different trees, except to distinguish, perhaps, between such strikingly different families, as Oaks and Maples, or Elms and Ashes. The Hickories and Walnuts are always confused, and many botanists are astonished when they discover, that there are fourteen distinct Willows common to our own neighborhood.

Notwithstanding the supposed difficulty of determining the different trees in summer, it is not difficult to distinguish them even in winter. A glance at the tree is often sufficient, and in some families, a few twigs, bearing the leaf-buds, will be enough to separate the species. Of course, this is not always possible, but it will answer in a majority of cases.

Winter is the only season that the system of tree-branching may be studied, and this of itself might well occupy the hour given to this paper. We might compare the angular forking of the Sassafras, with the graceful curves of the Birch. We might compare the drooping younger branches of the Elm, with the older limbs of the same tree, and wonder how any of them became erect. We might compare the upright branches of the Ash, with the spreading branches of the Chestnut, or the irregularities of the Hickory branches. We might enter into endless study to learn how and why all this branch variation came about.

Then too, in winter, we can see why it is that Spruces are spiriform, while the deciduous trees are spreading, for we can see that the continuance and more rapid growth of the terminal bud of the Spruce must produce a conical tree, while the evident early loss of the terminal bud, or its entire absence, in the other trees, shows that they must be spreading in their growth.

From the æsthetic point of view, it is surprising that so few people appreciate the beauty of the leafless trees in their winter state.

Many of them possess a grace and beauty which is wholly lost in summer when they are densely clothed with leaves, or when hidden by their neighbors.

One of our own townsmen, Mr. Very, whose rambles in the country around Salem, brought him face to face with Nature whom he loved, and whose every work he appreciated, in a sonnet to "The Tree," says :—

"I love thee when thy swelling buds appear
And one by one their tender leaves unfold,
As if they knew that warmer suns were near,
Nor longer sought to hide from winter's cold;
And when with darker growth thy leaves are seen
To veil from view the early robin's nest,

I love to lie beneath thy waving screen
With limbs by summer's heat and toil opprest:
And when the autumn winds have stript thee bare,
And round thee lies the smooth untrodden snow,
When nought is thine that made thee once so fair,
I love to watch thy shadowy form below,
And through thy leafless arms to look above
On stars that brighter beam when most we need their love."

The season of rest for the trees, however, is not of very long duration; but as the winter wanes, and the spring sun rises higher and higher, the trees reflect his influence, and long before the herbs and grasses show signs of life, or the leaves can dare appear, the trees become gorged with their juices, and to the ends of their topmost branches are visibly full of life. Few objects are at this time more conspicuous, than the golden twigs of the white Willow, or the less brilliant, but larger branches of the Poplars, which with the Birches, soon hang out their tassel-like catkins. The more humble dark-stemmed Alders follow their example. The Pines shake out their brushes, which have been rigidly drawn together to avoid the cold winds. The Pussy-willow makes bold to show its yellow anthers, for it has all winter pushed out farther and farther, as a warm day permitted, the silky white heads of its catkins. A Dandelion or two blooms in the pastures, the Arbutus and Hepatica are found hiding beneath protecting leaves. In a word, spring has come, and so it is from the time of the falling of the leaves in autumn to their reappearance in summer, we find that there is much to learn about trees in winter.

After appropriate remarks from Dr. Abbott and the Rev. E. S. Atwood the meeting adjourned, to enable the party to botanize in the woods before their return to the city.

Monday, January 17, 1881.

At the Regular meeting this evening

Mr. Charles E. Endicott, of Boston, read a very interesting paper upon China. He began by speaking of the religions and government of China. The rationalistic philosophy of Confucius, while exerting immense influence over the nation, has failed to satisfy the innate yearnings for supernatural refuge and assistance. Consequently Tauism and Buddhism have been resorted to, though the doctrines of these sects have really no great hold on the mass of the nation. The Buddhists are the most popular of religious sects and their temples are scattered over the empire. The peculiar beliefs of both Tauists and Buddhists were given in some detail.

The Emperor, called the "solitary man," is the source of all authority and patronage. Notwithstanding his autocracy, he deems it best to have a board of advisers, in the form of two councils, termed the Cabinet and the General Council. A full account of the different subsidiary councils and the form of government was then given. After which the speaker said that science — natural, physical or mathematical — could hardly be said to exist in China. Astronomy is understood to a very limited extent, and is merely valued astrologically. There is an entire ignorance of the globe, either as regards its shape or dimensions, or the situation of foreign countries. The knowledge of mathematics is extremely limited, and is mostly studied for mercantile purposes. Chemistry and metallurgy are unknown as sciences, and the knowledge of anatomy is most crude.

In speaking of education, he said: The hope of holding official position is the chief incentive to literary attainment among the Chinese, and education consists

principally in a proficiency in the knowledge of moral philosophy. Children are placed at school at the early age of six years. Great care is taken to select a teacher of virtuous habits, which are considered as necessary as that he should be learned. An account of the examination for degrees was given.

The Industrial Arts, Fine Arts, Architecture, Army, Agriculture, Gardening, were all touched upon, and some of these treated at length. Opium smoking he thought far less general in China than is usually supposed,— the expensiveness of the drug restricting the prevalence of the custom. And though the habit obtains to a considerable extent, the results therefrom are not so pernicious and wide spreading, as is the use of intoxicating liquors in other countries.

A sketch of the life and philosophy of Confucius was given. He said the Chinese have been as faithful followers of Confucius, as Christians have been of Christ, but the absence of a vitalizing inspiration has so circumscribed the influence of the sage that the whole nation has become fossilized. There can be no doubt, had Christianity in its infancy been properly introduced into China, the natives of that country would have shown themselves as faithful in the observance of the duties inculcated by the new dispensation, as any in Christendom.

In conclusion he said, that during his long sojourn among the Chinese, he became convinced that they were entirely misunderstood by the Western world. Their respect for intelligence, as far as they are in a position to appreciate it, is quite equal to our own. Their commercial honesty is practically better than that which exists generally in Europe or America. Their industry and frugality are of the highest types. The only obstacle which retards their progress is a deathlike conservatism

which surrounds them, but when the time arrives, which is fast approaching, they will accept the teaching of a more advanced thought; a field of enterprise will then be opened in that country, which, for stupendous results, will far eclipse the most sanguine imagination of the ancients concerning the riches existing in "Far Cathay."

MONDAY, FEBRUARY 7, 1881.

MEETING this evening. The PRESIDENT in the chair. Records read. Donations and correspondence announced.

MR. JAMES F. ALMY gave an interesting sketch of his travels in Europe during the summer of 1880, with brief allusions to and observations upon the principal places visited. The following is an outline of his remarks.

Our countrymen voyaging to Europe, mingling with the awe inspired by the majesty of the ocean, speedily realize that there is a mistake in their former estimate of American nationality. We step from the pier at New York into the care of another nation. We feed the world, we supply its industries, but we have no steamships. The great ocean teaches many lessons to mind and soul which cannot be written, of the majesty and power of Him "who holdeth the waters in his hand." We sailed by the "Anchor Line" to Glasgow, touching at Moville on the Irish coast. The Giant's Causeway was passed in full view. The passengers were landed at Greenock, and proceeded by rail to Glasgow. The lack of dispatch in moving baggage, and a liquor saloon in the railroad station were noted.

Glasgow is a metropolis of monuments, fine public and private buildings, a thriving city, but also abounding in drunkenness and poverty. It was here that we met the

conductor or courier of our party. The courier is a prime convenience if not a necessity for European travel, caring for baggage, hotels, routes of travel, porters' fees, etc., etc., and especially fertile of expedients in emergencies. Our party had occasion to appreciate the services of our conductor in arranging for comfortable railway carriages for a night ride from Edinboro to Kenilworth.

The English Country Inn is a thing of precious memory to us. An inimitable breakfast, served by mine host at the inn close by the ruins of Kenilworth, was thoroughly enjoyed. A carriage ride from Kenilworth to Stratford, *via* Warwick, afforded the desired opportunity of viewing the country scenery in England.

The English lake region charms you, but most essentially through the spirit of poesy with which the bards have enthralled it. London, the great city, ancient, historic, beneficent, spangled with parks, no description of it can be given in this epitome.

We went to Holland across the North sea. Rotterdam, the Hague with Scheveningen beyond the dyke, Haarlem, and the concert at the old cathedral, Amsterdam, and the picture galleries in all these cities, the quaint dress of the people, their amphibiousness, the cattle, the windmills and dampness, are homogeneous. Passing from Holland to Germany, the latter's military spirit appears at once. The flagmen stationed at the road-crossings present arms with their flags in scabbards. Characteristics no less marked attract attention in all the nations. Cologne, in Germany, has finished her beautiful cathedral after six hundred years. I do not wonder that a simple and unlearned people are devoted to the Roman Catholic faith with its wonderful cathedrals,

"Where lights like glories fall.

The Rhine reminds one of the Hudson, minus the an-

cient towns and ruined castles. Its yellow waters would run red, if all the blood which has been shed for the control of the river was mingled with them. Weisbaden, Frankfort, Heidelberg, and Baden-Baden were visited. Most of the field work is done by women in this country.

Basel was our gateway into Switzerland, a city distinctly Swiss, but rich and prosperous, having trade with the contiguous French and German provinces. Switzerland is an inspiration; this remarkable land in the heart of the vintage world, reaching towards heaven with more than four hundred snow-clad spires,—their awful majesty, have taught the Swiss people to love their land better than any other, and liberty better than life.

Lucerne sits by her lake of the cross, reclining beneath Pilatus and the Rhigi; beyond the Brunig Pass are Interlaken, Berne, and Freiburg, the two latter quaint and strange with ancient landmarks. Lausanne and Geneva are by the bright waters of Leman, and so is the castle of Chillon with its dungeons of rock. Chamouni and Mt. Blanc are all pictured in delightful memories.

Paris merits the name of the wonderful city, but our space denies description.

The contrast between our native land and the old world lies in the value each has set upon the individual man and woman. Class distinctions across the sea have created impassable barriers. On one side the few are exalted and deified. On the other are degradation and low esteem for man and woman.

In our beloved land, the value of man and woman is set at the great price of our liberties. The priceless estimate has inspired our progress, and under God, shall, ere long, give us the leadership of the world.

Edward J. Mason, of Marblehead, was elected a resident member.

BULLETIN

OF THE

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MONDAY, MARCH 7, 1881.

MEETING this evening. The PRESIDENT in the chair. Records read. Donations and correspondence announced.

Charles R. Wood and Lavinia D. McKeen, both of Salem, were elected resident members.

Henry F. Waters, of Salem, was elected a member of the Publication Committee, in place of James Kimball deceased.

AMOS NOYES, of Newburyport, read a paper on

"THE FRENCH REPUBLIC."

IN language and in race, the French were nearer the Americans than any people in Europe, except the English. Equality was the passionate longing of the French, and they esteemed it more than liberty, in this sentiment differing from the English who put liberty first. This was exhibited in the property laws. The French legislated so as to promote the diffusion of property, and to this end restricted the power to make wills, more narrowly than we did. France in the treatment of

religious belief (although Catholic) was much more liberal than Germany. The causes of the greater resemblance of people of the United States to France and England, than to Germany, were stated to be in closer proximity, more frequent intermarriages, comparative immunity from the full inundation of Eastern immigration. Lutheranism had always been intolerant, and by reason of the military power of Germany was now more dangerous to religious liberty than papacy. Although France was deficient in primary education, as compared with Germany, this had not prevented her from showing superior results in science, invention, production, wealth and literature. Her previous experience in political experiments had better fitted her to make a successful trial of republicanism than any country of Europe. In this connection the constitutional history of France for one hundred years was partially sketched. The previous failures were not to be wondered at, and the excesses of the French Revolution of 1789 could be ascribed to the long continued despotism under which they had suffered prior to that time. Yet in these excesses there was a striving after scientific government, except where overcome by mob violence. They had made war even on duodecimals, and had endeavored to apply the decimal system to the measurement of time, of quantity, and of weight. Napoleon I had infamously attempted to destroy all the progress that had been made toward modern notions of liberty and economy. He had endeavored to restore the ancient régime, and though starting as a democrat, had constantly tried to bring on a reaction in favor of despotism. Restoring a state church and the court ceremonial, he had finally wound up his career in a catastrophe, viz., the Russian campaign, so frightful, that it had cancelled the glory of his most brilliant exploits.

Napoleon III had been for a time brilliant and successful, but finally dimmed at Sedan all the prestige that remained, and the death of his son had removed the apprehensions of another usurpation from that dynasty. The French had failed generally from want of those checks and divisions of functions in government, which history has shown were indispensable. A single house of legislature, consisting of 750 members, had been their cause of failure. It was tumultuous, unwieldy in size, and a prey to factions. To illustrate the faults of such a constitution, the instances of Spain, Switzerland, Rome and the French Assembly were cited; and, on the other hand, the stability which was gained by the duplex system was illustrated by the city governments of England and America, the state constitutions, and the Federal system. There were three reasons why, independent of experience, we were warranted in expecting better results from the duplex system.

1. Because two houses differ in constituency and the principle of representation, thus affording greater scope for talent.

2. Two houses gave publicity to legislature, and thus furnished a check to bribery and fraud.

3. They prevented hasty legislation.

There was in France special necessity to guard against impulsiveness. The audacity, violence, and impetuosity of French orators and statesmen were then described, and attributed in part to a dramatic and histrionic character which expressed more than it felt. France had learned by experience to establish two houses of legislation, and since the establishment of the senate had shown great patience and conservatism.

There were still those who, notwithstanding the promising prospect for the republic, were faithless. These

persons brought up Napoleon, the menacing attitude of Germany, the consequent necessity of maintaining a large standing army, the vast centralization of power at Paris, and the immense patronage that must be intrusted to the executive. Bonapartism seemed dead beyond power of resurrection. The army could be reduced when Bismark and Moltke died. The methods of these men were short-sighted efforts to introduce a Lycurgean system, and to foster masculinity. With a reduction of the army a diffusion of patronage could take place in France and the administration be decentralized. Others objected that the illiterateness of France was so great as to render a representative government inexpedient. But our ancestors in ante-revolutionary times were more illiterate, and yet their government was wise and prudent. France needed a strong government it was said, and this was true ; but it did not mean a despotic or an imperial, or a military government. Despotism was weak financially, and could not indulge in philanthropy or education. The weakest governments to-day were Turkey, Russia and Germany. Any month might bring tidings of revolt and insurrection, in the first two of revolution. Great Britain's government, by reason of the prevalence of aristocratic and monarchical influences prior to 1832, had been unable to prevent secession, and was so hostile to the people as to have provoked many insurrections in the island, which defied for weeks the whole power of the government, and caused much weak and pernicious legislation. Although Great Britain and Spain had lost their colonies, and the government managed so poorly as to fail to obtain support by reason of the aristocratic bias which controlled every measure, France with republican energy was able to put down revolt in La Vendee ; Switzerland held in allegiance seven cantons which were bent on secession in 1832 and

1846, and the United States was able to subjugate a rebellion which covered half its territory and embraced one-third of its people. In short, republics were stronger than aristocracies or imperialism in dealing with rebellion, in obtaining revenue, in enforcing taxation, and in giving security to property and virtue.

These objections met, it yet remained as an objection, alleged that France was hopelessly given over to the vagaries of socialism and communism. There was little or no socialism in France, though in Germany and Russia socialists were numerous. Socialism and communism were irreconcilable enemies. Though they were often ignorantly confounded, socialism would annihilate private property and prevent competition. This would be fatal to progress, and could only be done by forming associations. Communists recognized competition and the right of private property, but believed that government should do all things which could be best done by it, and had the right to burden property by many taxations. Literally rendered, extreme communism was township government carried into all kinds of administration of business. In effect, perhaps, extremes in communism and socialism would meet, if ubiquitous; for the tremendous taxations necessary to the full realization of the philanthropic and sentimental objects of extreme communists would as effectually destroy private property as its direct inhibition. But while in republics socialism becomes extinct, communism becomes modified and takes charge of politics. Communists desired sidewalks, lighted streets, mail facilities, public schools and baths, colleges supported by public expense, and more authority in local governments. The most communistic countries in the world were the northern tier of states of America. The communistic spirit

had taken deep root in our law. Towns and states did more and more business every year. Such things as were now commonly furnished, viz., free libraries, free baths, free reading rooms, would be regarded in England as grossly communistic, if supported by taxation, although now looked upon as usual here. This bugbear of communism was, in fact, the practice more or less of all countries above semi-barbarism. In republics controlled by the common sense of the people, these principles were synonymous with republicanism, and had not gone too far. There was great need of the localizing principle with which communism started in France. As matters now stood, the national administration at Paris determined courses of study and selected teachers for towns distant from Paris.

In the exercise of the suffrage, the French system resembled England more than America. Their executive did not have fixed tenures; even the President, though chosen for a term, deemed it necessary to resign, when the assembly and senate were both against him.

The probability of the success of republicanism arose out of the present tendencies of the age, enumerated as the relative increase of personal property; the instability this imparted to inherited position and vested interest; the educating influence of railroads and inventions; the increasing interchange of ideas. These influences tended to obscure national lines, and render possible a United States of western Europe. There was a growing similarity of law and custom, and a mingling of business interests which favored this. The government of Great Britain was in reality an aristocratic republic. Her example was a warning to all. Everything done there cost two to three times as much as it did in republics. Salaries paid to the principal officers were disproportionate,

and the island was infested with sinecure offices. Republics were more economical, more humane, and more just. And the example of France and America was a painful contrast and cogent argument against the aristocratic and monarchical governments of Great Britain, Germany and Austria. It was true there were some seeming failures. New York city was called a failure, but New York city is in reality an imperialism. Not democracy, not republicanism were on trial, but bureaucracy and one man government. The Mayor was an emperor in disguise. There should be at least three hundred councilmen to prevent fraud, and there should be sixty aldermen, and these should really be the legislature of New York.

There was an essential difference between the American and English or European idea of government. The English regarded government as a kind of pageantry. America regarded it as a business.

The introduction of minority representation, as practised in Illinois, was hoped in France. It was an ideal system of perfect representation, and was essential in order to get perfect justice done. If there were 240 members to the house of representatives, and 100,000 democrats and 200,000 republicans, minority representation by the cumulative system and triple districts, would give democrats 80, and republicans 160 of these representatives. The French would be successful, and would even show improvements in reference to voting and deliberative assemblies which would be of value in this country. Republicanism, struggling amid military monarchies, was indeed in perilous straits, but had the sympathy of the oppressed subjects of feudalism.

Monday, March 21, 1881.

Meeting this evening. The President in the chair. Records read. Donations and correspondence announced.

Mrs. Eliza Stevens Low and Miss Elizabeth B. Perkins, both of Salem, were elected resident members.

Mr. J. P. Cowles, of Ipswich, gave an informal talk on China. His special subject was "In and about Pekin." Some fifty-five lantern pictures were thrown upon the screen by Mr. George L. Newcomb, exhibiting to the audience the usual appearance and daily scenes of that city, the streets, buildings, people, carriages, sedan chairs, temples, tombs, idols, etc., each picture being briefly and clearly explained by the speaker, whose long residence in and close observation of that country and its people, well qualified him for this duty. Some of the characters of the Chinese language were shown and described. Mr. Cowles' manner in conducting the exercises of the evening was very happy; the eliciting of replies from some of the audience, especially of the younger portion, to appropriate questions, led to suggestions and trains of remarks that added much to the interest and instruction of the evening's talk.

Monday, April 4, 1881.

Meeting this evening. The President in the chair. Records read. Donations and correspondence announced.

William Amasa Keese, of Salem, was elected a resident member.

Rev. George Frederick Wright read a communication entitled,

THE GLACIAL PHENOMENA OF NORTH AMERICA AND THEIR RELATION TO THE QUESTION OF MAN'S ANTIQUITY IN THE VALLEY OF THE DELAWARE.

(ABSTRACT.)

The speaker remarked that since it was his privilege to present to this Society in Dec., 1875, his first paper on the gravel deposits of Eastern Massachusetts, he was glad to appear again before them to report progress and show to what the subject has led the way.

Upon this map [referring to a map 15×15 ft. which the speaker had prepared], the extent of the glaciated region in North America is exhibited, and several of its most important features delineated. The boundary line of extreme glaciation passes through Long Island, across New Jersey to Belvidere, through northern Pennsylvania, there bends south through southern Ohio, Indiana, and Illinois. On crossing the Mississippi, it sweeps northwestward to the upper waters of the Missouri.

The whole region above this line is covered, at least in areas, with till — a compact clay, bearing pebbles and boulders which are occasionally scratched. Above this line, also, the rocks show in favorable situations the smoothed and striated surfaces peculiar to glaciated regions.

On passing south from this line, the superficial deposits change, the rocks are not striated, but show solely the effect of disintegrating influences acting from the surface.

As you see by the arrows, which mark the observed direction of the striæ, the ice-sheet radiated from the highlands south of Hudson Bay, moving along the lines of

least resistance. Near the Atlantic coast the movement tended to be at right angles to the shore, and in the valley of the Mississippi the movement converged somewhat towards the axis of the valley. For a time, however, there was a movement up the valley of the St. Lawrence, and parallel with the axis of Lake Erie.

Upon this map of New England (10×10 ft.) is shown the system of gravel ridges, or "kames," explored since I described Indian Ridge in 1875. These investigations have been carried on chiefly by Mr. Warren Upham of the New Hampshire Geological Survey, Prof. George H. Stone of Kent's Hill, Maine, and myself. It appears that in passing from New Brunswick to the Connecticut river, parallel to the shore, forty or more series of gravel ridges are crossed. The direction of these conforms closely to that of the glacial striæ, and they are in the main parallel with one another. While following in general the direction of the valleys, they sometimes cross them and pass over moderate elevations. The kames frequently begin near the mountains at a height of 1000 or 2000 feet above the sea, and are continuous for 100 or more miles to the coast. The material often varies somewhat abruptly in the same series, changing from sand to coarse pebbles a foot or more in diameter, while frequently larger boulders are embedded. Usually the sand and gravel are in a reticulated belt of ridges from twenty to one hundred feet high, standing at as sharp an angle as the material will allow. But frequently the ridges give place for a time to extensive plains of sand and gravel; and near the shore they usually end in such plains. These lines of gravel deposit are also marked by numerous "kettle holes," of which the dungeons near Marblehead are a good example.

The most probable theory concerning the formation of

kames is that they mark the course of the floods which must have characterized the last stages of the glacial period (the Champlain Epoch). When but a few hundred feet of the ice was left, the earthy material which had been held in the whole mass must have rested in places in a thick deposit upon the lower stratum of ice, and must have been brought into lines of special depth through previous action of superficial currents of water. At this time the remaining ice frequently obstructed the natural outlets to the floods, so that they were to a considerable extent independent of the present river channels, though not of the larger valleys. The final result was, that when the various ice barriers were removed and the water sought its present lines of outflow, these previous gravel deposits of the glacial rivers were left undisturbed, except where the changed course of the water-flow led across their path and eroded them. In places, doubtless, the earthy material had been deposited in ice channels; in which case a ridge would be formed when the sides melted away. In other places vast masses of ice would have been so covered with sand and gravel that the melting would be greatly delayed. In such cases the earthy material would settle down in a very irregular manner, forming the characteristic reticulated ridges and the frequent kettle holes where the material had slid off on every side and left an enclosed mass of ice to melt away gradually.

Soon after beginning to investigate the kames, my attention was directed by Mr. Clarence King to a terminal moraine on Cape Cod and the Elizabeth Islands. His communication to me was published in my paper before the Proceedings of the Boston Society of Natural History, for Dec., 1876. Upon hearing of this Mr. Upham at once visited the locality, and found that a terminal mo-

raine forms the backbone of Cape Cod, of the Elizabeth Islands, and of Long Island. Professors Cook and Smock, about the same time, traced its course across New Jersey. Somewhat earlier, Professors Whittlesey, Winchell, Chamberlain, and Irving had identified it in the "kettle range" of Wisconsin.

This moraine is a line of hills from 100 to 300 feet high running at right angles to the direction of the ice flow and of the kames, is composed of both stratified and unstratified material, contains scratched pebbles, and usually has angular boulders of great size upon its surface. Kettle holes are likewise abundant along its course and frequently of great size.

During the past two years, Mr. Upham has traced a similar line of hills in a loop, following down the lake region in Minnesota to Minneapolis, thence to the vicinity of Des Moines in Iowa. There it bends to the north-west, crossing the Minnesota line near the south-west corner of the state and continuing as the Coteau des Prairies in Dakota. The upper part of the Minnesota river is midway between the eastern and the western line of this loop. The distance from one side to another is about seventy miles.

It is evident from a glance at this map that during the closing part of the glacial period all the drainage which now empties into Hudson Bay poured down through Lake Traverse and the Minnesota river into the Mississippi. This is also proved directly by the size of the Minnesota valley and the extent of the gravel deposits on either side of it. At the same time, the waters of the St. Lawrence were obstructed by the ice to the north, and poured mainly into the Mississippi through two south-western outlets, one from Lake Michigan through Illinois, the other from Lake Erie through the Maumee and the Wa-

bash. The marks of this enormous accumulation in the channel of the lower Mississippi are seen in the bluff deposits and the Orange sands, investigated by Prof. Hilgard.

Coming east, the first river entering the sea below the boundary of the glaciated region is the Delaware. This has a small drainage area, and is so situated with reference to the Catskill Mountains and the Alleghanies that even in glacial times it never could have been reinforced by northern ice accumulations like the rivers farther west. The terminal moraine crosses the Delaware at Belvidere, a few miles above its junction with the Lehigh and a few miles below the Delaware Water Gap. The portion of the drainage basin above this point does not exceed 6000 square miles. Still the melting of the 2000 or 3000 feet of ice which accumulated over that area must from the nature of the case have produced important results in the valley below. Following down the river from Belvidere about sixty miles, we descend something over 200 feet to tide level. Through this distance, the valley is somewhat constricted, and the river is everywhere bordered by a terrace of coarse gravel from fifteen to twenty feet above present high-water mark. At Trenton, where tide level is reached, this gradually passes into an extensive accumulation three miles wide and more than forty feet above high-water mark. It is here, in the accumulation of coarsely stratified pebbles and gravel and sand, that Dr. C. C. Abbott has found so many palæolithic implements. Below Trenton the formation gradually diminishes and grows finer until at Philadelphia it is scarcely distinguishable. This accumulation of river gravel is entirely distinct from the deposits of yellow gravel which cover southern New Jersey. It is later also than the Philadelphia brick clay. This clay

contains boulders of large size from up the river, and is found for a long distance at a height of one hundred and fifty feet. These facts were discovered by Prof. H. C. Lewis, of Philadelphia, by whose courtesy I am allowed to present them and with whom I have been permitted to spend two weeks in reviewing the field. The conclusion is that the gravels containing flint implements at Trenton mark the closing stages of the glacial period, when water was excessively abundant from the melting of the ice, and pebbles for transportation were at hand in the freshly deposited kames and moraines of the glacial region above. The evidence is conclusive that man was in New Jersey before the glacial period. How much before we have no means of determining.

The remaining question is, When did the ice of the the glacial period disappear?

Evidence accumulates that this period is more recent than has been currently supposed. In the Am. Jour. of Science for Feb., 1881, I published a paper in which an attempt was made to estimate the age of a kettle hole in Andover, similar to the dungeons in Marblehead. This kettle is three hundred feet across at the top, and about sixty feet deep. The bottom is filled with a peat bog ninety feet in diameter. It is scarcely possible for it originally to have been more than twenty-five feet deeper than it is at present. This would represent a deposit upon the present surface of the peat of only eight feet. If the kettle was formed at the close of the glacial period it would hardly be reasonable to place that epoch back 80,000 or 100,000 years as is now customary upon astronomical grounds. For if we suppose the kettle hole to have existed 80,000 years we are compelled to believe that 1,000 years would be required for an inch of solid matter to accumulate upon the present surface of the peat,

where not only the growth of vegetable matter but the wash from the sides and the dust blown by winds would unite their forces to augment the rate. If the origin is placed 10,000 years back that would imply a rate of accumulation sufficiently slow, namely, an inch in one hundred years.

United with this calculation is that of Prof. N. H. Winchell, concerning the recession of the falls of St. Anthony. This cataract has receded about eight miles since the close of the glacial epoch. The old channel from Minneapolis to the Minnesota river is west of the present gorge and is filled with glacial débris. Since the falls were discovered by Hennepin in 1680 the recession has been about 1,000 feet, an average of about five feet per year. This would give only about 9,000 years for the erosion since the glacial epoch.[1]

To geologists, probably the gorge below Niagara Falls has been the most convincing evidence of the great antiquity of the glacial age. A preglacial channel exists below the Whirlpool, reaching Lake Ontario at St. Davids, some distance west of the present mouth of the river. This old channel was filled with glacial *débris*, so as to turn the water into its present course. In 1841 Professor Hall and Sir Charles Lyell, assuming that the whole gorge, from Lewiston to the present falls, had been formed since the filling up of the channel below the Whirlpool, estimated that the smallest amount of time which would suffice for this task was 30,000 years, and that probably a much longer period was consumed; but these eminent observers overlooked one circumstance of the very greatest significance, to which the late Mr. Thomas G. Belt has called attention. This paper (which

[1] See Fifth Annual Report of the Minnesota Geological Survey, pp. 156–189.

is very important) may be found in the London *Quarterly Journal of Science* for April, 1875. There is nothing to show that the portion of the gorge extending from the Whirlpool up to the present site of the Falls is not also preglacial, but many things to indicate that it is the true continuation of the old preglacial channel. The distance between the present cataract and the Whirlpool is about four miles, or half that of the whole gorge, and the position of the strata is such that through this portion of the gorge the rate of retrocession must have been much slower than that below the whirlpool. One of the evidences that this upper portion of the channel belongs to the preglacial times is that it is much wider than that from the Whirlpool to Lewiston. Now, if we suppose that, when the cataract had worn out the gorge from Lewiston to the Whirlpool, it struck the preglacial gorge and above that point had simply to scour out the loose material from it, the measure of the time since the glacial age is that required by the river to form the gorge below the Whirlpool plus so much of the upper end as was not already in existence. What this last element is we have no means of telling precisely, but the time required for eroding the lower section could scarcely have been more than 20,000 and very likely was less than 10,000 years, that being very much the easiest part of the work to be done.

The thing which the investigations of Dr. Abbott and Professor Lewis have settled is that man was in America before the close of the glacial epoch, so that now any investigations which help to assign a date to that period, help to determine the minimum chronology of man's existence on this continent. The kames and moraines of New England furnish a promising field in which to look for further evidence upon this most interesting question.

At the close of the reading of Mr. Wright's paper, Prof. EDWARD S. MORSE spoke in complimentary terms of the paper of the evening, and endorsed in the main his conclusions. He hoped that the Institute would hear occasionally from Mr. Wright as his investigations progress.

Adj.

MONDAY, APRIL 18, 1881.

MEETING this evening. THE PRESIDENT in the chair. Records read. Donations and correspondence announced.

Messrs. Geo. A. Perkins, T. F. Hunt, and D. B. Hagar, were appointed on the committee to nominate the list of officers for the coming year, to be balloted for at the annual meeting.

PROF. ISAAC J. OSBUN, of the State Normal School, gave an interesting lecture in the hall on "Science teaching in the schools." Many experiments were performed to illustrate fully the various remarks suggested in the course of his lecture.

MONDAY, MAY 2, 1881.

MEETING this evening. The PRESIDENT in the chair. Records read. Donations and correspondence announced.

PROF. EDWARD S. MORSE occupied the evening with a very interesting and familiar talk on a new invention

(of his own contrivance, and for which a patent has been applied for), for using the sun's rays as a means of heating and ventilation. He mentioned that he had in use at the hall of the Peabody Academy of Science in this city, a simple apparatus, that had effected a marked change in the ventilation; by means of which fresh air was introduced into the building, and the air as it entered the room, by the utilization of the sun's rays, was from fifteen to thirty degrees, Fahrenheit, warmer than when it entered the apparatus from the outside. A small model of the apparatus and ample drawings on the blackboard fully illustrated his remarks.

Prof. I. J. Osbun, of the Normal School, asked several questions which were satisfactorily answered by Professor Morse and contributed much to render the account more interesting and instrutive.

Before commencing his talk, Professor Morse referred in a very pleasant manner to the lecture of Professor Wright at the last meeting of the Institute, on the "Glaciation of North America and its bearing on the Antiquity of Man in New Jersey." Professor Morse endorsed the statements of Mr. Wright, and said that during a recent call on Dr. Abbott, who is making investigations in the Delaware valley, he had found several of the chipped-stone implements which he had described. Drawings of these stones were made on the blackboard.

Adj.

A List of the Birds of the Hudson Highlands, with Annotations.

By Edgar A. Mearns.

[Continued from Vol. XII, page 128.]

Family, **ARDEIDÆ.**

150. Ardea herodias, *Linné.* Great Blue Heron. A summer resident; abundant during spring and fall migrations; probably breeds. Arrives in April (26, 1874; 21, 1876; 4, 1877; 11, 1878). Departs the last of September, or later (September 20, 1876; 23, 1878; 25, 1879). A fine male was shot on Consook marsh on the 12th of December, 1880, when the temperature was low, and the Hudson frozen along shore, and the mountain lakes and ponds entirely closed.

This large and beautiful Heron remains in the Highlands during the breeding season and throughout the summer. I frequently see it flying over my house, towards the mountain, just at evening; but where it builds its nest, I have never discovered. Its large tracks are seldom absent during spring and summer, from the muddy margins of our solitary ponds. In general it is quite shy, flying away on the first approach of mankind; but, by seeking concealment and awaiting its return, its interesting habits can be studied. Soon it may be seen flying back, just skimming the tree-tops, and sailing slowly down over the pond. As it approaches the spot where it wishes to alight, it assumes a perpendicular position and holds its legs straight downward, and seems really to have alighted, but still glides onward, then actually settles, sinking in the water nearly up to its body. Then it casts a cautious glance around, and, should it descry any dangerous object, instantly betakes itself to flight, with heavy flapping of wings, soon mounting well up in the air. Should a number of Herons be present, as is the case during migrations, they may be seen chasing one another, dancing and executing various amusing antics.

Dimensions. — Measurements of No. 1,773, ♀ juv., September 23, 1878, Hudson River, at Cornwall, E. A. M.: length, 43·75; stretch, 69·50; wing, 16·75; tail, 7·00; length from tip of bill to end of longest toe, 59·00; culmen, 5·20; gape, 6·65; tarsus, 7·10. Measurements of

No. 2,172, ♂ ad., December 12, 1880, Consook Island, Hudson River, N. Y., E. A. M.: length, 47·50; stretch, 74·00; wing, 18·55; tail, 7·50; length from tip of bill to end of toes, 63·00; culmen, 5·80; gape, 7·35; bare part of tibia, 4·95; tarsus, 7·30; middle toe and claw, 5·10; middle toe alone, 4·45; its claw, ·70.

151. Herodias alba egretta, *Gmelin.* AMERICAN EGRET. A summer visitant. Observed at Cornwall, and at Cold Spring, in the Highlands. A specimen was shot at Yonkers, N. Y., in autumn, several years ago. Dr. A. K. Fisher recorded (Bull. Nutt. Orn. Club, Vol. IV, No. 1, p. 62) its capture at Sing Sing, on the Hudson; he also informed me verbally of one shot near Newburgh, N. Y., doubtless of this species, although not personally examined.

152. Butorides virescens, *Linné.* GREEN HERON. An abundant summer resident; breeds plentifully. Arrives about the last of April (27, 1873; May 22, 1874; 3, 1875; 3, 1876; 7, 1877; April 22, 1878; May 15, 1879; 13, 1880; 11, 1881), and departs in October.

The Green Heron builds its nest early in May. Its eggs are commonly deposited during the third week, although I have found them in June, and even July (4, 1872). It occupies the old nest season after season. Its eggs vary in number from four to six. On May 22, 1878, I found a very pretty nest, built in a festoon of grape-vine, swinging free over a pool in a swamp. The eggs were six in number, and incubation was considerably advanced.

Dimensions.—Average measurements of five females: length, 17·75; stretch, 26·75; wing, 7·19; tail, 3·00; culmen, 2·28; tarsus, 2·00; middle toe, 2·06; its claw, .34.

153. Nyctiardea grisea nævia, *Boddaert.* NIGHT HERON. A summer resident; breeds.

The Night Herons have established several breeding-places along the Hudson River. One of them is located in a large swamp of maple and birch saplings, with occasional large maples and groups of tall pine-trees, on Constitution Island, in the Hudson River. Dr. F. D. Lente, of Cold Spring, first informed me of its existence, in the spring of 1873. I first visited the Heronry on June 4th. After proceeding a little way into the swamp, we were startled by the loud "squawking" and flapping of the Herons; and we immediately discovered a large number of their nests. As we advanced, every limb and crotch that was at all adapted to hold a nest was occupied. The birds were flying wildly about, and the air was filled with their discordant croaking. Now and then a sound like the barking of a dog was heard. We were astonished at the number of birds and nests, but were rather late for collecting the eggs, as the nests nearly all contained young, or eggs nearly hatched. The Herons offered no resistance when their nests were being pillaged, but sat around in trees at a short distance. We

examined a large number of nests, by climbing to one and then swinging to the nearest on the maple and white-birch saplings on which the nests were constructed. The young, none of which were more than two or three days old, were covered with gray down. The nests contained from one to four eggs each, and in three, which I examined, five eggs were found. Crows destroy their eggs, and to some such accident the lesser numbers of eggs was probably due. The ground was strewn with dead birds, which had been cruelly shot for sport.

On June 26, 1873, I again visited the Herons, examining many of their nests, most of which were deserted, however; but two nests contained three eggs each, perfectly fresh, which were probably a second brood, belonging to birds whose first nests had been spoiled after the first laying. Other nests were still occupied by fat young ones, that seemed to enjoy climbing to the extremity of the branches about the nest, and to the top of the tree, dropping or scrambling rapidly back into the nest, as I approached. Their irides are narrow; color, light carmine. By the 26th of August the Herons had all left the swamp. The atmosphere was foul from the stench arising from the decaying Herons, which were lying in numbers upon the ground, having been shot in mere wantonness by the gunners. Dead fishes were also strewn about. I noticed five different species which the Herons had brought to the swamp.

On the succeeding season (1874) only one or two pairs of Night Herons had the courage to return to the old breeding-place, where they had been so cruelly treated; but those birds reëstablished the Heronry, and founded a city upon the ruins of the past, which has been the happy home of hundreds of prosperous "Squawks" ever since. Their swamp is a long stretch of oozy land, at the east side of Constitution Island; and their best friends are the lady owners of the island—the Misses Warner. The trees are mainly saplings; and on the top of each is placed a bulky nest, composed of sticks, which are arranged in an orderly manner, making a pretty, clean receptacle for the eggs, which vary in number from four to six, are bluish-green in color, and measure $2{\cdot}25\times1{\cdot}55$ of an inch. They arrive from the South during the first or second week in April. The old nests are carefully repaired; and during this busy time the birds fly back and forth, industriously carrying sticks and arranging them carefully in their nests, so as to form a good-sized basin, sufficiently concave to prevent the eggs from rolling out in case of high winds. Curved twigs are selected, and so placed as to radiate from the centre outwards, with their concavity directed upwards. This disposition of the twigs gives to the outside of the nest a rather bristling aspect. Some branches have green leaves attached to them, showing that the builders break them off from the living tree. One nest was quite well

lined with loose green leaves, plucked from a neighboring tree. Four or five is the usual complement of eggs; but six were taken from one nest, on May 23, 1877. In flight, the Heron's neck is retracted so that its head nestles upon its shoulders, and its legs extend straight behind, looking like a couple of long, central tail-feathers. Sticks, for building, are carried crosswise in its beak. Oviposition begins early in May; but (as I have also observed in young birds of other species) the immature Herons breed somewhat later than do the patriarchs of the settlement, and these newly-wedded birds may be found having fresh eggs late in the month.

As one enters the swamp, the sitting Herons leave their nests with heavy wing-strokes, and loud *quawk-quawk*, which, as they alight in distant pine-trees, are followed by a series of guttural, and barking sounds. When shot they usually clutch the first branch they strike, and cling to it as long as life remains. One that I shot as it flew overhead lodged in a tree-top, holding on to a branch with its feet, with body hanging down; soon, however, it managed to hook its bill over the limb, and finally got upon the branch, and sat erect, but suddenly fell off its perch quite dead. On the ground, they attempt to escape by running swiftly through the patches of tall ferns, brakes and bushes, which grow so abundantly in the swamp. One of my shots broke the wing of a flying Heron. It fell to the ground, and ran through some beds of high ferns, croaking so fearfully that I soon had the entire Heronry "squawking" over my head, as I pursued my wounded bird. At length it squatted, but as its white plumage could not readily be concealed, I caught it, and ended its existence, after no tame struggle on the Heron's part; meanwhile its cries were deafening.

Night Herons breed while still in immature plumage. A male in the dress of the second season was shot while carrying a stick to its nest, on May 23, 1877. It sailed into a distant tree, where I discovered it sitting upright, with neck drawn in. Soon it grew weak, swayed from side to side, at last drooping, as life became extinct, but still clinging to the branch, although I found it quite dead on climbing up to dislodge it. In this stage, its eyes are light red. In still younger birds, during the first autumn, the iris is straw-color; but, as I have previously stated, the nestlings have very light red irides. While I sat in the tree-top examining my prize, a fine old bird alighted close beside me, standing erect, with crest alternately raised and depressed—the only expression of a fear so intense as to paralyze every muscle. It sat erect, with neck extended. I noted especially the beauty and brilliancy of its eye, and that the long occipital feathers fitted together so as to present the appearance of a single long plume, hanging over the back and down by its side. At

my first movement the spell was broken, and the Heron flew away with a squawk that awoke the echoes. At first its legs dangled; afterward they were extended straight out beyond its tail.

Night Herons feed almost exclusively upon fishes and batrachians. They are frequently seen flying along the Hudson during summer evenings. I also see them, throughout the summer, about some ponds near my residence. They depart during September. They breed in the Central Park, New York City, where I have seen one as late as November 2, 1880. I also shot an adult bird at Sayville, Long Island, on October 6, 1880. I know of four large Heronries along the Hudson River. The largest one, judging from accounts of it, is at, or near, Low Point, in Dutchess County. Another, the highest up the river, is located on a low island, below Albany, where Mr. Robt. T. Morris has taken its eggs, and where I saw the birds in abundance, during the breeding season, in 1875.

Dimensions.—Average measurement of eleven adults: length, 26·18; stretch, 45·85; wing, 12·00; tail, 4·75; length from tip of bill to end of toes, 33·55; bill from nostril, 2·11; culmen, 3·06; gape, 4·22; length of nasal orifice, ·67; tarsus, 3·29; hallex, 1·30; its claw, ·77; inner toe, 1·92; its claw, ·58; middle toe, 2·90; its claw, ·57; middle toe and its claw, 3·55; outer toe, 2·14; its claw, ·46; length of occipital plumes, 8·33.

154. Botaurus lentiginosus, *Montague.* American Bittern. A spring and fall migrant; possibly remains during summer, and breeds.

155. Ardetta exilis, *Gmelin.* Least Bittern. The late Frederic S. Osborn found this species near his residence, at Garrisons, on the Hudson, in spring.

Family, **CHARADRIIDÆ.**

156. Charadrius dominicus, *Müller.* American Golden Plover. Only observed as an autumnal migrant. Shot at Cornwall.

157. Oxyechus vociferus, *Linné.* Kildeer Plover. Rare during migrations.

Family, **SCOLOPACIDÆ.**

158. Philohela minor, *Gmelin.* American Woodcock. A very abundant summer resident; breeds. Arrives early in March, and departs late in November.

This glorious game-bird infests all of our swampy swales and meadows, and affords rare sport to the gunners. It reaches us by the beginning of March, unless the season should be backward, and breeding begins early. The young ones are running about early in

April. Its nest is merely a bed of leaves, and sometimes not even that make-shift of a nest is used, but the eggs are deposited directly upon the bare ground, as in one case where I found four eggs lying upon the black earth, between two surface roots of a cedar-tree.

John Lawson, in his "New Voyage to Carolina," printed in the year 1709, gave the following quaint information concerning the habits of the Woodcock and his appreciation of its flesh: "The Woodcocks live and breed here, though they are not in great plenty, as I have seen them in some Parts of *England* and other Places. They want one-third of the *English* Woodcock in Bigness; but differ not in Shape, or Feather, save that their breast is of a Carnation Colour; and they make a Noise (when they are on the Wing) like the Bells about a Hawk's Legs. They are certainly as dainty Meat as any in the World. Their abode is in all Parts of this Country, in low, boggy Ground, Springs, Swamps, and Percoarsons."

159. Gallinago media wilsoni, *Temminck.* WILSON'S SNIPE. A common spring and fall migrant. In autumn, most abundant during October. In spring, I have taken it as late as April 19 (1879).

Dimensions.—Average measurements of four males: length, 10·78; stretch, 16·90; wing, 5·09; tail, 2·30; culmen, 2·46; tarsus, 1·20; middle toe, 1·18; its claw, ·28.

160. Ereunetes pusillus, *Linné.* SEMIPALMATED SANDPIPER. A migrant. Two specimens were shot from a flock on September 25, 1879, near Cold Spring.

Dimensions.—Average measurements of two males (Nos. 2,000 and 2,001, ♂ ♂ ad. ad., Cold Spring, N. Y., September 25, 1879, E. A. M.): length, 6·03; stretch, 11·83; wing, 3·66; tail, 1·57; culmen, ·68; gape, ·67; tarsus, ·81; middle toe, ·59; its claw, ·12.

161. Totanus melanoleucus, *Gmelin.* GREATER YELLOW-LEGS; TELL-TALE. A spring and fall migrant.

162. Totanus flavipes, *Gmelin.* YELLOW-LEGS. A spring and fall migrant. Both species of *Totanus* occur in occasional large flocks, during migrations, but neither can be said to be common.

163. Rhyacophilus solitarius, *Wilson.* SOLITARY SANDPIPER. Abundant during migrations, and late in summer. Arrives in April (25, 1874), and remains until late in May (24, 1874; 19, 1876; 15, 1877). About midsummer it again appears (July 6 and 20, 1874), and remains until October (15, 1876; September 25, 1879).

This species is of occasional occurrence along the river-bank, and usually quite abundant about small inland ponds.

Dimensions.—Average measurements of six males: length, 8·36; stretch, 16·33; wing, 5·20; tail, 2·30; culmen, 1·11; gape, 1·25; tarsus, 1·20; middle toe, ·96; its claw, ·19.

164. Tringoides macularius, *Linné.* SPOTTED SANDPIPER.

A common summer resident; breeds. Arrives in April (May 9, 1874; April 26, 1875; 29, 1876; 30, 1877; 20, 1878; 19, 1879; 20, 1880; May 8, 1881), and departs in October.

Dimensions. — Average measurements of eleven adult specimens: length, 7·87; stretch, 13·67; wing, 4·30; tail, 2·13; culmen, ·95; gape, 1·03; tarsus, 1·93; middle toe, ·83; its claw, ·19.

Family, **RALLIDÆ.**

165. Rallus longirostris crepitans, *Gmelin.* CLAPPER RAIL. Occasionally shot in autumn.

166. Rallus virginianus, *Linné.* VIRGINIA RAIL. A summer resident; breeds.

167. Porzana carolina, *Linné.* CAROLINA RAIL; SORA. A summer resident; breeds.

Dimensions.—Average measurements of fourteen specimens: length, 9·00; stretch, 14·30; wing, 4·35; tail, 2·25; length from tip of bill to end of toes, 12·75; bill from nostril, ·44; culmen, ·89; gape, ·90; tarsus, 1·36; middle toe, 1·43; its claw, ·35; middle toe and claw, 1·75.

168. Gallinula galeata, *Lichtenstein.* FLORIDA GALLINULE. A summer resident. Mr. Francis Butterfass, of Cold Spring, has a mounted specimen which he shot near Cold Spring, on the Hudson. Mr. Winfrid A. Stearns states (List of Birds in the Vicinity of Fishkill-on-Hudson, N. Y., 1880) that a single specimen was shot at Fishkill, on the Hudson. Bonaparte observes (Wilson and Bonaparte, American Ornithology, Vol. III, p. 402, 1828): "In the middle and northern United States it appears to be quite accidental; for, although a few well authenticated instances are known of its having been seen and shot, even as far as Albany, in the State of New York, it has escaped the researches of Wilson, as well as my own. It is by no means, therefore, a common bird, and is not known as inhabiting arctic America, ranging much less to the north, even as a straggler, than its European analogue."

169. Fulica americana, *Gmelin.* AMERICAN COOT. Abundant on the Hudson River in spring and fall.

Dimensions. — Measurements of No. 800, ♂ ad., Hudson River, October 11, 1875, E. A. M.: length, 14·50; stretch, 26·00; wing, 7·19; tail, 1·94; length from tip of bill to end of toes, 20·00.

Family, **ANATIDÆ.**

170. Olor americanus, *Sharpless.* AMERICAN SWAN; WHISTLING SWAN. An occasional visitant. Dr. A. K. Fisher informed me

that one was shot, several years since, on the Hudson River near Newburgh, by a gunner, who brought it to the house of his aunt, for sale. Another Swan was shot on one of the small lakes near Highland Falls, on October 21, 1880.

171. Chen hyperboreus, *Pallas.* SNOW GOOSE. A large flock of Snow Geese settled upon the Hudson, near Cornwall, a year or two ago; they were too wild to allow the gunners to obtain a shot, although Mr. "Josh" Ward endeavored to shoot a specimen for me.

172. Bernicla canadensis, *Linné.* CANADA GOOSE. Abundant during migrations.

173. Bernicla brenta, *Pallas.* BRANT. Occurs during migrations. Mr. Stearns says (List of Birds In Vicinity of Fishkill-on-the-Hudson, N. Y., 1880) that it is "not rare" in fall, at Fishkill, on the Hudson.

174. Anas boscas, *Linné.* MALLARD. Found during spring and fall migrations.

175. Anas obscura, *Gmelin.* BLACK DUCK. A very abundant spring and fall migrant; less numerous in summer and winter; breeds.

The Black Duck, although often seen in immense beds on the Hudson River, is rather partial to small creeks, and inland ponds and pools. It commonly feeds upon the salt marshes beside the river. On land, its movements appear awkward, although it manages to waddle over the humpy meadows with considerable celerity. At such times a side view is very pleasing, although a posterior one is most ludicrous. Its tail wiggles incessantly, while its body performs a remarkable series of lateral oscillatory movements, especially when walking over tussocks of grass. When alarmed it stretches its neck to the full extent, and then squats amongst the hummocks, and remains motionless. It swims very rapidly, and rises from the water with great swiftness. When a flock of Dusky Ducks is about to alight, the birds circle around the intended spot, and then drop vertically down from a considerable height, making a loud splash as they strike the water.

Dimensions.—Average measurements of two adult males: length, 24·50; stretch, 38·50; wing, 11·00; tail, 4·35; culmen, 2·33; gape, 2·65 tarsus, 2·00; middle toe, 2·17; its claw, ·44.

176. Chaulelasmus streperus, *Linné.* GADWALL. A spring and fall migrant.

177. Dafila acuta, *Linné.* PINTAIL. Quite common during migrations.

178. Mareca americana, *Gmelin.* AMERICAN WIDGEON; BALDPATE. A common species during migrations.

Dimensions.—Measurements of No. 888, ♂ ad., Highland Falls, N. Y., March 12, 1876, E. A. M.: length, 20·25; stretch, 34·50; wing,

9·88; tail, 4·50; culmen, 1·38; gape, 1·60; tarsus, 1·45; hallex and its claw, ·52; middle toe and claw, 2·00.

179. Spatula clypeata, *Linné.* Shoveller; Spoonbill. Occurs during autumn, winter and spring.

Dimensions.—Measurements of adult male: length, 20·10; stretch, 32·00; wing, 9·42; tail, 3·65; culmen, 2·60; tarsus, 1·25.

180. Querquedula discors, *Linné.* Blue-Winged Teal. Abundant during migrations.

181. Nettion carolinensis, *Gmelin.* Green-Winged Teal. Abundant during migrations.

182. Aix sponsa, *Linné.* Wood Duck; Summer Duck. A summer resident; breeds.

Dimensions.—Average measurements of three specimens: length, 17·35; stretch, 29·00; wing, 8·44; tail, 4·50.

183. Fulix marila, *Linné.* Scaup Duck; Greater Blackhead. Very abundant during autumn, winter and spring.

Dimensions.—Measurements of No. 1,841. ♂ ad., Hudson River, at Cornwall, March 28, 1879, E. A. M.: length, 19·65; stretch, 33·75; wing, 8·80; tail, 2·85; culmen, 1·69; gape, 2·23; tarsus, 1·58; middle toe, 2·50; its claw, ·38.

184. Fulix affinis, *Eyton.* Little Blackhead. A common species during migrations, and in winter.

Dimensions.—Measurements of No. 543, ♂ ad., Highland Falls N. Y., December 6, 1873, E. A. M.: length, 16·10; stretch, 28·30; wing, 8·00; tail, 2·60; culmen, 1·61; bill from nostril, 1·12; gape, 2·03; tarsus, 1·45; middle toe and claw, 2·50.

185. Fulix collaris, *Donovan.* Ringnecked Blackhead. Occasional during migrations.

186. Æthyia vallisneria, *Wilson.* Canvas-back. Quite common in autumn, winter and spring.

Dimensions.—Average measurements of Nos. 1,341 and 1,342, ♂ ♂ ad. ad., Hudson River, at Cornwall, March 23, 1877, E. A. M.: length, 22·31; stretch, 34·92; wing, 9·19; tail, 2·59; culmen, 2·94; gape, 2·59; tarsus, 1·75; length from tip of bill to end of toes, 26·00.

187. Æthyia americana, *Eyton.* Redhead. Not as abundant as the preceding species, but sometimes plentiful in autumn. Some that were shot at Cornwall on October 23, 1877, were moulting, and in such bad plumage that they could not be preserved as specimens.

188. Clangula glaucium americana, *Bonaparte.* American Golden-eye. Very abundant in autumn, winter and spring.

The Golden-eyes are fond of keeping in mid-stream amongst the floating ice-cakes, skulking behind some larger mass whenever an attempt is made to get near them. As they take to flight, the loud, ringing whistle of their wings may be heard a long way off—a very

pleasant sound! As long as the smallest spot remains unfrozen, the "Whistlers" stay upon the Hudson; and I have seen them flying northward when the river was entirely closed above West Point.

Dimensions. — Measurements of No. 819 ♀, Highland Falls, N. Y., December 8, 1875, E. A. M.: length, 17·13; stretch, 29·00; wing, 7·81; tail, 3·00.

189. Clangula albeola, *Linné.* BUTTERBALL; BUFFLEHEAD. A very common winter resident. It occasionally frequents small inland ponds.

190. Harelda glacialis, *Linné.* OLD SQUAW; LONG-TAILED DUCK. A very abundant spring and fall migrant, and winter resident when the Hudson is not frozen.

When heard at a distance, the loud cackling notes of hundreds of Old Squaws, borne from afar on frosty winds, strike the ear most pleasantly, bearing sweet remembrances of happy days spent on blue billows, amid the whistling wings of gay water-fowl and the beauteous forms of sea-birds. When the water is rough, the Old Squaws are reluctant to take to flight, or, perhaps, are more gentle than at other times. As you approach, they become greatly disturbed, however, and some of the old males get so much excited that they are barely able to sit upon the water. The females commonly dive, coming to the surface at an increased distance from you. The males elevate their tails until they stick perpendicularly upward, and rapidly vibrate them, at the same time throwing their heads backward, and turning around so swiftly on the water as to seem at times fairly to spin like a top, and croak loudly all the time.

On the 3d of November, 1879, I made the following observation on the rapidity of the flight of the Long-tailed Duck:—just after leaving the Sing Sing depot, going south on the Hudson River Railroad, a small flock of Old Wives arose from the water and flew in a direct course down the Hudson. Their white colors were very distinctly visible, as seen against the deep blue of the river. I noticed that they maintained about the same relative position with regard to the train, which, however, had not yet gotten under full headway; but the Ducks changed their course at intervals, and at times they would rise in the air, separating from each other, and then descending swiftly to near the surface of the water; then, for a time, the impetus thus acquired would carry them onward at an accelerated speed. As our train got fairly under way, and, fortunately for my observation, the Ducks ceased to move indirectly, and skimmed along close to the water, keeping about in the middle of the river. It so happened that the regular rate of speed at which the train moved was exactly equal to the rate at which the Ducks flew; accordingly they kept their relative position opposite to us as long as our course lay along the river;

when the train slowed up, before turning back from the Hudson, at Spuyten Duyvil, the Ducks flew ahead. In order to get at the exact distance and time, I wrote to the General Superintendent of the railroad, who kindly sent the following reply: "Referring to yours of this date, relative to train, stops, and distances, Nov. 3, 1879: The train alluded to left Garrisons at 7.52 A. M., Sing Sing 8.30 and Spuyten Duyvil 8.58; and the distance between Sing Sing and Spuyten Duyvil is $19\frac{56}{100}$ miles." Signed, "J. M. Toucey, Gen'l Sup't." The time, then, was exactly 28 minutes, and the distance 19.56 miles; this makes their rate of flight 1 mile in 1.43 minutes, or rather more than a mile in a minute and a half.

Dimensions.—Average measurements of three adult males: length, 23·00; stretch, 31·00; wing, 8·75; tail, 8·75; culmen, 1·12; gape, 1·77; tarsus, 1·40; middle toe and claw, 2·20; middle toe alone, 1·95; claw, ·34.

191. Œdemia americana, *Swainson* and *Richardson.* AMERICAN SCOTER. Very abundant during migrations.

Dimensions — Average measurements of three females: length, 18 24; stretch, 32·00; wing, 8·13; tail, 3·55; culmen, 1·63. Measurements of No. 796, ♂ ad., Hudson River, at Cornwall, October 9, 1875, E. A. M.: length, 20·50; stretch, 33·65; wing, 8·56; tail, 3·65.

192. Melanetta velvetina, *Cassin.* AMERICAN VELVET SCOTER. Very abundant during spring and fall migrations; occasionally seen in winter.

Dimensions. — Average measurements of four adult males: length, 22·50; stretch, 39·50; wing, 10·80; tail, 4·00; culmen, 1·55; gape, 2·78; tarsus, 2·00; middle toe and claw, 3·25; middle toe alone, 2·90; its claw, ·40. Average measurements of two adult females: length, 21·00; stretch, 37·50; wing, 10·10; tail, 3·45; culmen, 1·55; gape, 2·65: tarsus, 1·55; middle toe and claw, 3·20; middle toe alone, 2·80; its claw, ·42.

193. Pelionetta perspicillata, *Linné.* SURF DUCK; SEA COOT. Abundant during spring and fall migrations. Arrives earlier than the Velvet Duck, in autumn.

Dimensions.—Average measurements of two adult males: length, 20·10; stretch, 34·00; wing, 9·15; tail, 3·10; culmen, 1·53; gape, 2·58; tarsus, 1·82; middle toe, 2·67; its claw, ·40; middle toe and claw, 3·00.

194. Erismatura rubida, *Wilson.* RUDDY DUCK. An abundant spring and fall migrant. In autumn the Ruddys are very gentle, but expert divers.

Dimensions. — Average measurements of three females: length 14·55; stretch, 22·00; wing, 5·40; tail, 2·50; culmen, 1·60; gape, 1·80.

195. Mergus merganser americanus, *Cassin.* AMERICAN SHELDRAKE. A common winter resident.

This beautiful bird, though less abundant than the Red-breasted Sheldrake, is still quite plentiful on the Hudson. It often sits on shore, sunning itself and preening its feathers, or exploring crevices along the rocky shore. It feeds principally on fishes, which it is very expert at catching. I have often found a species of flat-fish in its gullet.

Dimensions.—Measurements of two adult females: length, 24·15; stretch, 33·50; wing, 9·23; tail, 4·15; culmen, 1·92; tarsus, 1·90; middle toe and claw, 2·80; length from tip of bill to end of toes, 25·00. Measurements of No. 1,343, ♂ ad., Hudson River at Cornwall, March 23, 1877, E. A. M.: length, 26·65; stretch, 37·00; wing, 10·30; tail, 4·75; culmen, 2·73; gape, 2 75; tarsus, 1·92; middle toe and claw, 3·00; length from tip of bill to end of toes, 27·30.

196. Mergus serrator, *Linné.* RED-BREASTED SHELDRAKE. A very abundant spring and fall migrant, and winter resident.

Dimensions.—Average measurements of two *adult males:* length, 24·00; stretch, 35·00; wing, 9 40; tail, 4·20; culmen, 2·35; gape, 2·90; tarsus, 1·86; middle toe, 2·40; its claw, ·40. Average measurements of two *adult females:* length, 22·00; stretch, 33·00; wing, 9·05; tail, 3·75; culmen, 2·16; gape, 2·61; tarsus, 1·75; middle toe, 2·21; its claw, ·35.

197. Lophodytes cucullatus, *Linné.* HOODED SHELDRAKE. A common winter resident.

Dimensions.—Average measurements of two males: length, 18·38; stretch, 26·50; wing, 7·25; tail, 3·81.

Family, LARIDÆ.

198. Larus argentatus, *Brünnich.* HERRING GULL. Usually abundant upon the Hudson during autumn, winter and spring, save when the river is frozen. It breeds in the Adirondack mountains.

199. Larus delawarensis, *Ord.* RING-BILLED GULL. Occasional in winter and spring.

200. Larus atricilla, *Linné.* LAUGHING GULL. I have seen a specimen, shot on the Hudson, at Cornwall, from a large flock; another shot at Cold Spring, on the Hudson. Both birds were taken in the spring. Another black-headed Gull was seen on the Hudson, near Constitution Island; it was so gentle that a boatman attempted to strike it with an oar, when it flew to a buoy and alighted.

201. Larus philadelphiæ, *Ord.* BONAPARTE'S GULL. A winter resident; abundant in autumn.

Dimensions.—Average measurements of numbers 1,515 and 1,516 ♂

♂ ad. ad., Hudson River at Cornwall, November 17, 1877, E. A. M.: length, 14·61; stretch, 33·33; wing, 10·18; tail, 4·30; culmen, 1·22; gape, 1·89; tarsus, 1·32; middle toe and claw, 1·44; hallex, ·18; claw, ·12.

202. Sterna fluviatilis, *Naum.* Common Tern; Sea Swallow. Only once observed,—on Nov. 15. 1874.

203. Sterna fuliginosa, *Gmelin.* Sooty Tern. On September 14, 1878, I saw one of these beautiful birds near West Point, from the deck of a little steam yacht. It flew quite near, and I wished for a gun to secure so rare a prize. To my great delight, however, a beautiful specimen was presented to me by Miss Anna B. Warner. It was killed by flying against the boathouse on Constitution Island, on the day previous to that on which I saw my bird.

Dimensions.—Measurements of No. 1772, ♀ ad., Constitution Island, Hudson River, N. Y., September 13, 1878, E. A. M.: length, 17·50; stretch, 34·70; wing, 11·00; tail, 6·60.

204. Hydrochelidon lariformis, *Gmelin.* Black Tern. The late Frederick S. Osborn shot three of these Terns in the autumn of 1874, near Garrisons, on the Hudson. I have seen one of the specimens in his collection; he also informed me that they were shot from a flock of about fifty birds. Mr. Thomas W. Wilson saw two Terns which were supposed to be of this species, about September 11, 1879, near Cold Spring.

Family, **PODICIPIDÆ.**

205. Podiceps holbölli, *Reinhardt.* American Red-necked Grebe. Quite abundant, at times, in autumn, winter and spring.

Dimensions.—Average measurements of two males: length, 21·55; stretch, 34·58; wing, 7·30; length from tip of bill to end of toes, 26·75; culmen, 2·06; tarsus, 2·61; middle toe and claw, 3·00.

206. Dytes auritus, *Linné.* Horned Grebe. A very common spring and fall migrant; occasional in winter.

Dimensions.—Average measurements of four adults: length, 14·30; stretch, 24·38; wing, 5·40; tail, 1·55; culmen, ·91; gape, 1·32; tarsus, 1·85; middle toe and claw, 2·00; middle toe alone, 1·70; its claw, ·31.

207. Podilymbus podiceps, *Linné.* Pied-bill Grebe; Dabchick. Abundant during migrations; occasional in summer; doubtless breeds.

Dimensions.—Average measurements of four specimens: length, 13·65; stretch, 22·60; wing, 4·95; tail, 1·55; culmen, ·86; bill from nostril, ·55; gape, 1·38; tarsus, 1·64; middle toe and claw, 2·30; middle toe alone, 2·00.

Family, COLYMBIDÆ.

208. Colymbus torquatus, *Brünnich.* LOON; GREAT NORTHERN DIVER. A common spring and fall migrant. A few possibly remain during summer, and breed.

209. Colymbus septentrionalis, *Linné.* RED-THROATED DIVER. The first specimen of this species taken on the Hudson, was procured by Peter de Nottbeck, Esq., on November 14, 1876, at Low Point, sixty-one miles from New York City.[1] Mr. Winfrid A. Stearns has since recorded another capture, in his "List of Birds in Vicinity of Fishkill-on-Hudson, N. Y.," page 15.

B. LIST OF THE FAMILIES OF BIRDS KNOWN TO INHABIT THE HUDSON HIGHLANDS, WITH THE NUMBER OF THEIR REPRESENTATIVE SPECIES.

		SPECIES.			SPECIES.
1	Turdidæ	7	20	Caprimulgidæ	2
2	Saxicolidæ	1	21	Cypselidæ	1
3	Sylviidæ	2	22	Trochilidæ	1
4	Paridæ	1	23	Alcedinidæ	1
5	Sittidæ	2	24	Cuculidæ	2
6	Certhiidæ	1	25	Picidæ	6
7	Troglodytidæ	3	26	Strigidæ	6
8	Alaudidæ	1	27	Falconidæ	14
9	Motacillidæ	1	28	Columbidæ	2
10	Sylvicolidæ	32	29	Tetraonidæ	1
11	Tanagridæ	1	30	Perdicidæ	1
12	Hirundinidæ	6	31	Ardeidæ	6
13	Ampelidæ	2	32	Charadriidæ	2
14	Vireonidæ	6	33	Scolopacidæ	7
15	Laniidæ	1	34	Rallidæ	5
16	Fringillidæ	26	35	Anatidæ	28
17	Icteridæ	8	36	Laridæ	7
18	Corvidæ	3	37	Podicipitidæ	3
19	Tyrannidæ	8	38	Colymbidæ	2

[1] See Bull. Nutt. Orn. Club, Vol. III, No. 3, p. 146, July, 1878.

C. Special Lists, giving, in tabular form, the permanent residents, summer and winter sojourners, and spring and fall migrants.[2]

(A.) Permanent Residents.

1 Turdus migratorius.
2 Sialia sialis.
3 Parus atricapillus.
4 Sitta carolinensis.
5 Ampelis cedrorum.
6 Carpodacus purpureus.
7 Astragalinus tristis.
8 Melospiza fasciata.
9 Passer domesticus.
10 Sturnella magna.
11 Corvus frugivorus.
12 Cyanocitta cristata.
13 Picus villosus.
14 Picus pubescens.
15 Melanerpes erythrocephalus.
16 Colaptes auratus.
17 Bubo virginianus.
18 Scops asio.
19 Asio americanus.
20 Strix nebulosa.
21 Circus hudsonius.
22 Accipiter fuscus.
23 Falco peregrinus nævius.
24 Tinnunculus sparverius.
25 Buteo borealis.
26 Buteo lineatus.
27 Buteo pennsylvanicus.
28 Haliæëtus leucocephalus.
29 Zenædura carolinensis.
30 Ectopistes migratoria.
31 Bonasa umbellus.
32 Ortyx virginiana.
33 Anas obscura.

(B.) Summer Residents.

1. *Species Known to Breed.*

1 Turdus migratorius.
2 Turdus mustelinus.
3 Turdus fuscescens.
4 Mimus carolinensis.
5 Harporhynchus rufus.
6 Sialia sialis.
7 Parus atricapillus.
8 Sitta carolinensis.
9 Troglodytes domesticus.
10 Telmatodytes palustris.
11 Mniotilta varia.
12 Parula americana.
13 Helmitherus vermivorus.
14 Helminthophaga pinus.
15 Helminthophaga chrysoptera.
16 Helminthophaga ruficapilla.
17 Dendrœca æstiva.
18 Dendrœca virens.
19 Dendrœca pennsylvanica.
20 Dendrœca discolor.
21 Siurus auricapillus.
22 Siurus motacilla.
23 Geothlypis trichas.
24 Icteria virens.
25 Myiodioctes mitratus.
26 Setophaga ruticilla.
27 Pyranga rubra.
28 Hirundo erythrogastra.
29 Tachycineta bicolor.
30 Petrochelidon lunifrons.
31 Cotyle riparia.
32 Stelgidopteryx serripennis.

[2] The plan of these tables is based upon Dr. C. Hart Merriam's excellent "Review of the Birds of Connecticut," and no pretence of originality is made.

33 Progne subis.
34 Ampelis cedrorum.
35 Vireo olivaceus.
36 Vireo gilvus.
37 Vireo flavifrons.
38 Vireo noveboracensis.
39 Carpodacus purpureus.
40 Astragalinus tristis.
41 Poœcetes gramineus.
42 Coturniculus passerinus.
43 Melospiza palustris.
44 Melospiza fasciata.
45 Spizella socialis.
46 Spizella pusilla.
47 Passer domesticus.
48 Zamelodia ludoviciana.
49 Passerina cyanea.
50 Pipilo erythrophthalmus.
51 Dolichonyx oryzivorus.
52 Molothrus ater.
53 Agelæus phœniceus.
54 Sturnella magna.
55 Icterus spurius.
56 Icterus galbula.
57 Corvus frugivorus.
58 Cyanocitta cristata.
59 Tyrannus carolinensis.
60 Myiarchus crinitus.
61 Sayornis fuscus.
62 Contopus virens.
63 Empidonax minimus.
64 Caprimulgus vociferus.
65 Chordeiles popetue.
66 Chætura pelagica.
67 Trochilus colubris.
68 Ceryle alcyon.
69 Coccyzus erythrophthalmus.
70 Coccyzus americanus.
71 Picus villosus.
72 Picus pubescens.
73 Colaptes auratus.
74 Bubo virginianus.
75 Scops asio.
76 Asio americanus.
77 Strix nebulosa.
78 Circus hudsonius.
79 Accipiter fuscus.
80 Accipiter cooperi.
81 Falco peregrinus nævius.
82 Tinnunculus sparverius.
83 Buteo borealis.
84 Buteo lineatus.
85 Buteo pennsylvanicus.
86 Haliæëtus leucocephalus.
87 Ectopistes migratorias.
88 Zenædura carolinensis.
89 Bonasa umbellus.
90 Ortyx virginianus.
91 Philohela minor.
92 Tringoides macularius.
93 Butorides virescens.
94 Nyctiardea grisea nævia.
95 Rallus virginianus.
96 Porzana carolina.
97 Anas obscura.
98 Aix sponsa.
99 Podilymbus podiceps.

2. *Species occurring in summer, not known to breed.*

1 Sitta canadensis.
2 Certhia familiaris.
3 Dendrœca pinus.
4 Passerculus savanna.
5 Quiscalus purpureus.
6 Empidonax pusillus trailli.
7 Centurus carolinus.
8 Melanerpes erythrocephalus.
9 Pandion haliaëtus carolinensis.
10 Ardea herodias.
11 Herodias alba egretta.
12 Rhyacophilus solitarius.
13 Gallinula galeata.

(C.) Winter Residents and Visitors.

(*Permanent residents are included.*)

1 Turdus migratorius.
2 Turdus pallasi.
3 Sialia sialis.
4 Regulus satrapa.
5 Parus atricapillus.
6 Sitta carolinensis.
7 Sitta canadensis.
8 Certhia familiaris.
9 Anorthura troglodytes hyemalis.
10 Dendrœca coronata.
11 Ampelis garrulus.
12 Ampelis cedrorum.
13 Lanius borealis.
14 Pinicola enucleator canadensis.
15 Carpodacus purpureus.
16 Loxia leucoptera.
17 Loxia curvirostra americana.
18 Ægiothus linaria.
19 Chrysomitris pinus.
20 Astragalinus tristis.
21 Plectrophanes nivalis.
22 Melospiza fasciata.
23 Junco hyemalis.
24 Spizella montana.
25 Passer domesticus.
26 Sturnella magna.
27 Corvus frugivorus.
28 Cyanocitta cristata.
29 Picus villosus.
30 Picus pubescens.
31 Sphyrapicus varius.
32 Melanerpes erythrocephalus.
33 Colaptes auratus.
34 Bubo virginianus.
35 Scops asio.
36 Asio americanus.
37 Strix nebulosa.
38 Nyctea scandiaca.
39 Circus hudsonius.
40 Accipiter fuscus.
41 Astur atricapillus.
42 Falco peregrinus nævius.
43 Æsalon columbarius.
44 Tynnunculus sparverius.
45 Buteo borealis.
46 Buteo lineatus.
47 Buteo pennsylvanicus.
48 Archibuteo lagopus sanctijohannis.
49 Aquila chrysaëtus canadensis.
50 Haliæëtus leucocephalus.
51 Ectopistes migratoria.
52 Zenœdura carolinensis.
53 Bonasa umbellus.
54 Ortyx virginiana.
55 Ardea herodias (Dec. 12, 1880.)
56 Anas obscura.
57 Spatula clypeata.
58 Fulix marila.
59 Fulix affinis.
60 Æthyia vallisneria.
61 Clangula glaucium americana.
62 Clangula albeola.
63 Harelda glacialis.
64 Melanetta velvetina.
65 Mergus merganser americanus.
66 Mergus serrator.
67 Lophodytes cucullatus.
68 Larus argentatus.
69 Larus delawarensis.
70 Larus philadelphiæ.
71 Podiceps holbölli.
72 Dytes auritus.
73 Colymbus torquatus.

(D.) Migrants not known to breed.

(*Some of these winter.*)

1 Turdus pallasi.
2 Turdus swainsoni.
3 Turdus swainsoni aliciæ.
4 Regulus calendula.
5 Regulus satrapa.
6 Sitta canadensis.
7 Anorthura troglodytes hyemalis.
8 Eremophila alpestris.
9 Anthus ludovicianus.
10 Helminthophaga celata.
11 Helminthophaga peregrina.
12 Dendrœca cærulescens.
13 Dendrœca cœrulea.
14 Dendrœca coronata.
15 Dendrœca blackburniæ.
16 Dendrœca striata.
17 Dendrœca castanea.
18 Dendrœca maculosa.
19 Dendrœca tigrina.
20 Dendrœca palmarum.
21 Siurus nævius.
22 Geothlypis philadelphia.
23 Myiodioctes canadensis.
24 Myiodioctes pusillus.
25 Vireo philadelphicus.
26 Vireo solitarius.
27 Ammodramus caudacutus.
28 Junco hyemalis.
29 Spizella montana.
30 Zonotrichia albicollis.
31 Zonotrichia leucophrys.
32 Passerella iliaca.
33 Scolecophagus ferrugineus.
34 Contopus borealis.
35 Empidonax pusillus trailli.
36 Empidonax flaviventris.
37 Sphyrapicus varius.
38 Asio accipitrinus.
39 Astur atricapillus.
40 Æsalon columbarius.
41 Archibuteo lagopus sanctijohannis.
42 Aquila chrysaëtus canadensis.
43 Botaurus lentiginosus.
44 Ardetta exilis.
45 Charadrius dominicus.
46 Oxyechus vociferus.
47 Gallinago media wilsoni.
48 Ereunetes pusillus.
49 Totanus melanoleucus.
50 Totanus flavipes.
51 Rhyacophilus solitarius.
52 Rallus longirostris crepitans.
53 Fulica americana.
54 Olor americanus.
55 Chen hyperboreus.
56 Bernicla canadensis.
57 Bernicla brenta.
58 Anas boscas.
59 Chaulelasmus streperus.
60 Dafila acuta.
61 Mareca americana.
62 Spatula clypeata.
63 Querquedula discors.
64 Nettion carolinensis.
65 Fulix marila.
66 Fulix affinis.
67 Fulix collaris.
68 Æthyia vallisneria.
69 Æthyia americana.
70 Clangula glaucium americana.
71 Clangula albeola.
72 Harelda glacialis.
73 Œdemia americana.
74 Melanetta velvetina.
75 Pelionetta perspicillata.
76 Erismatura rubida.

77 Mergus merganser americanus.
78 Mergus serrator.
79 Lophodytes cucullatus.
80 Larus argentatus.
81 Larus delawarensis.
82 Larus atricilla.
83 Larus philadelphiæ.
84 Sterna fluviatilis.
85 Sterna fuliginosa.
86 Hydrochelidon lariformis.
87 Podiceps holbölli.
88 Dytes auritus.
89 Colymbus torquatus.
90 Colymbus septentrionalis.

[To be continued]

Annual Meeting, Monday, May 16, 1881.

The annual meeting this evening at 7.30 o'clock. The President in the chair. Records of the last annual meeting read.

The reports of the Secretary, Treasurer, Auditor, Librarian, and the Curators and Committees were read and duly accepted, and ordered to be placed upon file.

Mr. Robert S. Rantoul read memoirs of the late Hon. James Kimball, of Salem, an associate member, for several years the curator of history, and of the late Prof. Benjamin Peirce of Harvard University, Cambridge, a corresponding member. Referred to the Publication Committee.

Mr. T. F. Hunt, chairman of the committee on nominations reported the following list of officers, which was duly elected; Mr. Israel and the Secretary having been requested to collect, assort, and count the votes.

PRESIDENT:

HENRY WHEATLAND.

VICE-PRESIDENTS:

ABNER C. GOODELL, JR. — WILLIAM SUTTON.
FREDERICK W. PUTNAM. — DANIEL B. HAGAR.

SECRETARY: GEORGE M. WHIPPLE.

TREASURER: GEORGE D. PHIPPEN.

AUDITOR: RICHARD C. MANNING.

LIBRARIAN: WILLIAM P. UPHAM.

CURATORS:

History—HENRY F. WATERS.
Manuscripts—WILLIAM P. UPHAM.
Archæology—FREDERICK W. PUTNAM.
Numismatics—MATTHEW A. STICKNEY.
Geology—ISAAC J. OSBUN.
Botany—GEORGE D. PHIPPEN.
Zoology—EDWARD S. MORSE.
Horticulture—JOHN E. PEABODY.
Music—JOSHUA PHIPPEN, JR.
Painting & Sculpture—T. F. HUNT.
Technology—EDWIN C. BOLLES.

COMMITTEES:

Finance:

The PRESIDENT, *Chairman ex off.*

JAS. O. SAFFORD. HENRY M. BROOKS. GEO. R. EMMERTON.

The TREASURER, *ex off.*

Library:

CHARLES W. PALFRAY. GEORGE F. FLINT. HENRY F. KING.
WILLIAM NEILSON. WILLIAM D. NORTHEND.

The LIBRARIAN, *ex off.*

Publication:

EDWARD S. ATWOOD. ABNER C. GOODELL, JR. EDWIN C. BOLLES.
H. F. WATERS. T. F. HUNT.
JAMES A. EMMERTON.

Lecture:

FREDERICK W. PUTNAM. AMOS H. JOHNSON. ARTHUR L. HUNTINGTON.
FIELDER ISRAEL. ROBERT S. RANTOUL.

Field Meeting:

The SECRETARY, *Chairman ex off.*

GEORGE A. PERKINS, Salem. — GEORGE D. PHIPPEN, Salem.
GEORGE COGSWELL, Bradford. — F. R. KIMBALL, Salem.
FRANCIS H. APPLETON, Peabody. — EBEN N. WALTON, Salem.
NATHANIEL A. HORTON, Salem. — WINFIELD S. NEVINS, Salem.
EDWARD S. MORSE, Salem.

THE RETROSPECT OF THE YEAR

compiled from the several reports read at the meeting, and the remarks of several members in relation thereto, presents the work of the Institute in the various departments since the last annual meeting.

MEMBERS.—Changes occur in the list of our associates by the addition of new names and the withdrawal of some by resignation, removal from the county or vicinity, or by death. We have received information of the decease of eleven members during the year.

CALEB COOKE, son of William and Mary (Fogg) Cooke, was born in Salem Feb. 5, 1836, naturalist; died at Salem, June 5, 1880. Elected a member May 11, 1853.

PORTEUS P. BIELBY, son of John and Martha (Liddle) Bielby, born at Little Falls, N. Y., physician; died at Salem, Aug. 1, 1880, aged 34 years, 5 mos. Elected a member February 5, 1877.

CHARLES H. FLINT, son of Simeon and Ellen (Pollard) Flint, born at Salem, drain-pipe dealer; died at Salem, Oct. 3, 1880, aged 34 yrs., 4 mos., 3 days. Elected a member, June 4, 1877.

BENJAMIN PEIRCE, son of Benjamin and Lydia (Nichols) Peirce born at Salem, April 4, 1809; graduated at Harvard College, 1829,—Perkins Professor of Astronomy and Mathematics at Harvard; died at Cambridge, Oct. 6, 1880. Elected a corresponding member, January 13, 1864.

WILLIAM F. NICHOLS, son of Ichabod and Cassandra (Frye) Nichols, born at Salem, April 4, 1801, currier;

died at Salem, Oct. 29, 1880, aged 79 yrs., 6 mos., 25 days. Elected a member, Sept. 27, 1854.

FRANCIS BROWN, son of Ammi and Hannah (Baker) Brown, born at Salem, Aug. 5, 1815, treasurer of Salem Lead Company; died at Salem, Nov. 16, 1880. Aged 65 yrs., 3 mos., 11 days. Elected a member Sept. 21, 1853.

JAMES KIMBALL, son of James and Catherine (Russell) Kimball, born at Salem, October 14, 1808, for many years one of the County Commissioners of Essex; died at Salem, Nov. 29, 1880, aged 72 yrs., 1 mo., 15 days. An original member.

WILLIAM S. HUTCHINSON, son of Thomas J. and Mary E. (Skinner) Hutchinson, born at Salem, March 14, 1853, printer; died at Salem, Dec. 24, 1880, aged, 27 years, 9 mos., 10 days. Elected a member, March 20, 1876.

NATHANIEL C. ROBBINS, son of David and Elizabeth (Burrill) Robbins, born at Salem, April 19, 1810, merchant; died at Salem, January 6, 1881, aged 70 years, 7 mos., 18 days. Elected a member, June 18, 1856.

GEORGE H. PEIRSON, son of Thomas and Celia (Peirson) Honeycomb, born at Salem, June 16, 1816, postmaster of Salem; died at Salem, Feb. 8, 1881, aged 64 years, 7 mos., 23 days. Elected a member, Apr. 5, 1869.

GEORGE C. CHASE, son of Henry and Betsey (Abbott) Chase, born at Salem, May 2, 1807, agent of Forest River Lead Company, Salem; died at Salem, May 14, 1881. Elected a member, Feb. 8, 1854.

FIELD MEETINGS.—During the year, five. *First*, at Salem Neck, June 22, 1880; the 250th anniversary of the arrival of John Winthrop at Salem. The meeting was largely attended. An admirable address was delivered

by Robert S. Rantoul, Esq.; an original poem by Miss Lucy Larcom was read by Rev. DeWitt S. Clarke, and remarks were made by Col. T. W. Higginson, of Cambridge, Hon. George W. Warren, of Boston, Hon. George B. Loring, M. C., Hon. Henry K. Oliver, mayor of Salem, Mr. Seth Low of New York. Letters were read by Rev. E. S. Atwood from John G. Whittier, Hon. R. C. Winthrop, Pres. of Mass. Hist. Soc., Dr. Andrew P. Peabody of Harv. Univ., His Exc. John D. Long, Col. L. Saltonstall of Newton, Hon. Charles L. Woodbury of Boston, and Hon. Marshall P. Wilder, Pres. N. E. Hist. Gen. Soc. Rev. George H. Hosmer read a communication prepared by Stanley Waters, relating to Rev. Dr. Wm. Bentley, on whose birthday the meeting occurred. The address, poems, letters, remarks, etc., have been printed in the Hist. Coll. of the Institute, vol. xvii.

Second Meeting.— Was held July 30, 1880, at Riverside Farm in Bradford, the residence of Dr. George Cogswell, an associate member. The day was pleasant and a large number were in attendance. By invitation, the Farmers' and Mechanics' Association of Haverhill and Bradford participated in the exercises of this occasion. The lunch was spread in a pine grove on the shores of the Merrimack, and the afternoon session was held at 2 P. M., the following taking part in the meeting: The President, Dr. George Cogswell, Rev. Mr. Kingsbury of Bradford, Prof. E. S. Morse of Salem, Mr. Tewksbury of Bradford, Prof. Hall of the university of Minnesota, Mr. Fish of the Salem Summer School, Mr. John W. Perkins of the Salem High School, and Mr. Emery of Lawrence.

Third meeting.— At Lowell Island, Salem Harbor, August 12, 1880. The President, Prof. E. S. Morse, of Salem, Rev. S. D. Gammell, of Boxford, Mr. H. Saze of the Summer School, Dr. G. A. Perkins, of Salem, Rev.

Jos. Banvard of Neponset, and N. A. Horton, Esq., of the Salem Gazette, took part in the exercises of the afternoon session. The Institute is again under obligations to Mr. Rantoul for his interesting account of Cat (now Lowell) Island which has been appended to the report of this meeting in the Bulletin of the Institute.

Fourth meeting.—On Friday and Saturday at the Wentworth House, New Castle, N. H. At the session, Friday evening, Vice-President F. W. Putnam spoke on the Pueblo Indians of New Mexico—on Saturday the party visited many places of interest in the vicinity, making an extended call at the old and celebrated Mansion of Gov. Benning Wentworth, on the return trip, in carriages, to the cars.

Fifth Meeting.—Was held in midwinter January 11, 1881, at the Ponds in Essex and Hamilton; thither the party was conveyed in large sleighs. After a ramble about the shores of the ponds and in the woods, and dinner at Whipple's, the afternoon session was held; Messrs. F. W. Putnam, C. C. Abbott, E. S. Morse and E. S. Atwood were the speakers, and an interesting paper on the condition of trees in winter was read by Mr. John Robinson.

Excursions.—*First*, a summer excursion to the Glen House, one of the leading White Mountain hotels. Among the natural attractions in this vicinity are Tuckerman's Ravine, Crystal Cascade, Glen Ellis Falls, the ascent to the summit of Mt. Washington by carriages, and a stage ride from the Glen Station of fourteen miles to the hotel. Left Salem Tuesday morning July 13, 1880 and returned on Thursday evening July 15.

The Second.—To Ausable Chasm, Lake Champlain, River St. Lawrence, Thousand Isles, Montreal, Dixville

Notch, etc. Left Salem Thursday, Aug. 19, 1880, and returned Aug. 24. *Third.*—To Washington (all rail route), left Salem Friday Feb. 11, 1881, return Friday Feb. 18.

LECTURES.—A course of eight lectures, under the direction of the lecture committee, was as follows: 1st, Monday, Oct. 18, 1880, Miss Alice C. Fletcher, "Passion Play of Ober-ammergau." *Extra*—Thursday, Nov. 4, 1880, Prof. W. Boyd Dawkins, of the Victoria University, Manchester, England, "The men of the Caverns." 2nd, Monday, Nov. 8, 1880, Mrs. Abby Sage Richardson, "English Ballads." 3rd, Monday, Nov. 29, 1880, Rev. Charles T. Brooks, of Newport, R. I., "Curiosities of Language." 4th, Monday, Dec. 20, 1880, Prof. William H. Niles of Cambridge, "Holland and its People." 5th, Monday, Jan. 24, 1881, Frederick E. Ober of Beverly, "Florida." 6th, Monday, Jan. 31, 1881, Rev. James F. Clarke of Boston, "Nooks and corners of English literature." 7th, Thursday, Mar. 24, 1881, Rev. E. C. Bolles of Salem, "Historic places of early England."

In addition to the above, three courses of lectures delivered in the afternoon, free to the public; the only condition was that persons desiring to attend should apply for tickets at the rooms of the Institute. The results have been most gratifying. These lectures were provided by the liberality of the Curator of painting and sculpture. *First course* by J. Walter Fewkes, Ph. D., of Cambridge: four lectures upon "Forms of animal life," Wednesdays, Nov. 3, 10, 17, 24, 1880. *Second course*, five lectures upon art subjects: Wednesday, Dec. 15, S. R. Roehler, "A practical talk on Etching;" Wednesday, Dec. 22, S. G. W. Benjamin, "The art of design;" Wednesday, Dec. 29, by E. S. Morse, "Methods of Illustration;" Wednes-

day, Jan. 5, 1881, G. P. Lathrop of Boston, "Color in Nature;" Wednesday, Jan. 12, G. P. Lathrop, "Color in art and life."

Third course by Prof. Isaac J. Osbun of the State Normal School, Salem, on "The Chemistry of common Things:" Feb. 2, "A lump of Salt;" Feb. 9, "A pound of Sugar;" Feb. 16, "A loaf of Bread;" Feb. 23, "A cup of Tea."

MEETINGS.—Regular meetings usually on the first and third Monday evenings of each month. The following communications received and lectures delivered may be specified: John Robinson, "Notes on the Flora of Essex County, with sketches of the early botanists and a list of the publications on this subject." Edgar A. Mearns, "A continuation of a list of the birds of the Hudson Highlands, with annotations." Edward S. Morse, "The gradual dispersion of certain mollusks in New England."

William P. Andrews, "A tribute to the memory of Jones Very;" E. A. Silsbee on "Jones Very's place in Literature;" Charles E. Endicott on "China;" James F. Almy, "Notes on European travels;" Amos Noyes of Newburyport, "On the French Republic;" J. P. Cowles, Jr., of Ipswich, "In and about Pekin;" George Frederick Wright of Andover, "On the Glaciation of North America, and its bearing on the antiquity of man in New Jersey;" Isaac J. Osbun, Normal School, Salem, "Science teaching in schools," illustrated by experiments; Edward S. Morse, "A descriptive account of his apparatus for the utilization of the sun's rays in the ventilation of buildings," etc.; James A. Emmerton, "An account of Henry Silsbee and some of his descendants;" Mrs. K. T. Woods, "A memoir of Lewis N. Tappan of Manchester, Mass.;" Henry F. Waters, "Matthias Cor-

win of Southold, L. I., his parentage and relationship to George Corwin of Salem."

A Social Meeting. Monday, Jan. 3, 1881. The hall was well filled, the fine illustrated books from the art and centennial departments were placed on the tables for inspection, and there was some good and pleasing music of fine voices, Miss Kehew, Mrs. Washburn, Messrs. Chadwick, Macpherson, Cate and Clarke taking part; Messrs. Morse, Hagar, and Clarke spoke in a familiar manner, Dr. G. A. Perkins entertained some of the many guests by his microscope.

Concerts.—Under the personal direction of the curator of Music, four concerts have been given with much credit to the Society as musical performances. The twelfth season: 1st, Monday, Nov. 15, 1880, by Lilian Bailey and Mr. John A. Preston; 2d, Monday, Nov. 22, Miss A. L. Gage, Mrs. Jennie M. Noyes, Mr. Geo. W. Want, Mr. C. E. Hay; 3d, Monday, Dec. 6, by B. J. Lang, Pianoforte, Charles N. Allen and Gustav Dannreuther, violins, Henry Heindl, viola, Wulf Fries, violoncello, Miss Grace F. Dalton; 4th, Monday Jan. 10, 1881, by Miss E. W. Archer, Miss H. A. Brooks, Miss G. E. Machado, Mr. C. A. Clark, Mr. J. Phippen, Jr., pianist, Dr. S. C. Bullard, baritone. Monday, Jan. 28, 1881, a Piano recital by Joshua Phippen, Jr., assisted by Miss Ita Welsh.

Publications have been issued as heretofore,—the Bulletin, vol. xii, and the Historical Collections, vol. xvii. The exchange list, with few exceptions, continues about the same as last year. In the opinion of persons competent to judge they are becoming more and more valuable, and this estimate seems to be strengthened by the fact that historical societies and libraries are anxious to

procure them and there is an increasing demand from individuals and the book-trade.

LIBRARY. — The additions to the Library for the year (May, 1880 to May, 1881) have been as follows.

By Donation.

Folios,	10
Quartos,	178
Octavos,	506
Duodecimos,	280
Sexdecimos,	222
Octodecimos,	18
Total of bound volumes,	1214
Pamphlets and serials,	6171
Total of donations,	7385

By Exchange.

Folios,	1
Quartos,	15
Octavos,	52
Duodecimos,	3
Sexdecimos,	2
Total of bound volumes,	73
Pamphlets and serials,	1238
Total of exchanges,	1311

By Purchase.

Quartos,	3
Octavos,	41
Duodecimos,	10
Sexdecimos,	3
Total of bound volumes,	57
Pamphlets and serials,	39
Total of purchases,	96
Total of donations,	7385
Total of exchanges,	1311
Total by purchase,	96
Total of additions,	8792

Of the total number of pamphlets and serials, 3,362 were pamphlets, and 4,086 were serials.

The donations to the Library for the year have been received from one hundred and sixty-five individuals and forty-six societies and departments of the General and State

governments. The exchanges from seven individuals, one hundred and fourteen societies and incorporate institutions of which sixty-four are foreign; also from editors and publishers.

The annual examination of the Library has been made. Twelve volumes are missing from their places.

Donations or exchanges have been received from the following:—

	Vols.	Pam.
Abbott, Francis E., Cambridge, Mass.,	1	
Abbott, Dr. Charles C., Trenton, N. J.,	1	3
Adams, Prof. H. B., Amherst, Mass.,		2
Adelaide, Philosophical Society,		1
Almy, James F.,	1	
Alnwick, Bernwickshire Naturalists' Field Club,		1
Altenburg, Naturforschende Gesellschaft des Osterlandes		1
American Association Advancement of Science,	1	1
American Social Science Association,		1
Amiens, Société Linnéenne du Nord de la France,	6	4
Anagnos, M., So. Boston, Mass.,		1
Andrews, Mrs. James H.,		1
Andrews, William P.,		52
Appleton, W. S., Boston, Mass.,		2
Archer, A. J.,		1
Atkinson, William P.,	1	
Atwood, Rev. E. S.,		70
Baker, W. S., Philadelphia, Pa.,	1	
Baltimore, Maryland Historical Society		1
Baltimore, Md., Peabody Institute,		1
Bancroft, C. F. P., Andover, Mass.,		2
Barenson, A. Frank,		1
Barlow, Mrs. John,	19	11
Barton, Gardner,	10	98
Barton, William G., Newspapers,	2	14
Bassett, Samuel, Chelsea, Mass.,	1	3
Batchelder, Henry M.,	1	
Beadle, Capt. William,		4
Belfast, Naturalists' Field Club,		1
Berkshire Life Insurance Company	1	
Berlin, Gesellschaft Naturforschender Freunde,		1
Berlin, Zeitschrift für die gesammten Naturwissenschaften,	1	
Bern, Naturforschende Gesellschaft,	2	
Bolles, Rev. E. C.,	11	196

	Vols.	Pam.
Bologna, Accademia delle Scienze,		1
Bonn, Naturhistorischer Verein der preussischen Rheinlande und Westphalens,	2	
Bordeaux, Société Linnéenne,		5
Boston, American Academy of Arts and Sciences,		5
Boston Athenæum,	1	
Boston, City of,	5	
Boston, City Hospital, Trustees of,	1	
Boston, Mass. General Hospital,		1
Boston, Mass. Historical Society,	1	
Boston, Mass. Horticultural Society,		2
Boston, Mass. Institute of Technology,		2
Boston, Mass. Medical Society,		1
Boston, Public Library,		5
Boston, Scientific Society,		5
Boston, Society of Natural History,	1	5
Boston, State Library of Massachusetts,	11	5
Boston, N. E. Historic Genealogical Society,	1	8
Bradlee, Rev. C. D., Boston, Mass.,		1
Braunschweig, Archiv für Anthropologie,	3	
Braunschweig, Verein für Naturwissenschaft,		1
Bremen, Naturwissenschaftlicher Verein,		3
Brinley, Francis, Newport, R. I.,		1
Bristol, Naturalists' Society,		1
Brock, R. A., Richmond, Va., Newspapers,	4	1
Brockway, Miss Adelaide M., Newburyport, Mass.,	11	1
Brooklyn, New England Society,		1
Brooks, Henry M.,	5	160
Brooks, Miss E. M. R.,		42
Brünn, Naturforschender Verein,	1	
Brunswick, Me., Bowdoin College Library,		1
Bruxelles, Société Belge de Microscopie,	1	18
Bruxelles, Société Entomologique de Belgique,	1	7
Bruxelles, Société Malacologique de Belgique,	1	8
Buckhurst Hill, Epping Forest and County of Essex Naturalists' Field Club,		5
Buffalo, Society of Natural Sciences,		1
Buffalo, Young Men's Association,		1
Bunker Hill Monument Association,		1
Burnham, J. H., Bloomington, Ill.,	30	24
Buttrick, S. B.,		1
Cable, H. M., Boston, Mass.,	2	
Calcutta, Geological Survey,	1	
Caller, J. M.,	5	1

	Vols.	Pam.
Cambridge, Harvard University Library,		11
Cambridge, Museum of Comparative Zoölogy,	1	10
Cambridge, Nuttall Ornithological Club,.		4
Carpenter, Rev. C. C., Mount Vernon, N. H.,	5	28
Case, L. B., Richmond, Ind.,		3
Case, Theo. S., Kansas City, Mo.,		1
Chadwick, Jas. R., Boston, Mass.,		2
Chadwick, Harrison E., Bradford, Mass.,		1
Chamberlain, Samuel,	1	
Chandler, Gardner L.,	57	7
Cheever, A. W., Sheldonville, Mass.,		53
Chicago, Historical Society,		2
Chicago, Illinois Association Sons of Vermont,		1
Choate, Mrs. George F.,	42	
Cincinnati, Public Library,	2	
Cody, P. J., Peabody, Mass., Newspapers.		
Cole, Miss C. J.,		2
Cole, Mrs. N. D., Newspapers.		18
Collett, Prof. John, Indianapolis, Ind.,	1	
Columbia, Missouri State University,		1
Cooke, Caleb, Estate of the late,	47	216
Copenhague, Académie Royale,		1
Copenhague, Société Royale des Antiquaries du Nord,		3
Crosby, Mrs. M. K.,	9	133
Crosby, Nathan, Lowell, Mass.,		1
Cutter, Abram E., Charlestown, Mass.,		1
Dana, Rev. M. McG., St. Paul, Minn.,		3
Danzig, Naturforschende Gesellschaft,	2	
Darmstadt, Verein für Erdkunde,		1
Davenport, Academy of Natural Sciences,		2
Deblois, T. M., St. John, N. B.	1	
De Borre, Alf. Preudhomme,		1
Devereux, John James, Estate of the late,	1	
Doolittle, Miss E., Troy, N. Y.,		1
Dorchester, First Church,		1
Dresden, Naturwissenschaftliche Gesellschaft "Isis"		3
Dresden, Verein für Erdkunde,		3
Dublin, Royal Irish Academy,	3	2
Dublin, Royal Society,		24
Dudley, Rev. M. S., Cromwell, Conn.,		1
Emden, Naturforschende Gesellschaft,		1
Erfurt, Konigl, Akademie Gemeinnütziger Wissenschaften,		1
Essex Agricultural Society,		1
		2

	Vols.	Pam.
Eustis, Prof. H. L., Cambridge, Mass.,		1
Fall River, Public Library,		1
Farrier, George H., Jersey City, N. J.,		1
Fewkes, J. Walter, Cambridge, Mass.,		7
Flanders, Rev. G. T., Lowell, Mass.,		3
Flint, Mrs. Simeon, Newspapers,	28	127
Folsam, A. A., Boston, Mass.,		1
Foote and Horton, Newspapers.		
Frankfurt, Zoologische Gesellschaft,		5
Gerard, James W., New York, N. Y.,		1
Giessen, Oberhessische Gesellschaft für Natur und Heilkunde,		1
Gillis, James A.,		193
Goodell, A. C. jr., Newspapers,		1
Green, Samuel A., Boston, Mass.,	50	274
Green, Samuel S., Worcester, Mass.,		2
Groton, Town of,		2
Hagar, D. B.,		2
Hale, Rev. E. E., Boston, Mass.,		277
Halifax, Nova Scotian Institute of Natural Science,		1
Hall, Prof. E. W., Waterville, Me.,		2
Hamburg, Naturwissenschaftlicher Verein,		2
Harlem, Société Hollandaise des Sciences,		3
Harris, Mrs. George O.,		91
Hart, Charles Henry, Philadelphia, Penn.,		2
Henry, James, Trustees of the late,		1
Higbee, Charles H., Boston, Mass.,	1	8
Hobart Town, Royal Society of Tasmania,	1	
Hodges, Osgood, Estate of the late,	63	142
Holmes, John C., Detroit, Michigan,	1	1
Horton, N. A.,		60
Hunnewell, James F., Boston, Mass.,	1	6
Hunt, T. F.,	36	130
Ill. State Agricultural Society,		2
Ill. State Board of Agriculture,	1	
Israel, Rev. Fielder, Newspapers,	11	43
Ives, Henry P.,		7
J., C. T.		1
James, Davis L.,		1
James, Joseph F.,		2
Jenison, O. A., Lansing, Michigan,	1	3
Jewett, Rev. George B.,	4	
Kato, H., Tokio, Japan,	1	
Kimball, James, Newspapers,		18
Kimball, Mrs. James, Newspapers,		108

	Vols.	Pam.
King, Henry F., ... Newspapers,	101	261
Kittredge, Miss H. A , No. Andover, Mass., . .	1	
Kittredge, Miss Mary H., ...	17	43
Kittredge, Misses, No. Andover, Mass., . . .	14	
Kjöbenhavn, Kongelige Danibee Videnskabernes Selskab,		1
Königsburg, Physikalisch-Okohomische Gesellschaft,		6
Landis, Mrs. Henry D., Philadelphia, Pa., . . .	1	
Lausanne, Société Vaudoise des Sciences Naturelles,		1
Lawrence, Public Library, ...		5
Lee, F. H., ... Newspapers,	3	158
Lee, Leslie A., Brunswick, Me., ...		1
Le Mans, Société d'Agriculture, Sciences et Arts de Sarthe,		2
Lick Observatory, Trustees of, ...		1
London, Royal Society, ...		9
Loring, George B., ...		1
Lovell, John, Montreal, Canada, ...	6	
Lowell, Old Residents' Historical Association, . .		1
Lyon, Académie des Sciences, Belles-Lettres et Arts, .	1	
Lyon, Société d'Agriculture, d'Histoire Naturelle et des Arts Utiles, ... Atlas,	2	
Lyon, Société Linnéenne, ...	2	
Mack, Miss Esther C., ...	22	273
Mack, William, ... Newspapers,		120
Madison, Wis., Department of Public Property, . .	1	
Manning, Francis H., Boston, Mass., . . Atlas,	1	
Manning, Robert, ... Newspapers,	1	58
Marshall, John W., Rockport, Mass., ...	1	
Mason, Prof. Otis T., Washington, D. C., . . .		3
McCalla & Stavely, ...		1
Meek, Henry M., ...	1	
Mexico, Museo Nacional, ...		2
Middletown, Scientific Association, ...		1
Miller, Lewis F., ...	2	
Milwaukee, Wisconsin Natural History Society, . .		1
Montpelier, Vt. Historical Society		1
Montpelier, Vermont State Library, . Newspapers.		
Montreal, Canada, Geological Survey, ...	1	
Morrison, N. J., Springfield, Mo., ...		1
Morse, Prof. E. S., ...	1	13
Moulton, John T., Lynn, Mass., ...		1
München, Königlich Bayerischen Akademie der Wissenschaften, ...		1
Myer, Albert J., Washington, D. C., ...	1	
Neal, Theo. A., Boston, Mass., ...		1

	Vols.	Pam.
Neubrandenburg, Verein der Freunde der Naturgeschichte in Meklenburg,	1	1
Nevins, W. S., Newspapers,		20
Newark, New Jersey Historical Society,	1	1
New Bedford, Free Public Library,		1
New Haven, Yale College Library,	1	1
New York, Academy of Sciences,		13
New York, American Geographical Society,		6
New York, Astor Library,	5	11
New York, Chamber of Commerce,	2	
New York, Genealogical Biographical Society,		4
New York, Mercantile Library Association,		1
Nichols, Andrew, jr.,		1
Oliver, Gen. Henry K.,	25	185
Packard, Rev. Philo W.,		1
Palfray, Charles W.,	113	295
Paris, Société d'Acclimatation,		12
Paris, Société d'Anthropologie,		4
Paris, Société des Etudes Historiques,		4
Peabody, George L.,	2	1
Peabody, John P.,	1	12
Peabody, Mass., Peabody Institute,	1	1
Peele, Miss Eliza,		20
Peet, Rev. S. D., Clinton, Wis.,		4
Peirce, B. O., Beverly, Mass.,	6	
Peirce, Henry B., Boston, Mass.,	10	1
Pennsylvania, University Medical Department,		1
Perkins, A. C., Exeter, N. H.,		5
Perkins, Henry, Philadelphia, Pa.,	3	16
Perley, Sidney, Boxford, Mass.,	1	2
Philadelphia, American Philosophical Society,		3
Philadelphia, Library Company,		2
Philadelphia, Numismatic and Antiquarian Society,		5
Philadelphia, Pennsylvania Historical Society,		4
Philadelphia, Zoölogical Society,		2
Phillips, Henry, Jr., Philadelphia, Pa.,		4
Phippen, J. H.,	45	77
Pickering, Miss Mary O.,	7	5
Plumer, Miss Mary N.,		1
Poole, Wellington, Wenham, Mass.,		2
Poole, W. F., Chicago, Ill.,		1
Pope, Miss Sarah N.,		40
Powell, J. W., Washington, D. C.,		1
Preston, Chas. P., Danvers, Mass.,		1

	Vols.	Pam.
Providence, Public Library,	1	
Providence, R. I. Historical Society,		2
Putnam, Mrs. Eben,	1	52
Putnam, F. W., Cambridge, Mass.,		7
Rantoul, R. S.,		1
Richardson, F. P.,		3
Robinson, John,	1	44
Ropes, Joseph,		12
Salem, Essex Lodge F. and A. Masons,	1	
Salem, Ladies' Centennial Committee,	11	29
Salem, Peabody Academy of Science,		6
Sampson, Davenport & Co., Boston, Mass.,	23	
San Francisco, Mercantile Library Association,		1
Savannah, Georgia Historical Society,		1
Scott, Lewis A., Philadelphia, Penn.,		1
S'Gravenhage, Nederlandsche Entomologische Vereeniging,		2
Shanghai, North China Branch of the Royal Asiatic Society,		2
Silsbee, Mrs. B. H.,	55	65
Smith, Everett, Portland, Me.,		1
So. Hadley, Mt. Holyoke Female Seminary,		1
Springfield, Mo., Drury College Library,	2	61
Stearns, Robert E. C., San Francisco, Cal.,		1
Stickney, G. A. D.,	2	
Stilson, Arthur C., Ottumroa, Ia.,		1
St. Louis, Missouri, Historical Society,		3
St. Louis, Public School Library,		5
Stockholm, Académie Royale des Sciences,		4
Stone, Rev. Edwin M., Providence, R. I.,	1	2
Stone, Miss Mary H.,		349
Stone, Robert, Newspapers,		
St. Paul, Minnesota Historical Society,		5
St. Pétersbourg, Académie Impériale des Sciences,		11
St. Pétersbourg, Jardin Impérial de Botanique,		2
Sydney, Royal Society of New South Wales,	6	
Tasmania, Government of,	1	
Taunton, Eng., Somersetshire Archæological and Natural History Society,	1	
Taunton, Old Colony Historical Society,		1
Taunton, Public Library,		1
Thomas, W. W., jr., Portland, Me.,	1	
Thomson, Peter G., Cincinnati, O.,	1	
Topeka, Kansas State Historical Society,		1

	Vols.	Pam.
Trafford, François W. C.,		1
Tromso Museum,		1
Underhill, J. W., Cincinnati, O.,	1	
Unknown,		40
Upsal, Société Royale des Sciences,		3
U. S. Bureau of Education,	1	18
U. S. Commission of Fish and Fisheries,	1	
U. S. Department of the Interior,	59	13
U. S. Department of State,	1	7
U. S. Engineer Department,	3	1
U. S. Life Saving Service,	1	
U. S. Lighthouse Board,	11	6
U. S. National Museum,		1
U. S. Naval Observatory,	1	
U. S. Patent Office,	1	54
U. S. Treasury Department,	1	
Utica, N. Y., Oneida Historical Society,		1
Washington, D. C., Smithsonian Institution,	14	
Waters, H. F.,		54
Waters, J. Linton, Newspapers,	4	106
Waters, Stanley, Newspapers,	114	721
Weymouth, Historical Society,	1	
Wheatland, H.,		23
Wheatland, Miss Martha G., Newspapers,		
Wheeler, George M., Washington, D. C.,	5	
Whipple, George M.,		17
Whitcher, Mary, Shaker Village, N. H.,	4	21
Whitney, Mrs. Mary W., Lawrence, Mass., Newspapers,	2	6
Whittlesey, Col. Chas., Cleveland, O.,		1
Wien, Verein zur Verbreitung Naturwissenschaftlicher Kenntnisse,	1	
Wein, K. K. Zoologisch-botanische Gesellschaft,	1	
Wilkesbarre, Pa., Wyoming Historical and Geological Society,		1
Willson, Rev. E. B.,		18
Willson, Rob't W., Cambridge, Mass.,	1	
Wilmington, Delaware Historical Society,		1
Winthrop, Robert C., Boston, Mass,		1
Woodbury, Charles Levi, Boston, Mass.,		1
Wolcott, J. W., Boston, Mass.,		1
Worcester, American Antiquarian Society,		3
Worcester, Society of Antiquity,		5
Wright, F. V.,	25	48
Würzburg, Physikalisch-medicinische Gesellschaft,		3

The following have been received from editors or publishers:—

American Bookseller.
American Journal of Science and Arts.
American Naturalist.
Antediluvian.
Beverly, N. J., Banner.
Canadian Naturalist.
Cape Ann Bulletin.
Danvers Mirror.
Essex Statesman.
European Mail.
Francis' Catalogue.
Gardener's Monthly and Horticulturist.
International Review.
Ipswich Antiquarian Papers.
Lawrence American.
Lynn Reporter.
Manataug Pebbles.
Monthly Index.
Musical Herald.
Nation.
Nature.
Newport Historical Magazine.
Newton Transcript.
Our Dumb Animals.
Peabody Press.
Peabody Reporter.
Publishers' Weekly.
Quaritch's Catalogue.
Sailors' Magazine and Seamen's Friend.
Salem Gazette.
Salem Observer.
Salem Post.
Salem Register.
Turner's Public Spirit.
Zoologischer Anzeiger.

Museum.—The specimens in natural history, including those in archæology, which have been given during the year, are on deposit with the Trustees of the Peabody Academy of Science, in accordance with previous arrangement. In addition to the above those of an historical character, or possessing artistic interest, have been arranged in the rooms. The following may be specified as contributors: Stanley Waters, Salem; J. M. Emanuel, Hong Kong, China; Mrs. C. H. Upton; E. S. Morse; Mrs. G. E. Wiggin, So. Peabody; T. O. Williams, Watertown, N. Y.; Estate of Mary C. Anderson; Augustus S. Brown; William P. Upham; William Mack; Mrs. Simeon Flint; Edwin R. Ide; Dorcas Nourse; Rev. C. C. Carpenter; Jonathan Perley; B. D. Hill, So. Peabody; E. Wheatland; Mrs. Charles Whipple, Newburyport; Stephen H. Osborne; C. W. Palfray; E. N. Walton; W. P. Andrews; J. A. Emmerton; Henry K. Oliver;

James W. Averill; Mrs. James Kimball; Mrs. B. H. Silsbee; N. A. Horton; Mrs. Charles Hoffman; Boston Public Library; Edwin C. Bolles; David Campbell; Charles T. Jenkins; Samuel Chamberlain; Leonard B. Harrington; George P. Osgood; Charles Haddock of Beverly.

MANUSCRIPTS have been received from Mrs. B. H. Silsbee; T. F. Hunt; Mrs. George Hall of Chelsea; Mrs. James Kimball; Stanley Waters; George L. Peabody; William R. Hubbard; Gilbert L. Streeter; Jonathan Perley; Mrs. Charles Whipple, Newburyport; David P. Carpenter; Mary Kittredge; Agnes F. Churchill; Charles W. Palfray; George Anderson; Mary O. Pickering.

The Secretary has arranged the log-books and sea-journals in the Library, numbering some three hundred and seventy-five, and the same will soon be indexed; several valuable additions have recently been made to this collection: contributions are solicited. These journals give a most interesting record of the commercial days of Salem, and constitute valuable material for history.

FINANCIAL. — The Treasurer's Report of the receipts and expenditures of the past year (condensed for printing).

RECEIPTS.

General Account.

Balance on hand at commencement of year		$505 11
Dividends of stocks,	$26 46	
Return tax,	11 40	
Assessments of members,	984 00	
Publications,	869 88	
Excursions, Lectures, etc. (net),	638 60	
Salem Athenæum,	193 13	
		$2,723 47

Historical.

Dividends of stocks,	65 50

Natural History and Horticulture.

Dividends of stocks,	36 00

Davis Fund.

Interest of bonds,	380 00

Ditmore Fund.

Interest of bonds and stocks,	180 00

Manuscript Fund.

Interest of Savings Bank,	21 26

Ladies' Fair Fund.

Interest of bond,	60 00

Derby Fund.

Rent of land,	30 00

Howes Fund.

Interest of bonds,	1,490 00
	$5,491 34

EXPENDITURES.

General Account.

Salem Athenæum, $350 and $175,	$525 00	
Salaries,	1,530 60	
Publications,	1,283 65	
Sundry accounts,	659 79	
		$3,999 04
Balance of Treasurer on deposit at Salem Nat. Bank.		69 76

Historical.

Books, etc.,	212 91

Natural History and Horticulture.

Book-binding, etc.,	75 00

Ditmore Fund.

Mr. Perkins' annuity,	105 00

Manuscript Fund.

Savings Bank, interest added to fund,	21 26

Howes Fund.

Purchase of bond, added to fund,	1,008 37
	$5,491 34
The invested funds of the Institute stand, at cost,	$37,716 03

The American Academy of Arts and Sciences commemorated the one hundredth anniversary of its organization, in Boston, on Wednesday, May 25, 1880. The oration by Hon. R. C. Winthrop and addresses by other gentlemen present, were delivered in the Old South Church, followed by a reception in the hall of the Academy. Delegates were present from the various scientific

societies of Europe and this country. The Institute was represented by Messrs. Hagar and Rantoul.

During the session of the American Association for the Advancement of Science at Boston, in August, 1880, the members and their friends, at the request of the Trustees of the Peabody Academy of Science and the members of the Essex Institute, visited Salem on the afternoon of Monday, the 30th of August.

After examining the libraries and collections of these institutions, the party proceeded to Kernwood, the residence of S. Endicott Peabody, Esq., who extended a cordial invitation. The extensive grounds were thrown open to the visitors, and the time was pleasantly passed until the hour for departure arrived, in listening to the music of a band, partaking of a bounteous collation, and conversing with many of the citizens of Salem and vicinity, who were invited to meet them on this interesting occasion.

The annual contributions of books, pamphlets and other printed matter to the library, valuable manuscripts and relics of the olden times to the cabinets, also paintings, engravings, maps, etc., to the general collections, indicate to the officers, members and friends of the Institute the necessity of obtaining means to provide more suitable accommodations for the proper arrangement and classification of these increasing collections, so that the same may be rendered readily accessible to the student and enquirer for historical, statistical, scientific and general information. This want is now very sensibly experienced, and it is most ardently hoped that at no distant day the public spirited friends of the Institute, of literature, the arts, the sciences and history, will liberally respond.

BULLETIN

OF THE

ESSEX INSTITUTE.

VOL. 13. SALEM; JULY, AUG., SEPT., 1881. NOS. 7, 8, 9.

VISIT TO CAMBRIDGE, WEDNESDAY, MAY 25, 1881.

BY the polite invitation of President Eliot, of Harvard University, and of Mr. F. W. Putnam and other officers having in charge the various museums, libraries, etc., that cluster around this venerable university, a party, consisting of members of the Institute and their friends, spent a very profitable and pleasant day in examining these several collections which, for the most part, have been gathered together during the past thirty years by a few devoted friends of science and of the University.

Left Salem by the 8.42 A. M. train for Boston, thence by horse cars to Memorial Hall, Cambridge, where Mr. Putnam was present to tender a cordial welcome. The party repaired to the Sanders Theatre, near by, where the program for the day was announced as follows: —

The Peabody Museum of American Archæology and Ethnology, Museum of Comparative Zoölogy, Gymnasium, Memorial Hall, Sever Hall, Library at Gore Hall, Chemical Laboratories and the Mineralogical Collections in Boylston Hall, the Botanic Garden and Herbarium, and the Observatory.

The day was fine. Many thanks are due to Mr. Putnam for his untiring efforts in contributing so largely to the enjoyment of the occasion.

MONDAY, JUNE 6, 1881.

MEETING this evening at 7.30 o'clock. The PRESIDENT in the chair. In the absence of the Secretary, Mr. W. P. Andrews was requested to act *pro tem.* Records of preceding meeting read. Donations and correspondence announced.

Messrs. Charles F. Rice and John E. Peabody, both of Salem, were elected resident members.

The recent visit to Cambridge, the cordial reception, and the facilities afforded to view the extensive and various collections, were referred to by the President, who briefly alluded to the benefactors of the University in aid of these departments.

The following resolutions were unanimously adopted, embodying the views and sentiments of the meeting, several members expressing their high appreciation of the courtesies extended.

Resolved, That the sincere thanks of the Essex Institute be tendered to President Eliot, and the several officers of Harvard College, who kindly opened the Museums, Gymnasium, Observatory, Library, and other collections under their especial charge, to the members of the Institute and their friends, during the visit to Cambridge on Wednesday, May 25th last; and for other courtesies extended to them on this interesting occasion.

Resolved, That the Secretary be directed to place these resolutions on the records, and to transmit a copy to President Eliot and his associates in the administration of the University.

The meeting then adjourned.

MONDAY, JUNE 20, 1881.

MEETING of the Institute this evening. Adjourned to Tuesday, June 21. The PRESIDENT in the chair.

Messrs. George E. Sperry and Frederick P. Richardson, both of Salem, were elected resident members.

The meeting then adjourned.

THURSDAY, JULY 7, 1881.

FIELD meeting in Rowley this day, the party leaving in the 8.10 A. M. train from Salem on the Eastern railroad. At Rowley proceeded, in carriages, to the Town Hall, where the afternoon session was held and where the baskets were deposited. From thence, under the guidance of Mr. John H. Sears, the botanical section strolled into the woods in search of plants and flowers, while others went in different directions as inclination dictated.

This is an old and interesting town and was incorporated in 1639. It was named by Ezekiel Rogers, its early settler, for a Parish in York County, England. It had a fulling mill, owned by John Pearson, as early as 1643, and its first grist-mill was erected on Mill river, two years later, by Thomas Nelson. At the earliest period it was quite

noted for the manufacture, by the old process, of cotton hemp and flax cloth. Winthrop, in 1643, said that in this respect "Rowley exceeded all other towns."

The present appearance of the town is not uninteresting. It is a rural community, and not a few of its families date back from the beginning of the settlement. As in many of the old New England towns, some of its children, from an early period to the present time, have been wont to leave the old homestead, to colonize new places, or to seek the centres of trade, commerce and manufactures. This migratory propensity of our people has largely conduced to the settling of the extensive territory, constituting nearly, if not quite, the present area of the United States, under one general government, divided into states and territories. Many from the distant portions of the union, descendants of the first comers, visit, occasionally, the places where their emigrant ancestors first settled, and made for themselves homes in this, then unsettled, country.

To aid in thus perpetuating the memories of our ancestors and tracing the development of the growth of our country from these fountain heads — especially those located within the limits of the county of Essex — the germs, as it were, from which has evolved, by constant accretions, the country of to-day, is one of the leading objects of the Essex Institute.

How much the Institute has done, in this direction, can be seen by visiting its rooms in Plummer Hall, Salem, or in examining its various publications, treating on these and kindred subjects. What progress it will make in the future will largely depend upon the encouragement and support it receives from the citizens of the county, from those who have removed therefrom and made their homes

elsewhere, and from that class of large-hearted persons, whose mission appears to be the encouragement of all movements that tend to the advancement of general culture and the happiness of mankind.

Lunch was provided at 1.30 P. M. The afternoon session was held at 3 o'clock. The PRESIDENT in the chair. Records read by the Secretary.

MR. JOHN H. SEARS exhibited the flowers and plants collected during the day, describing the same with appropriate remarks. The following may be specified.

1 **Lupinus perennis** (*Wild Lupin*).
2 **Melampyrum Americanum** (*Cow Wheat*).
3 **Callitriche verna** (*Water Starworts*).
4 **Archangelica atropurpurea** (*Gt. Angelica*).
5 **Iris Virginica** (*Slender Blue Flag*).
6 **Raphanus raphanistrum** (*Charlok*).
7 **Rudbeckia hirta** (*Cone flower*).
8 **Calopogon pulchellus** (*Calopogon*).
9 **Hypoxys erecta** (*Star grass*).

MISS MARY N. PLUMER, of the State Normal School, Salem, read a very interesting and instructive paper on "The Dissemination of Seeds." See the paper on pages 121–147.

REV. JOHN PIKE, D. D., responding to the call of the chair, pointed out wherein certain features of nature are always the same, and, among other things, said that science and religion, that is, the best science and the highest religion, are going hand in hand.

REV. G. M. HARMON, of Peabody, spoke of the work of the "Village Improvement Societies" of western Mas-

sachusetts, the object of these organizations being the general improvement of the smaller towns of the state, the planting of trees, the laying out of parks, the matter of drainage, the removal of unsightly fences and other objects, etc.

Rev. Charles C. Bruce, of Rowley (one of Dr. Pike's successors), spoke of the practical effects of an increased knowledge of scientific things and of its value to man. He thought that religion had been advanced by science, and that it was now an exploded idea that science will subvert religion.

Mr. N. A. Horton alluded briefly to some of the historical incidents of the place,—a town old and interesting, a town of public spirit. He spoke of the history of Rowley, and in a humorous way alluded to the vexed question between Boxford and Rowley, as to which should have the credit of the capture of the cannon Nancy. Mr. Horton also offered votes of thanks to the selectmen of Rowley for the use of the town hall; to the town clerk, and the clergymen of the town; to Mrs. Sarah W. Cressy for polite attentions and for refreshments; and to the people generally for courtesies tendered the party.

Mr. John Robinson offered a vote of thanks to Miss Plumer for the paper of the day, speaking in complimentary terms of her treatment of the subject.

The above votes were unanimously adopted. The meeting then adjourned.

DISSEMINATION OF SEEDS.

BY MARY N. PLUMER.

THE one great object of the plant from the time of germination until the time of death is to provide nourishment for the formation and perfecting of the fruit, for the production and ripening of seeds. For this purpose every plant was created; for this, it exists; for this, it clings to life with wonderful tenacity under conditions the most adverse.

Varied as are seeds in their external form, their internal structure shows that all are adapted to the same great end, the forming of plants which shall possess the prominent characteristics of the mother plants. Each one contains, neatly packed away, all of the parts essential to the formation of a new plant; each one, although showing no signs of life, has within itself the principle of life, destined under favorable conditions to display itself. With truth has it been said that "the seed may be considered as that link in the chain of vegetable existence which binds the old plant to the new."

It has been found by careful examination that, from a morphological point of view, terminal ovules or seeds must be considered as the terminal portion of an axis, the lateral ones as equivalents of whole leaves, the marginal as branches of leaves (lobes, pinnæ, etc.). During the process of development, changes take place in the structure and texture of these parts by which they become fitted to perform the special offices assigned to them. When they have reached the stage of maturity, they separate, sooner or later, from the parent plant and, either

alone or surrounded by the pericarp, fall to the ground. Here, under peculiar and favorable circumstances, they germinate, continue to grow, and develop into new individuals possessing the important characteristics of the plants which produced them.

So long as scientific men believed that "the several species of plants were special creations formed to live in those countries in which now found," their habitat and mode of perpetuation called for no discussion; they were facts requiring no explanation. At the present time, however, with the advance that has been made in the study of plants, we find ourselves obliged to inquire what provision has been made for the dissemination of the seed; how it has come to pass that the same plants are found as members of the floras of countries widely separated; how that natives of the mountain-tops of certain lands are found, apparently growing wild, in polar regions far away; how that the fossil plants of some lands are the living plants of others; how that the plants of tropical regions are sometimes found flourishing on distant shores.

The answering of these questions is a work by no means easy since so many elements enter into the consideration, each one in itself important and each requiring a large amount of careful consideration. To understand fully all the means provided by nature for bringing about these results, we need a complete knowledge of the flora of the whole world, of the natural classification of living plants, of the forms of plant-life existing thousands of years ago but now extinct, of the known effect of changes in climate upon living organisms, of the changes that have been made in the relative position of land and water upon our earth, of the modern theory of the "origin and development of species."

"It is a law of nature that plants shall be diffused as widely as possible wherever the circumstances are favorable for their growth and welfare." The agents employed in the carrying out of this law with reference to plants are more numerous than those employed in the distribution of any other class of objects. This is largely due to their mode of propagation by seeds, to the length of time that seeds retain vitality, to the great extremes of heat and cold, of drought and moisture which they can endure without injury to the germ.

First among the natural modes of dissemination of the seed, because the most common, may be mentioned that produced by the action of the wind.

DISSEMINATION OF SEEDS BY THE WIND.

The wind is one of the most efficient agents in the dispersion of seeds. The seeds formed by very many plants are minute, almost microscopic in size, and, when the seed-vessels which contained them burst, they float in the air until they reach a suitable place in which to germinate. Here signs of life begin to manifest themselves, the seeds burst their outer coverings, roots are formed, stems and leaves expand, and under the influence of light, heat, air, and moisture, plants flourish which, in their turn, develop seeds and scatter them broadcast through the air. The spores of lichens, mosses, and ferns are in this way scattered by the wind and, being very numerous, wherever the soil is adapted to the growth of such plants they cover it with their peculiar verdure and in many cases fit it for the growth of higher orders of plants. The seeds of many flowering plants are small, but very abundant. They are enclosed in peculiar capsules and, as these are moved to and fro by the wind, the seeds are scattered

far and wide. When we think how small, how inconspicuous these seeds and the spores which in Cryptogams take the place of seeds are, we do not wonder that we have either no ocular proof or but little such proof of this method of their transportation.

Many seeds are specially adapted for transportation by the wind from one place to another. This is peculiarly true of the seeds of the Compositæ many of which are furnished with a feathery appendage evidently designed to assist in the carrying of the seeds to a distance. As illustrations may be mentioned the *Taraxacum*, *Leontodon*, *Cirsium*, *Erechthites*, *Senecio*, *Gnaphalium*, and *Solidago*, popularly known as the spring and fall dandelions, thistle, fireweed, groundsel, everlasting, and goldenrod. These plants are members of the largest family of the vegetable kingdom and, if we consider the structure of their flowers, we shall be at no loss to decide why the family is so numerous and so widely scattered.

The *Taraxacum dens-leonis*, dandelion, may serve as the flower to be specially studied. With its brilliantly colored head resembling a flower, we are all familiar. The apparently single blossom is really a cluster of many sessile florets crowded together upon a common receptacle and surrounded by an involucre. Each floret is an illustration of the changes in shape which the organs of plants undergo in their adaptation to certain ends. The limb of its calyx is reduced to a tuft of hairs; the five little notches at the end of its strap-shaped corolla show how its five petals have been united into a gamopetalous corolla and altered from the tubular form by being split down the side and laid open; its stamens are united by their anthers around the forked style of the pistil. The tube of the calyx is incorporated with the surface of the ovary while its limb separates into a circle of hairs called

pappus and remains attached to the rostrate or beaked achenium; this pappus is persistent, increases with the ripening of the seed and, when the achenium with this light downy appendage is removed by natural or artificial means from the receptacle, it is borne hither and thither by the wind until it reaches a resting place where it germinates under favoring circumstances and, it may be, far from the plant which produced it.

Every breath of wind blows off the ripened seeds of the dandelion and carries them to places far and near so that we are not surprised that the weed is found "through Europe and Asia, from Arctic latitudes to Algeria and India, from Greenland to the Straits of Magellan; in Japan and New Zealand as well as in the Canary Islands; and on the Andes and Himalayas at an altitude of from 11,000 to 18,000 feet."

The thistle, which has become naturalized to such an extent as to have become in some parts of North America a perfect pest, is furnished with a similar silky appendage. When permitted to mature its fruit, the long spreading pappus, very large in proportion to the size of the seed, may be seen floating the achenia by hundreds through the air and thus disseminating the intruder far and wide.

Erigeron Canadense, a very common weed furnished with a similar pappus, was carried from America to a botanical garden in Paris and Linnæus said that "in less than a hundred years the seeds had been so distributed by the wind that it flourished in France, the British Islands, Italy, Sicily, Holland, and Germany."

In an article on the distribution of plants, A. R. Wallace says "When we consider the enormous quantity of seeds produced by plants, that great numbers are more or less adapted to be carried by the wind, that winds of violent and long duration occur in most parts of the

world, we are as sure that seeds must be carried to great distances as if we had seen them so carried; such storms carry leaves, hay, dust, and many small objects to a great height."

With the peculiar globular shaped fruit of the *Platanus*, or buttonwood-tree, most are familiar. It remains suspended like a little ball from the branches of the tree during a large part of the winter until, by the action of wind and snow, it falls to the ground. There it lies until the nutlets separate when each with its tuft of hairs is carried hither and thither by the wind until it reaches a resting-place.

The styles of the *Clematis alba*, during the ripening of the seed, develop into long feathery tails which remain attached to the achenia and render the latter fitted to become scattered by the wind. While the pericarps with their richly fringed styles are attached to the receptacle, they give to the vine, as it hangs in festoons from the branches of shrubs and trees, a peculiarly attractive appearance.

The fruit of some of our forest trees, as the maple, the ash, and the elm, receives the name samara. In all except the first it is an indehiscent, one-seeded fruit, furnished with a membranous wing. This wing which assists in the dispersion of the seed is an outgrowth of the pericarp. In the ash, the wing is terminal; in the elm, it surrounds the body of the pericarp; in the maple the fruit is a double samara, that is, it consists of two united indehiscent pericarps each enclosing a seed and developed at one extremity into a wing.

The fruit of the *Liriodendron tulipifera*, tulip-tree, consists of numerous one- or two-seeded winged carpels, dry and indehiscent. These carpels consist of long flat styles imbricated in the form of a cone and, as the seeds

ripen, they become samaræ, separate from the central axis of the cone, and, being furnished with a wing, may be easily wafted to a distance by the wind.

Appendages or outgrowths of the testa, the outer covering of the seed, frequently have reference to dissemination by the wind. Such appendages belong to the seeds of dehiscent fruits, also to the peculiar fruit of cone-bearing trees. The wing of a pine seed, which is a part of the carpellary scale upon which the two ovules grow, is an example of such an outgrowth. The flowering female catkin consists of bracts arranged in a spiral upon an axis; in the axil of each bract is formed a scale which bears two ovules and which is therefore called a carpellary scale. After fertilization the imbricated scales protect the ovules as carefully as would a closed pericarp. The cones remain closed on the trees for at least one season after fertilization. When the hot weather of the next summer has continued for some time so as to dry the cones thoroughly, the scales open with a sudden spring, ejecting the seeds which, being rendered buoyant by the wing before-mentioned, are committed to the wind that the seeds may be borne away and the range of the species extended. If a number of these cones happen to open together, the noise of the cracking can be heard to a considerable distance.

Alders and birches which are so abundant in the cool regions of the northern hemisphere produce cones similar to those produced by pines, spruces, and larches, yet, in some respects, unlike them. The seeds of the birch become winged and scale-like nutlets, or small samaræ. These seeds are often carried by the wind to the lofty summits of rocks and mountain peaks and, for this reason, birches are found in all parts of northern Europe, Asia, and America where heavy seeds like those of the oak and the hickory cannot follow.

In the *Tecoma radicans*, trumpet-creeper, a beautiful climber extensively cultivated in New England, an entire wing surrounds the body of the seed. In the catalpa, a plant closely allied to the last mentioned, the testa is extended at each end into a membranous wing, fringed and comose at the ends. As the pods containing the seeds open, great numbers of seeds are liberated and quickly scattered by the wind.

The seeds of *Asclepias*, milkweed, are thin, flat, and of a brownish color. They are produced in great numbers and are arranged upon a large placenta which separates at maturity from the suture. At one end of each seed are many soft, satiny hairs called the coma. When the seeds are ripe they become separated from the placenta and the lightest breath of wind wafts them away from the follicle and to their destined resting-place. The evident design of the coma is to assist in the wide-spread distribution of the species. Many of the seeds probably fall near the plant which produced them, while chance breezes carry others to a great distance.

The seeds of *Epilobium*, or willow herb, are endowed with a similar tuft of silky hairs to assist them in their wanderings. This plant is often one of the first to grow on land which has been burned and, for this reason, it has been called in Maine and Nova Scotia fireweed. The coma of the seeds causes them to be wafted by the winds and, finding the ashes and burnt soil specially adapted to their germination and growth, they speedily take possession and flourish.

The seeds of plants belonging to the order *Salicaceæ*, the willows and the poplars, are furnished with a very abundant silky or cottony down. The abundance of this down on the fruit of one variety of poplar, *Populus balsamifera*, makes the tree a disagreeable neighbor during the period of fruiting.

"The wing and coma of seeds are functionally identical with the wing of the samara and with the pappus of the pericarp in the achenes of the Compositæ, but morphologically are unlike them."

Tilia Americana, the linden-tree, has a somewhat peculiar mode of dispersing its seeds. Its flowers appear in clusters in the upper axil of a leaf, the stem of each cluster being attached for about half its length to a ribbon-like bract of about the length of the stem. The fruit, which is a round nut of about the size of a pea, remains attached by the stem of the flower-cluster to the bract before-mentioned. As this falls from the tree the bract, moved by the wind, spins around and travels quite a distance. When, as is often the case, the tree stands on the shore of a pond or river, the seeds fall upon the surface of the water and the winged appendage, acting as a sail, wafts the seeds to various points on the opposite shore.

The structure of the pericarp in some fruits is such that by means of it they are wafted to a distance. This is true of *Staphylea trifolia*, *Colutea arborescens*, and *Cardiospermum halicacabum*, which last from its inflated capsule is called the balloon-vine. The inflated seed-vessels of these plants seem intended for the purpose of wafting the seeds by exposing to the wind a large, light body.

Many plants not possessing any of the before-mentioned peculiarities are carried off bodily by the wind to distant localities. "The rose of Jericho," *Anastatica hierochuntica*, one of the Cruciferæ, has this method of dissemination. Its short stem separates into long, spreading branches; its leaves are obovate; its flowers are small, white, sessile, and are succeeded by pods which begin to ripen on the approach of dry weather; the branches

before soft and juicy and spreading become hard and woody and curl inward so that, when the fruit is ripe, the plant appears like a curious ball on a short stem; most of the root dies and the fierce winds of autumn uproot the dead plants and carry them to a great distance. If, in its course, the ball is thrown upon a pool of water or reaches a damp place, the branches unfold under the influence of the moisture, and the pods open and discharge their seeds, it may be at a great distance from the locality where the plant developed. This plant grows abundantly in Palestine and many specimens of it have been brought from that country as curiosities. When placed in water, these plants, although they may be many years old, absorb moisture, expand, and assume the appearance of plants suddenly brought to life.

Selaginella lepidophylla, a Lycopod, native of southern California and northern Mexico, has the same strange habit; hence one of its common names, resurrection plant. When the ground where it grows becomes parched, it curls itself into a little ball, loosens itself from the earth, and is then driven over the ground by the wind. When it reaches a place suited for its growth, it uncurls itself, takes root, and flourishes until its new home becomes parched when it seeks another locality. As it is thus bodily carried from place to place, its spores are scattered by the wind and it is therefore widely disseminated in the regions fitted for its growth.

DISSEMINATION BY WHIRLWINDS, HURRICANES, ETC.

Large quantities of leaves and other vegetable débris are often carried by whirlwinds to very great heights in the air and, entering strong upper currents, may be carried far away before dropping to the surface. Mingled

with this débris may be found the spores of Cryptogams and the seeds of Phanerogams which, on reaching a soil adapted to their development, may spring up and flourish. In this way has been explained the abundant growth of certain species of plants on islands far away from the continent on which the species were indigenous.

Tornadoes, hurricanes, and cyclones often sweep along at the rate of ninety miles per hour and may carry with them heavy fruits and seeds over seas of considerable width.

DISSEMINATION CAUSED BY THE ELASTICITY OF THE PERICARP.

The pericarp of many fruits is possessed of a certain amount of elasticity. This displays itself at the time of the maturity of the seeds by causing the pericarp to open with a sudden spring and thus throwing the seeds with violence and often to a great distance. Many examples of this peculiar property might be named—among the most prominent and familiar are the capsules of *Echinocystis*, *Geranium geum*, *Fraxinella*, and *Impatiens* which discharge their seeds with a peculiarly effective jerk.

The pericarp of *Impatiens* consists of one cell opening by five valves, and is one of the most common examples. If accidentally touched when ripe, it will immediately burst open; while the valves, coiling themselves in the form of spirals, spring from the axis, discharge, and scatter the seeds. Hence the common name of one species, touch-me-not.

Mr. Thomas Meehan in an article published in the American Naturalist says, "While travelling through a wood recently, I was struck in the face by some seeds of *Hamamelis Virginica*, the common witch-hazel, with as

much force as if they were spent shot from a gun. I gathered a number of capsules to learn the cause of the projecting force and the measure of its power. Laying the capsules on the floor, I found the seeds thrown generally from four to six feet and, in one case, twelve feet away. The cause was the contracting of the horny endocarp surrounding the seed. The seeds were oval and in a smooth, bony envelope and when this had burst and expanded enough to get just beyond the middle where the seed narrowed again, the contraction of the endocarp caused the seed to slip out with force."

The woody fruit of the sand-box-tree, an American tree of the order Euphorbiaceæ, *Hura crepitans*, is composed of from twelve to eighteen cocci which, having become dry, open suddenly at the back with two valves and are detached from their axis with a kind of detonation. "These fruits have been actually surrounded by iron wires, yet the force with which they expand has been such that the valves have been separated from one another."

DISSEMINATION ASSISTED BY THE ACTION OF MOISTURE UPON THE FRUIT.

"The fruit of *Erodium gruinum*," says Sachs, "and of other Geraniaceæ splits up into five mericarps each of which has the form of a cone with the apex pointing downwards, containing the seed and bearing a long awn. When moist this awn is stretched out straight, but if it becomes dry while lying on the ground, the outer side of the awn contracts strongly, causing the upper end to describe a sickle-like curve which brings its point against the ground, the cone being thus placed with its apex downwards. The lower part of the awn now begins to

contract into narrow spiral coils, causing the cone to turn on its axis and to penetrate the ground, and the erect hairs on it which point upwards retain it there like grappling-hooks. After the cone has penetrated the ground, the twisted part of the awn does the same, driving the part which contains the seed further and further into the soil. If the mericarp now becomes moistened, the coiled part attempts to straighten itself but its coils are held by the hairs which stand on the convex surface; and this movement also contributes to drive the cone deeper into the soil. Whether therefore the moisture is greater or less, the mechanical contrivance produces the same effect, namely, to drive the part of the mericarp which contains the seed into the soil."

The twisted awn of *Avena fatua*, or wild oats, and of some other plants, seems to have been specially intended to aid the further dispersion of the seed on being discharged from the plant. This spiral awn or spring which is beset with a multitude of fine, minute hairs possesses the property of contraction by drought and of expansion by moisture; hence it remains in a perpetual state of contraction and dilatation dependent on the weather. From these changes in the length of the awn, as well as from the additional aid of the fine hairs which act as so many fulcra and cling to whatever object they meet, the seed to which it is attached remains in motion until it germinates or is destroyed. When the seeds of oats are ripe, it is said that they are projected with such violence that in a dry day one may hear them thrown out with a slight, sudden snap.

Darwin experimented with the seeds of *Stipa pennata*, feather grass, and reached conclusions nearly identical with the preceding.

DISSEMINATION FAVORED BY THE PLACE OF GERMINATION.

By a peculiar provision of nature, the increase in the number of mangrove trees is insured. The seeds of the mangrove germinate before leaving the fruit. The long, thick radicle pierces through the testa and the pericarp, and the young plant rapidly grows downward until the fruit falls off when the roots penetrate the mud. After this the plant rapidly increases until it becomes a large tree.

DISSEMINATION OF SEEDS BY MOUNTAIN STREAMS.

A mountain stream or torrent frequently washes down to the valley seeds which have accidentally fallen into it, or which the water has swept from the banks as it has overflowed them. These, as one stream unites with another until a broad river is formed, are carried by it to remote localities sometimes to the mouth, and there, if they are dropped upon a soil suited to their growth, the seeds spring into life and cause a growth of plants unlike those in the vicinity. Thus the shores of the Baltic are visited by seeds from the interior of Germany; the shores of the Gulf of Mexico, by seeds from the northern and western parts of the United States.

DISSEMINATION BY RIVER-RAFTS.

In large rivers there is often found a formation called a river-raft; it consists of pieces of logs and timber fastened together by various substances which they have collected in their journey from the source of the river. These constantly increase in size and sometimes form a natural bridge across the river. Sometimes in the débris,

consisting of rich soil from the forests through which the stream flows, seeds germinate and, as the depth of soil increases, the plants springing from these seeds flourish with unwonted vigor hundreds of miles from the places where these seeds were formed and ripened. In some cases they have been seen covered with a growth of green bushes and small trees.

Rivers running east or west carry seeds and extend the limits of species, while those running north or south are not so likely to carry the seeds to a climate suited to their development.

Sir Charles Lyell tells us, in his Geology, that, among the Moluccas, floating islands, similar to the river-rafts before-mentioned, are often seen. On these, mangrove trees as well as undershrubs and a multitude of smaller plants flourish. Similar rafts with trees on them have been seen after hurricanes in the neighborhood of the Philippine Islands.

DISSEMINATION BY ICEBERGS.

Icebergs are very often loaded with débris in which earth and seeds may be found. The seeds germinate and plants begin to grow in the alluvial soil of the iceberg, sometimes becoming of considerable size. If the iceberg, driven by currents and winds, is at last stranded on some distant shore, these wandering plants may become permanently established.

DISSEMINATION BY OCEAN-CURRENTS.

Ocean-currents, too, are efficient carriers of plants and of seeds. The seeds of grasses and sedges are often enveloped in chaffy glumes; thus protected they may be

carried by the wind over long distances and, if dropped into the sea, may reach land by means of surface currents. The grasses are mostly wind-fertilized and can therefore establish themselves in any place whose climate and soil are adapted to the germination of the seeds and to the growth of the plants.

Heavy seeds and dry fruits, especially if inclosed in a hard shell, may be exposed for a long time to sea-water without injury to their vitality; they may be conveyed across the sea for long distances by winds and surface-currents. Double cocoa-nuts cross the Indian Ocean from the Seychelle Islands to the coast of Sumatra. West Indian beans frequently reach the west coast of Scotland. "Large seeds which have floated from Madagascar and Mauritius, around the Cape of Good Hope, have been thrown on the shores of St. Helena and have there sometimes germinated."

When once established in climate and soil adapted to their habits and constitution, plants soon take possession of a country, often extirpating the native plants. The cocoa planted on a coral island becomes the progenitor of a flourishing grove of cocoa palms. This is the case on islands of the Pacific whither the seeds have been carried by ocean currents.

The Gulf Stream aids greatly in this work. By its aid the seeds of West Indian plants are carried annually to the shores of Ireland, Scotland, and Nova Zembla. To Bermuda the currents carry objects, animate and inanimate, and almost without number from the Caribbean Sea. These include the seeds of shrubs and trees and of tender plants; they are frequently cast ashore and germinate. Plants on the coast of Brazil and Guiana are identical with those on the banks of the Congo and, as the seeds of those plants are capable of resisting the

action of sea-water and of retaining vitality for a long time, it is sensible to conclude that the seeds crossed the ocean.

Linnæus in speaking of this method of dissemination said, "Seeds embark upon the rivers which descend from the highest mountains of Lapland and arrive at the middle of the plains and the coasts of the seas. The ocean, too, throws, even upon the coasts of Norway, the nuts of the mahogany and the fruit of the cocoanut tree which have been borne on its waves from the far distant tropical regions; and this wonderful voyage is performed without injury to the vital energy of the seeds."

Experiments made by Darwin prove to us without doubt that this method of distribution of plants is one of the most important, though occasional, methods of producing a change in the flora of a country. In "Origin of Species," he describes several interesting experiments from which he reached the conclusion that the seeds of fourteen plants in every hundred "belonging to one country might be floated across nine hundred twenty-four miles of sea to another country, and when stranded, if blown by an inland gale to a favorable spot, would germinate."

DISSEMINATION BY GLACIAL ACTION.

In studying the geographical distribution of plants, one is struck with the identity of plants on mountain summits separated from each other by hundreds of miles of lowlands over which it seems impossible that these plants could have migrated. Thus it has been found that many species of plants living in the Alps and Pyrenees are identical with those of northern Europe; that the plants of the White Mountains are like those of Labrador and like those on the highest mountains of Europe.

Such facts as these have led to many discussions and the belief at present is that, during the Glacial Period which is plainly marked by bowlders and scored rocks in various parts of Europe and America, as the southern regions became fitted for the plants of the north these latter took the place of the original inhabitants of the warm region; those of these warm regions travelled farther south so that the soil of temperate regions became covered with plants from arctic regions and that of tropical regions with plants from the temperate regions. As this period was succeeded by one of increasing warmth, the reverse process was carried on, one result being that at its close there were found on the tops of the mountains the plants originally found in the cooler northern regions.

We can also thus understand why European and American plants are so closely allied; for then, as now, the northern lands were nearly united and the same plants probably flourished in all parts of the polar regions; as the cold period moved from north to south on certain meridians, so the plants of northern regions moved south and, with the increase in the distance between two meridians as they extend towards the equator, became scattered over broad tracts of country.

DISSEMINATION BY BIRDS.

Birds must be mentioned among the important agents in the dispersal of seeds over a broad expanse of land or of water. Many seeds are thus dispersed because their fleshy pericarps are used for food. Birds often carry cherries to some convenient place for eating the pericarp. The stone, not being useful for food, is dropped and from it there may spring up cherry trees far away from the tree which produced the fruit. In some places these are

found abundantly along stone walls on which the birds have rested.

Sometimes the seeds of plants are taken into the stomach and afterwards rejected in a fit state for germination. This is true of the seeds of berries like those of the mistletoe which the thrush swallows and afterwards deposits on the boughs of trees adapted to the growth and development of the plant. Seeds of currants are often swallowed by the blackbird and one may occasionally see a currant bush growing out of a tree upon which a seed was left by the bird in an opening in which earth had collected.

It is surprising that seeds have the power to resist the heat and digestive action of the stomach of animals, but it is undoubtedly the fact that some seeds seem to require it. An English botanist tells us that seeds of the *Magnolia glauca* carried to England refused to vegetate until they had undergone this process.

We are told that in England the brown linnet feeds upon thistle seeds and, in trying to obtain them, "perches on the top of the stalk and tears the downy head asunder in order to reach the seeds which are attached to the receptacle. During the act, many of the seeds are loosened and carried away by the breeze to places far distant from the parent stem, the bird being in this instance the indirect disseminator of the thistle. Were the head not rent asunder in this fashion it would most probably be soaked by the rains of winter and fall down only a few inches from the original stalk instead of being transported, as it frequently is, across many miles of country." "What is here told of the linnet," says Macmillan, "may be witnessed in any 'thistlery' on a fine September day when the birds are feeding in flocks."

Birds when they migrate from a colder to a warmer climate or from a warmer to a colder often carry seeds

which retain their vitality and, under favorable circumstances, grow.

Many aquatic birds build their nests on the ground far from the water's edge and, being wanderers, must often aid in the dispersal of seeds having hispid awns, hooks, or prickles by which they become fastened to the feathers of the birds. Some species of birds burrow in the soil and in burrowing get their feathers covered with vegetable mould which may contain seeds and spores in large numbers. Earth often becomes attached to the plumage of ground-nesting birds or to the feet of aquatic birds, and Darwin has proved by actual experiment that all such earth contains seeds. On page 328, "Origin of Species," he says, "Although the beaks and feet of birds are generally clean, earth sometimes adheres to them. . . . . The leg of a woodcock was sent to me by a friend, with a little cake of dry earth weighing only nine grains attached to the shank; and this contained a seed of toad-rush which germinated and flowered. . . . . Prof. Newton sent me the leg of a red-legged partridge which had been wounded and could not fly, with a ball of hard earth adhering to it and weighing six and a half ounces. The earth had been kept three years, but when broken, watered, and placed under a bell-glass, no less than eighty-two plants sprang from it. . . . . With such facts before us, can we doubt that the many birds which are annually blown by gales across great spaces of ocean, and which annually migrate, for instance the millions of quails across the Mediterranean, must occasionally transport a few seeds embedded in dirt adhering to their feet or beaks?" . . . . "Wading birds wander more than those of any other order. They frequent the muddy edges of ponds and are most likely to have muddy feet. They are occasionally found on the most remote and barren islands of

the open ocean; they would not be likely to alight on the surface of the sea, so that any dirt on their feet would not be washed off; and, when gaining the land, they would be sure to fly to their natural fresh-water haunts." Darwin tried several experiments to show that the mud of ponds is charged with seeds, the most striking one being the following:—"I took in February," he says, "three tablespoonfuls of mud from three different points, beneath water, on the edge of a little pond; this mud, when dried, weighed only six and three-fourths ounces. I kept it covered up in my study for six months, pulling up and counting each plant as it grew. The plants were of many kinds and were five hundred thirty-seven in number, and yet the viscid mud was all contained in a breakfast cup! Considering these facts, it would be an inexplicable circumstance if water-birds did not transport the seeds of fresh-water plants to unstocked ponds and streams situated at very distant points."

When considering birds as seed-carriers, the "succession of forest-trees," a subject about which much has been written, is naturally suggested. When a forest springs up naturally where none of its kind has been known to exist, we do not hesitate to say that it sprang from seeds. The lighter seeds, as maples and pines, were carried by the wind; the heavier, as nuts and acorns, by birds and squirrels. When an oak wood is cut down, a pine forest does not immediately spring up, unless in the neighborhood there are pine trees. This is a view opposed to that of many who suppose that in this and in similar cases the trees of the new forest have sprung from seeds spontaneously produced, or which have lain dormant for hundreds of years, or which may have been led to show signs of life by heat from a fire. So, too, when a pine forest is succeeded by an oak, the explanation is simple. Squir-

rels are known to carry to pine forests stores of acorns and other nuts and there conceal them for future use. In some cases the squirrels are killed; in others they neglect to return to the storehouse; and the result is the germination of many of the seeds in the succeeding spring. For this reason, we often find little oaks and hickories springing up in pine forests, and, if the pines are cut down or in any way destroyed, the trees which have already commenced to grow will assert themselves, and the hard woods will succeed the soft.

William Bartram, an American naturalist of the last century, wrote as follows: — "The jay is one of the most useful agents in the economy of nature for disseminating forest-trees and other nuciferous and hard-seeded vegetables on which they feed. Their chief employment during the autumnal season is foraging to supply their winter stores. In performing this necessary duty they drop abundance of seed in their flight over fields and hedges and by fences on which they alight to deposit the seeds in the post-holes, etc. It is remarkable what numbers of young trees rise up in fields and pastures after a wet winter and spring. These birds alone are capable in a few years' time to replant all the cleared lands."

DISSEMINATION BY ANIMALS.

Many seeds attach themselves, by means of hooks and hairs, to the bodies of animals which come in contact with the plant in their search for food, and thus become involuntary agents in the dissemination of the seed. The hooks or hairs serve as points of attachment, and by them the seed remains fixed so that it may be carried about by the animal until detached by some accident and committed to the soil. In *Bidens* and *Myosotis*, the hooks are at-

tached to the seeds themselves; in *Galium aparine*, to the pericarp; in the thistle and burdock, to the involucre; in *Agrimonia*, to the dry calyx. In some species of *Geum*, the style becomes hooked at the tip for adhesion to the fleece of animals. The jointed pods of *Desmodium* attach themselves by means of minute hairs to the fleece of animals or to clothing and are thus readily carried from place to place.

Squirrels, as before-mentioned, often hoard large quantities of fruit, sometimes burying it in the ground and at others in hollows in the trunks of trees. When this supply is discovered by an animal not caring for the fruit, it is often scattered, and, coming in contact with the moist earth, the seeds germinate. This means of the dispersion of the seeds was noticed by the Indians, who had a tradition that squirrels planted all the timber of this country.

Certain quadrupeds, particularly the grass-eating, as the reindeer which live on the plains of Siberia, and which at certain seasons migrate in herds, assist in the dispersion of seeds.

Darwin states that he found that many fresh-water fish consumed the seeds of land and water plants, that these fish were eaten by birds, such as the heron, and that by the birds, as they took their flight and went to other waters, the seeds were transported, it might be, many miles from the place where they were eaten by the fish.

MAN THE DISSEMINATOR OF SEEDS.

While birds and the lower animals are involuntary agents in the distribution of seeds, man voluntarily and purposely introduces plants from one country to another. This he does from various motives, the most prominent being the desire to cultivate useful plants and to beautify

his home. Sometimes, too, he becomes the unintentional agent in disseminating seeds, as when with the seeds of wheat he introduces those of noxious weeds.

From the history of the different nations of the world we learn how, by wars and by the frequent migration of tribes, plants were carried from country to country. In Europe, even in modern times, armies have been known to carry grains and cultivated vegetables from one extremity of the continent to the other during the time of wars. Great numbers of new plants have been found in France in the vicinity of places to which the Germans carried food for their horses.

From the time of the discovery of our own land to the present time, we have been receiving additions to our native plants and freely giving of our own to other nations. Among the plants earliest introduced were those useful for food and medicine, such as the various cereals, apples, pears, quinces, etc., *Datura*, *Verbascum*, *Tanacetum*, *Artemisia*. Plants useful in the arts were soon added to the number cultivated, while those with beautiful flowers or foliage quickly followed, and those remarkable for peculiarities in structure were not omitted from the list of introduced or exotic plants.

When the introduction of these plants is of recent date, we have no difficulty in tracing the origin, but when such introduction took place a long time ago it is difficult, almost impossible, to do so, and especially difficult because the number introduced unintentionally is in excess of the number introduced intentionally.

The common plantain, called by the Indians "the white man's foot," follows the steps of the European. One species has become so extensively naturalized as to have become a nuisance in some sections of the United States. Its seeds are of about the size and weight of those of red

clover and, when once mixed with the latter, cannot be readily separated, and hence in cultivating the clover the plantain is disseminated.

Chickweed, called by the New England savage "the mark of the pale face," is a native of Europe, but is now found in nearly all parts of the world.

Some of our most troublesome weeds have been brought to us from Europe. *Cirsium arvense*, *Onopordum Acanthium*, and *Lappa officinalis*, better known, perhaps, by the names, Canada thistle, cotton thistle, and burdock, are very common examples of such plants. *Taraxacum dens-leonis*, the common dandelion, too, is a foreign plant, not very disagreeable, but so thoroughly naturalized as to be more abundant than welcome in some pastures and meadows. Whiteweed, called now by the more euphonious name, Marguerites, is another intruder which has obtained exclusive possession of some fields.

Soil raised to the surface in the digging for railway cuttings and embankments is often covered with a growth of plants, strangers in the locality. These sometimes survive a few years and then disappear as the natural vegetation of the section gains strength and kills the intruder; at other times, the new plants continue to flourish.

By commerce, the most pernicious weeds have spread from Europe to America and India where they have made themselves at home sometimes by their wonderful vitality usurping the place of the native plants. Whiteweed and woadwax, *Leucanthemum* and *Genista*, two of the greatest pests of Essex County, were thus introduced.

From the West in 1855, *Rudbeckia hirta* was brought in hay seed to New England and now bids fair to usurp a place in our fields that should be occupied by useful plants.

Seeds are often found in the fleeces of wool carried

from Mexico, La Plata, and Buenos Ayres to Europe. In the process of cleaning these fall out and often spring up in the new soil. This has been noticed particularly at the port of Montpellier where American wools are received to be purified; here the seeds of many American plants have sprung up and obtained possession of the soil. Dr. Shaw mentions the similar introduction of a European plant, *Xanthium spinosum*, into South Africa; its spiny achenia cling to the wool of Merino sheep.

Many plants now naturalized here have been brought as garden plants, others have been found in the materials used for packing merchandise brought from foreign countries, and others have been brought with the materials used for new manufactures. As an instance of the last named may be mentioned the introduction into Tapleyville, in the vicinity of a carpet factory, of several species of foreign plants.

In the ballast in vessels sailing from many parts of the world, the seeds of foreign plants are often found and these springing up increase the number of plants not natives of the soil.

In the "Flora of Essex County," lately published by Mr. Robinson, one can find the names of many plants thus introduced into this country. In this, it is stated that the latest arrival noticed is *Eleusine Indica*, a weedy oriental grass common in New York and Philadelphia. It has made its appearance along the railroad tracks at the Pennsylvania Pier, Salem, having travelled thence by the steamers which regularly bring coal from Pennsylvania.

America has sent to Europe only a very few weeds. Dr. Seemann says this is because our present flora is older than the Germanic flora which now constitutes the principal vegetation of Europe. America and Australia have not attained to the degree of floral development to which

Europe has attained, consequently plants coming to Europe from Australia and America would not come as colonists to play a new part in that country but as the survivors of an older flora whose cycle of existence has ages ago run out there. The former geological flora of Europe has exhausted its capabilities in it and plants of this flora, returning at a later date from another country, find in it no circumstances suitable for their growth. On the other hand, European plants going to Australia and America encounter there an older flora about to pass away in the altered conditions of the world. The older flora has no chance with the newer and better equipped flora coming for the first time in contact with a soil to which it is altogether virgin.

The facts here cited are sufficient to show that abundant means have been provided for the dissemination of seeds and for the appearance in various parts of the world of plants originally created in places far distant.

Wednesday, August 3, 1881.

Field meeting at Marblehead Neck to-day. Some one hundred or more persons were present, and were provided with special cars by the Eastern Railroad on the 9.45 A. M. train to Marblehead; thence by steam ferry "Escort," Capt. E. A. Pitman, to the Neck. By the kindness of Mr. Frank R. Kimball, a member of the Field meeting committee, his new house was placed at the disposal of the Institute for the lunch; accordingly the baskets and wraps were there deposited. The party then separated into squads, and rambled about the beaches and bluffs, at pleasure, to enjoy the beautiful scenery or to search into the wonders of the bold promontory which helps to land-

lock the deep waters of Marblehead harbor, and render it a safe anchorage from the storms. The day was warm, and a fog enveloped the ocean for a portion of the morning, but the views were delightful; and as the fog lifted for a season, the tops of the islands near by, and portions of vessels could be seen, giving a weird and supernatural effect.

Many changes have taken place since the time of the first field meeting here on Sept. 8, 1858. The place of rendezvous was then, the seed room of Mrs. Ephraim Brown, whose farm occupied a greater portion of the Neck and the well-tilled fields resembled large beds of a garden; some 240 acres were under cultivation and tillage, 25 acres under hoe culture, the hay crop about 100 tons annually, onions about 1500 barrels, besides cabbages, carrots, squashes, etc. The facilities of the sea manure had been of great practical value.

At the afternoon session of that meeting, Rev. J. L. Russell spoke of the medusa or jelly-fish, Mr. J. J. H. Gregory of the geology of Marblehead, Mr. C. M. Tracy of the flora, and Mr. Moses G. Farmer on the absorbing topic of that day, the Atlantic cable, a piece of which he exhibited. We notice, to-day, a great change; a pleasant and attractive village by the sea has sprung up, as it were, in a day, with its many beautiful cottages; by some called "Manataug," though the native inhabitants of Marblehead are somewhat restive over this assumed name.

A hall has been erected, by the Marblehead Neck Association, for the religious services on Sundays and for social gatherings on other days. A post-office has been established, and a little sheet occasionally printed, with the other outgrowths incident to a new settlement.

The afternoon session was held at 3 o'clock in the hall

above referred to, kindly placed at the disposal of the Institute by the officers of the association. The PRESIDENT in the chair. The records of the preceding meeting read by the Secretary.

The PRESIDENT spoke of the tendency, prevailing at the present time, to resort to the seashore and there spend the heated term. Every available space on our coast, especially on the northern shore of Massachusetts Bay, is occupied or being rapidly taken for this purpose; land, a few years since, that was considered of little value, now commands high prices; large and extensive hotels have been erected, or being erected, at prominent points for the accommodation of those who prefer this mode of life. As the country becomes more settled and the people acquire additional property, this custom will prevail, and the numbers that resort thither will annually be on the increase.

MR. JOHN H. SEARS, of Salem, exhibited the specimens of the following plants and flowers found during the morning ramble, and described the same.

Anemone Virginica, *L.*	Cakile Americana, *Nutt.*
Elodes Virginica, *Nutt.*	Spergularia rubra, *Presl.*
Spergularia salina, *Presl.*	Silene inflata, *Smith.*
Oenothera biennis, *L.*	Solidago odora, *Ait.*
Cephalanthus occidentalis, *L.*	Xanthium strumarium, *L.*
Lobelia cardinalis, *L.*	Plantago maritima, *L.*
Stachys palustris, *L.*	Convolvulus arvensis, *L.*
Datura stramonium, *L.*	Salicornia herbacea, *L.*
Suædea maratima, *Dum.*	Salsola kali, *L.*
Zostera marina, *L.*	Habenaria lacera, *R. Br.*

Habenaria psycodes, *Gray.*

Mr. Sears also made some appropriate remarks upon the troublesome weeds, so annoying to farmers.

HON. J. J. H. GREGORY, of Marblehead, was called

upon by the President, and spoke of the geological features of the Neck. He said that porphyry, syenite and greenstone were the principal formations, and, while porphyry was very abundant on the Neck, there were no specimens of it found in Marblehead proper. Some of the ledges showed very fine and handsome specimens of banded porphyry. Mr. Gregory spoke in a general way of the geology of the county and of the state, and said that there should be a full and complete collection of rocks and minerals of the state for preservation in the county, and suggested that the Institute would do well to take the initiative. It would be both valuable and interesting.

Along the shores of the Neck are found great quantities of porphyry chippings, so called; these were, without doubt, left by the Indians, who formerly roamed over the vicinity, and who made their cutting implements from porphyry, which is very hard; these Indians probably came to the ledges and chipped stone into the general shape of arrowheads, or other weapons, and carried them away to be finished at leisure. The speaker said that large quantities of these chippings could be found in various places along the shore. Mr. Gregory referred to the beautiful porphyry tables at the centennial exhibition in Philadelphia, which were highly polished, showing a remarkable finish and lustre. He had made experiments with the stone found here, but had been unable to produce the desired effect.

Mr. Gregory also alluded to the plants spoken of by Mr. Sears, saying he had been much troubled by the horsemint on his farms at Middleton.

Prof. Edward S. Morse was the next speaker. He referred to the plants and marine animals noticed during

his walk along the shores, and spoke of the habits of several of these animals, which showed a wonderful capacity for discovering localities fitted to their several conditions. He described in a most interesting manner the habits of the common ant, its methods of building, etc. He also said, that several southern forms of seaweed are now found in Gloucester, and that many of the mollusks and other species of animals, found along our seacoasts, were imported, coming in various ways from their original homes. In this connection he alluded to the remarkable rapidity in the diffusion of *Littorina littorea;* an interesting and valuable account is printed in the Bulletin of the Institute, and will be found on pages 171–176 of Vol. XII.

Hon. William D. Northend being called on by the President responded in a humorous vein,— remarking upon the work of the Institute, expressing his interest in the object, and extending a cordial welcome. He referred to the geological features of the Neck, and hoped that a systematic study of the rock formations would be made.

George M. Whipple, the Secretary of the Institute, offered the following resolution which was unanimously adopted.

Resolved, That the thanks of the Essex Institute be tendered to the Directors of the Marblehead Neck Association for the use of their hall, and to Frank R. Kimball, Esq., for many courtesies so pleasantly rendered, and for the use of his house for the lunch.

The Institute then adjourned, and the party returned to Salem by ferry and cars, at pleasure.

TUESDAY, AUGUST 16, 1881.

MEETING this day. The PRESIDENT in the chair. Records read.

Mr. George Sibley, of Salem, was duly elected a resident member.

WEDNESDAY, AUGUST 30, 1881.

THE field meeting postponed from August the 18th and 19th, on account of the inclemency of the weather, was held this day at Saugus. The day was intensely hot, the thermometer being over 90° in the shade. The people of Saugus were very polite and attentive, and by their civilities rendered the day very enjoyable.

After depositing the baskets in the library room at the Town Hall, parties were improvised to visit the principal places of interest. The following may be specified: The Cinder Bank, the site of the old Iron Works, Appleton's Pulpit Rock, the Jasper Quarry, the cool retreat at the ancient homestead of the Hawkes family, the house of Mr. W. F. Hitchings, in which were found the Records of the Third Parish, Lynn, since incorporated as the town of Saugus, the first warrant granted by Hon. Ebenezer Burrill, dated March 5, 1738–9, to Joseph Haven, one of the proprietors of the meeting house in the westerly end of Lynn for holding the meeting for organization. June 9, 1739, Rev. Edward Cheever was chosen the first minister and was ordained Dec. 5, 1739. Rev. Joseph Roby accepted the call July 26, 1750, was the second minister. He continued the devoted pastor for more than half a century, his death occurring Jan'y 31, 1803,

in the eightieth year of his age and the fifty-first of his ministry in this parish. Many historical points of interest were found in these records, worthy of mention, if space would allow.

Lunch was served at 1.30 P. M., and the afternoon session was held at 3 o'clock, the President in the chair. Records of preceding meeting were read.

The PRESIDENT after a few remarks alluding to the kind courtesies extended to the Institute at a previous meeting held in this place, called upon Mr. John H. Sears to give some account of his findings during the forenoon ramble.

MR. SEARS said that Saugus was a remarkably fine field for the botanist, and that the fluviatile species of plants were well represented. He regretted that in consequence of the heat and want of time, he was unable to make a satisfactory examination of the flora. He, however, exhibited and described several specimens. The following may be specified:

1. Nymphæa odorata (*White Pond Lily*).
2. Polygala cruciata (*Milkwort*).
3. Amphicarpæa monoica (*Hog Pea Nut*).
4. Potentilla fruticosa (*Shrubby Cinquefoil*).
5. Eupatorium purpureum
6. Nabulus altissimus (*Rattlesnake root*).
7. Lobelia cardinalis (*Cardinal Flower*).
8. " inflata (*Indian Tobacco*).
9. Clethra alnifolia (*Sweet Pepper bush*).
10. Monotropa uniflora (*Indian Pipe*).
11. Gerardia purpurea (*Purple Gerardia*).
12. Chelone glabra (*Snake Head*).
13. Verbena hastata (*Blue Vervain*).
14. Cuscuta epilinum (*Flax Dodder*).
15. Phytolacca decandra (*Garget*).
16. Juglans nigra (*Black Walnut*). There are several fine specimens of this tree in this town, the largest is on the land of Mr. Albert F. Parker, which measures eighteen feet in circumference at one foot above the ground, and

is seventy or eighty feet high, and produces an abundance of fine nuts. Mr. Parker has steps built up to the branches some fifteen feet above the ground, where there is a seat which looks as if it might be enjoyable.

17. Pontederia cordata (*Pickerel Weed*).
18. Scirpus eriophorum (*Wool Grass*). Specimens were quite conspicuous in the several collections of wild flowers gathered during the ramble.
19. Zizania aquatica (*Indian Rice*) was very luxuriant on the banks of the mill stream.
20. Muhlenbergia sylvatica (*Drop Seed Grass*) abundant in damp woods.
21. Lygodium palmatum (*Climbing Fern*). Locality doubtful.

Prof. Herbert B. Adams, of Johns Hopkins University, Baltimore, followed with the paper of the day — on the *Commons and Commoners of Salem* — commencing with the remark, that Salem Common and the Great Pastures of Salem are cases of historic survival. They are bits of fossil history linking the communal life of New England with the earliest beginnings of the Teutonic life. Salem, and all our towns are but the reproduction of the village community system of the ancient Germans, as described by Tacitus. He then gave a brief outline of this system which, he said, was brought over to this country by the invading Puritans, and was established at Salem in all its completeness. He then confined his remarks to the special subject, "the Commons and Commoners of Salem," or Naumkeag as it was first called, but afterwards took its present name to mark the era of peace to the infant settlement, chosen as the site of a plantation by Roger Conant and his companions. These pioneers came hither from Cape Ann, because of the inviting meadows and "the quantity of planting land," upon this "pleasant and beautiful peninsula environed by an arm of the sea on each side," as Hubbard says in his narrative, and laid the foundation of the village of Salem. He presented a

life-like picture of this early period, noticing the additions to the population, and the materials necessary to the use of the settlement, by the arrivals of Endicott, Higginson, Winthrop and others, tracing the various changes in this system of land tenure then held to the present time, as circumstances required, interspersed with brief sketches of the habits, customs and occupations of the people in the different periods.

It may be needless to particularize more fully the interesting and instructive communication of Professor Adams; it is intended to have the same printed in full in the Historical Collections of the Institute.

Dr. J. W. Goodell, of Lynn, brought to the meeting a curious old steam jack. This machine consists of an iron vessel from which the escaping steam acts upon the floats of a wheel, the power thus created was utilized in turning the spit which was placed before the fire upon hooks attached to the andirons, the same fire roasting the meat and generating the steam in the machine, patented by John Bailey, of Lynn, in 1795.

Mr. E. P. Robinson, of Saugus, was then called upon to give some account of the early and local history of Saugus. After speaking of the "Hawkes' Homestead" and the very notable gathering there in July, 1880, when a reunion was held at the 250th anniversary of the family, which embraced persons of the name from very many states in the Union, bringing together divines, lawyers, poets, editors, generals, farmers, artizans, etc., he proceeded to give an account of the Saugus "Iron Works," the first in the country, and where the die was struck which coined the first "Pine Tree shilling" of Massachusetts, by Joseph Jenks. He also described "Pulpit Rock"

and the Cate mount, and gave the legend of that somewhat noted locality, which became the property, afterward, of Samuel Appleton. He also gave the inscription recently placed upon the rock, on a copper tablet, bolted securely on to the rock, reading as follows: "Appleton's Pulpit. In Sept., 1687, from this rock tradition asserts that, resisting the tyranny of Sir Edmund Andros, Major Samuel Appleton of Ipswich spoke to the people in behalf of those principles, which later were embodied in the Declaration of Independence." He also gave a brief account of the seminary, dedicated in 1821, Rev. Joseph Emerson, Principal, and alluded to several scholars who have since been noted in the fields of literature. He then considerd some of the Saugus worthies of the past, Zaccheus Stocker, Dr. Abija Cheever, Benj. F. Newhall and others, touching upon their salient points. He paid an appropriate tribute to George William Phillips, a graduate of Harvard in 1829, and concluded with glancing at the representative men of the present day, now in the active duties of life.

Dr. George A. Perkins, of Salem, presented the following vote, which was unanimously passed.

Voted, That the thanks of the Essex Institute be tendered to the people of Saugus for their kind and lavish attentions during the day. To the Selectmen for the use of the Town Hall. To the ladies for services and for refreshments furnished. Especially is the society indebted to Mr. E. P. Robinson, Mr. A. A. Scott, the Misses Scott, Mrs. C. Wilson, Mrs. O. M. and W. F. Hitchings, Mrs. D. Cheever and Miss Jackson, for many courtesies.

Dr. Perkins also embodied in his motion, the thanks of the Institute to Professor Adams for his very able and instructive paper. Meeting adjourned at 5 P. M.

BULLETIN

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Mar 27 1882

OF THE

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FIELD MEETING IN BOXFORD, SATURDAY, OCT. 8, 1881.

SEVERAL members of the Essex Institute and their friends visited Boxford, this day, by invitation of the Boxford Natural History Society,[1] of which Rev. Wm. P. Alcott is President, and Mr. Sidney Perley, Secretary. The Institute party reached the First Parish Church about 11.30 A. M., after a pleasant drive along the ancient roads and by-ways, which are bordered here and there by the loose stone walls or brush fences, with growths of bushes and trees; occasionally passing the quiet homes of the farmer, consisting in many cases of an old fashioned house and barn, irregularly located out-buildings, and the open well with the sweep and the oaken bucket, recalling the scenes of days long past. The inquiry is suggested in passing, who were and who now are the occupants and what have been their experiences in their seemingly quiet lives. In some of these old homesteads of the early settlers successive generations of their descendants have passed their lives from infancy to old age.

A delegation of the Boxford society was at the church

[1] Appended to this report is a notice of this society, communicated by Mr. Sidney Perley.

and received the party on arrival. After depositing the baskets, the time previous to lunch was occupied by a ramble through the fields and woods. The rich bloom of vegetation was past, a few autumnal flowers yet lingered, and the dry and withered leaves as they fell to the ground indicated that summer was ended and that the winter was near.

After partaking of a lunch in the basement of the church, the afternoon session was held in an adjoining room. The Rev. W. P. Alcott, in the chair, extended a cordial welcome and said that such visits from the older societies would do much to stimulate those that are recently formed, to increased efforts in the cause of science. He exhibited a fine collection of plants prepared by himself; several of these were found in the refuse heaps of a woollen mill — the seed undoubtedly imported with the wool, finding a lodgment in the bales during the process of packing. Several quite rare plants, of foreign origin, have thus been detected and have become naturalized.

Since the meeting Mr. Alcott has prepared a list of the plants exhibited with accompanying notes, and it is appended to the report of this meeting.

Mr. Alcott then called upon Mr. John Robinson, of Salem, who read a very interesting paper entitled "A Study of Botany in Essex County," alluding briefly to those plants that characterize our local flora, spoke of the condition of botanical science during the time of Rev. Dr. M. Cutler, when he was the devoted minister at the Hamlet church in Ipswich, now Hamilton, during the latter part of the last and the beginning of the present centuries, devoting much attention to scientific pursuits, and may be considered the pioneer botanist of Essex. Brief sketches were given of Dr. George Osgood, Dr. Andrew Nichols, Dr. Charles Pickering, William Oakes, John

Lewis Russell and others, who were worthy to follow in the footsteps of Cutler.

Henry Wheatland, being called upon, spoke of the pleasure he had received from the gathering this day, and said it was part of the work of the Institute to aid all kindred societies in the performance of the work of their organization. He extended a cordial invitation to the Boxford Society to visit Salem at such times as may be agreeable and convenient to them.

Mr. George M. Whipple proposed that the thanks of the Institute be tendered to the Boxford Society of Natural History for the courtesies extended during the pleasant visit to Boxford this day, and especially to Rev. Mr. Alcott, Mr. Sidney Perley, Mrs. M. P. Perley, Miss Mary E. Perley, Miss Hattie E. Parkhurst, Miss Lizzie M. Frye, Mr. Lawson B. Twitchell, and others. Unanimously adopted. Voted to adjourn.

The society before returning to Salem visited the Match Factory, one of the institutions of Boxford. The total number of hands employed is twenty-seven, and the present season is the busiest the place has ever known. The company which runs the mill is the Diamond Match Company. Only the sawing and preparing of the wood is done in Boxford, the "dipping" process being done at the company's works on Pearl street, in Boston. Mr. John Parkhurst, to whom we are indebted for the facts in this sketch, has occupied the office of superintendent of the mill for about thirteen years. The place has, we believe, been in operation as a match factory some fifteen years, and previous to the establishment of the present industry, the manufacture of cotton batting and wicking was carried on, while the original use of the establish-

ment was for a grist mill. The operation by which a log comes into the mill in a rough state, and goes out cut up into many thousand cards of matches, is a very interesting one. First the log (nothing but white pine is used) is hauled into the mill and cut up by two large circular saws into various lengths, care being taken to remove the knotty and defective portions of the logs. These sections are then passed through other saws which cut them up into pieces a little thicker than a card of matches, and trim off the rough edges. These boards are then put into iron tanks, where they are steamed for two hours, for the purpose of taking out the pitch, and facilitating the cutting. After taking the wood out of the tanks it is cut up into strips having the same thickness as a match, by a rapidly working knife, driven by power. The wood is now cut into strips of various lengths but having the width and thickness of a card of matches. The wood is then pressed together in racks and put into drying rooms, where the temperature is constantly kept up to 160 or 170 degrees day and night, through the drying process, which lasts about a week. When the wood has become sufficiently seasoned it is taken into the "gauging room," where workmen thrust a bunch of the strips into a box containing a number of revolving saws which cut the slits between the matches. Then by the aid of another saw and gauge the cards are cut off from the strips and the operation is completed.

The wood used by the mill is all obtained within a radius of three or four miles, and notwithstanding some 2,000 tons of timber are sawed up annually, it seems as though Boxford might stand the drain for many years to come. Much of the rough timber which comes to the mill is used in the manufacture of boxes in which the matches are packed and shipped. When this factory was first started it was believed that the water-power would be suffi-

cient for all purposes; but it was afterwards found necessary to put in a fifty or sixty horse-power engine, which is now used in connection with the water-power — the latter being estimated at about fifty horse-power. Wood is used altogether for fuel in the boiler, the refuse pieces and trimmings from the mill supplying most of the demand. The fireman is kept constantly busy feeding the fires. A new process is being introduced into the mill for drying the wood after it has been steamed, by which a draft of hot air will be passed through a heater, containing a mass of 1,350 feet of inch piping and weighing nearly two tons, and then through the drying rooms.

NOTICE OF THE BOXFORD NATURAL HISTORY SOCIETY.

A few persons interested in the study of natural history met at the house of Mrs. Mary P. Perley, May 28, 1881, and organized this association. Sidney Perley was chosen chairman, and Miss Mary E. Perley, secretary. A committee was chosen to draft a constitution, which was adopted by the society, June 21. Under the constitution the officers are chosen semi-annually — at the first regular meetings in January and July. The first election of officers was held June 21, and the following was the result:—President, William P. Alcott; Vice President, Miss Mary E. Perley; Secretary, Sidney Perley; Treasurer, Miss Hattie E. Parkhurst; Curator, Frank L. Parkhurst; Executive Committee, F. L. Parkhurst, S. Perley, and Miss M. E. Perley. The regular meetings are held on the second and fourth Tuesday evenings in each month. The society had eight charter members, and at present (Dec. 16, 1881), has twenty-four regular and two honorary members. They are gathering a museum, and a library of books treating upon subjects pertaining to natural history.

INTRODUCED PLANTS FOUND IN THE VICINITY OF A WOOL-SCOURING ESTABLISHMENT.

BY WILLIAM P. ALCOTT.

Among agencies which affect the distribution of vegetable life, sheep are an important factor. Brushing amidst low vegetation, their fleece lays hold of all seeds and seed vessels which are not perfectly smooth. These seeds, becoming tangled among the filaments and often working their way deep into the fleece, may be carried wherever sheep are introduced or wool is manufactured into cloth.

We occasionally receive into our mills, wool from Australia, the Cape of Good Hope, Asia Minor, Spain and other countries of the Old World, as well as from various parts of South America and from some of the islands of the Pacific. Our New England factories draw their supplies, in considerable part, from the states of the interior, from the territories west of the Mississippi, and from the Pacific coast; and American flocks are continually maintained and improved by importations from the other great sheep-raising countries of the world. All this involves the scattering of seeds from every region where sheep flourish. It may be expected that many of the plants which grow where these animals can live upon *other* continents, will grow where they can live upon *our own* continent. Some perhaps may enter our milder sections, by way of the cooler, and some the cooler, by way of the milder, while others may be unable to adapt themselves to more than a very limited portion of our national domain.

Of these suggestions, the following list is an illustration:

In a village near Lowell — North Chelmsford, Middlesex Co., Mass. — is a wool-scouring establishment. Hither are sent, for cleansing, bales of fleece from many regions of the world, but mostly from California. That which comes from the latter country is peculiarly "*shivey*,' or full of seeds and other foreign substances. The dirt, which is blown or washed from the wool is thrown into pits and the foul suds are pumped upon the mass which is thus converted into manure. The solid refuse, in this way utilized, consists largely of two kinds of burs which have become so familiar to "wool-scourers" as to obtain technical names, the burs of Xanthium strumarium being called "*mestizoes*," and the spiral pods of Medicago denticulata, "*alfaquas*." Along with these are many other kinds of seeds, all of which are more or less concealed in the fuzzy masses of refuse. In the process of dumping this waste into the pits, these seed masses are somewhat scattered, as they also are by the wind and other agencies. Many germs, too, survive in the manure.

The writer resided in North Chelmsford from 1878 to 1880, but most of the following plants were collected during the summer of 1878 when his daily walk to the post office took him through this botanic garden. Previous to that season, a piece of ground around the pits had been manured heavily with this compost and "seeded down" to grass. This land produced quite abundantly many of the following plants, especially the Borraginaceæ, Compositæ, Grasses, and Erodium cicutarium. Business being dull that summer and the weather being favorable, the edges of the pits produced certain species more abundantly than either subsequent summer.

The soil of the village is a sand which becomes very hot and dry under a summer sun, and may afford special Californian conditions.

In the list there are thirty-six species, representing twenty-nine genera and fourteen orders. A professional botanist might doubtless have obtained a larger list. One of these plants (Microseris Douglasii, *Gray*), never refound since its discovery nearly fifty years ago, turns up here in eastern Massachusetts! Some unknown sheep certainly deserves botanical honors!

Most of these plants were identified by Sereno Watson, Ph. D.; also to Mr. L. J. Hastings, of North Chelmsford, special acknowledgments for assistance are due.

A few of the species in the following list grow in New England and even in Middlesex county. But none of them are found in the immediate vicinity under consideration, and there can be no question that all below were sown by wool; and that, whatever be their original *habitat* they came to this locality, with possibly an exception or two, *via* California, whence is received seven-eighths of the wool "handled" and where nearly every plant mentioned has been recorded as growing. In the list, special scarcity or abundance is noted.

CRUCIFERÆ.

1. Sisymbrium incisum, *Engel.*
2. Tropidocarpum gracile, *Hook.*

GERANIACEÆ.

3. Erodium cicutarium, *L'Her.*
   Abundant and spreading. This plant seems to be a native of the Pacific coast of both Americas, but may have found its way thither from Europe, which has been considered its home. It grows about woollen mills in New England, and is occasionally found in New York and Pennsylvania. The twisted and bearded styles greatly favor the dispersion of its seeds by the fleeces of sheep.

LEGUMINOSÆ.

4. Medicago denticulata, *Willd.*
   Eastern States; adventive from Europe.

5. Medicago minima, *L.*
   Not mentioned among California plants, but probably growing there. As a plant of Southern Europe and Oriental Asia, it may possibly have reached our locality with Turkish wool.
6. Trifolium Macræi, *H. & A.*

ONAGRACEÆ.

7. Clarkia rhomboidea, *Dougl.*
8. Œnothera bistorta, *Nutt.*
   Abundant.
   Œnothera bistorta, *Nutt.*, var. Veitchiana, *Hook.*
   Rare.

COMPOSITÆ.

9. Bæria tenerrima, *Gray.*
10. Bæria uliginosa, *Gray.*
11. Chænactis glabriuscula, *D. C.*
12. Hemigonia ramosissima, *Benth.*
13. Hypochæris glabra, *L.*
14. Layia platyglossa, *Gray.*
    Much at home. Having a prettily colored daisy-like flower.
15. Matricaria discoidea, *D. C.*
    "Apparently indigenous on the Pacific coast."
    "Established in Northern Europe."
16. Microseris Douglasii, *Gray.*
    Concerning this plant, Dr. Watson wrote me in 1879: "A very rare species having been collected only by Douglas himself, over forty years ago."
17. Xanthium spinosum, *L.*
    "Introduced from Chili" into California, doubtless by sheep. Tropical America and Southeastern United States.
18. Xanthium strumarium, *L.*
    Originally from Europe. Occasionally found in Eastern Massachusetts.

SCROPHULARIACEÆ.

19. Mimulus brevipes, *Benth.*
20. Orthocarpus purpurascens, *Benth.*

LABIATÆ.

21. Marrubium vulgare, *L.*
    From Europe.

BORRAGINACEÆ.

22. Amsinckia spectabilis, *F. & M.*
    Very abundant.

23. Echinospermum Lappula, *Lehm.*
Scarce. Found in New England. From Europe.
24. Eritrichium oxycaryum, *Gray.*
Very abundant.

HYDROPHYLLACEÆ.

25. Phacelia brachyloba, *Gray.*
26. " circinata, *Jacq.*
27. " tanacetifolia, *Benth.*
28. " Whitlavia, *Gray.*
Abundant; showy flowers; well known as a garden annual.

POLEMONIACEÆ.

29. Gilia inconspicua, *Dougl.*
30. " leucocephala, *Gray.*
Both scarce.

SOLANACEÆ.

31. Nicotiana Bigelovii, *Watson.*
Single specimen found.

CHENOPODIACEÆ.

32. Atriplex bracheosa, *Watson.*

POLYGONACEÆ.

33. Chorizanthe pungens, *Benth.*
Single specimen.

GRAMINEÆ.

34. Festuca myurus, *L.*
Europe; Middle and Southern States.
35. Hordeum murinum, *L.*
Europe.
36. Polypogon Monspeliensis, *Desf.*
Europe. One locality in New England and Southern States.

Excursion to Chelsea, Friday, October 14, 1881.

A party of the members of the Institute, with friends, numbering seventy-seven persons, left Salem, at noon, over the Eastern Railroad. On arrival at Chelsea, special horse cars conveyed the party to the Art Tile Works of the Messrs. Low, on Broadway (formerly known as the Salem

Turnpike), about a mile distant. At this place, the operation of tile-making was observed and rendered very interesting by the explanations of Mr. J. G. Low. These works are now filling orders from the proprietors of the large hotels, private residences and public buildings, for the beautiful decorative tiles, which are fully equal to those of foreign manufacture in richness of design. The demand is also becoming extensive, as the tiles are largely used by the furniture and stove manufacturers. The operation of glazing and coloring was found especially interesting, many of the figures being elaborate and well executed.

The party then proceeded to the works of the McGee Furnace Company, where the great variety of castings, from stoves and stove fittings to fine metallic vases, shields, helmets and wall decorations, were examined and admired. Several gentlemen of the concern were very polite and courteous and conducted the party through the various departments.

At 4 P. M. the afternoon session was held in the rooms of the Chelsea Review Club on Broadway. The President in the chair.

The PRESIDENT, after a few brief remarks, called upon Mr. J. G. LOW, who gave a description of the Tile Factory, how it was commenced, and its progress to the present time.

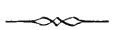
Prof. EDWARD S. MORSE followed Mr. Low and gave an account of the Japanese pottery, describing the methods adopted from an early period to the present time, and also the peculiarities in the manufacture of the different varieties, accompanying his remarks with allusions to some of the social and domestic habits of the Japanese.

Vice President F. W. PUTNAM exhibited some specimens

of early American pottery and gave a description of the various modes of its manufacture by the different peoples in America. He showed how the ancient pottery had been made over round stones, in some instances, while in others it was formed by coiling ropes of clay upon themselves, and in still others by casting in moulds. He then explained how his studies of the pottery of past times, and that made by the uncivilized peoples of the present time, were not at all from the standpoint of the artist, but purely from that of the ethnologist. He then called attention to the different ways of preparing and mixing the clay by various American tribes and nations, and to the distinct forms and methods of ornamentation adopted. Stating that from a study of these methods we could soon learn to distinguish the various types found in America, and by following out the particular development of the art in various places in North, Central and South America, we could draw important conclusions relating to the migrations of nations and their contact with each other.

Rev. Fielder Israel, of Salem, offered the following vote of thanks which was unanimously passed:

Voted, That the very cordial thanks of the Essex Institute are hereby tendered to the Messrs. Low of the Chelsea Art Tile works, Mr. J. R. Carr of Chelsea and the proprietors of the McGee Furnace Company for many civilities and attentions during the day, and to the Chelsea Review Club for the use of its rooms for this meeting.



Regular Meeting, Monday, November 7, 1881.

At the meeting this evening Messrs. George Plumer Smith of Philadelphia, Pa., and William W. Wheildon of Concord, Mass., were elected corresponding members.

REGULAR MEETING, TUESDAY, NOVEMBER 22, 1881.

AT the meeting this evening, adjourned from Monday 21st, Miss Haskell Moulton Nichols of Salem was elected a resident member.

The President read a communication from the Historical Society of Prince Edward Island.

Referred to Robert S. Rantoul, Esq., who was requested to reply to the communication expressing to the society the good wishes and the coöperation of the Institute.

Charlottetown, Prince Edward Island,
17 November, 1881.

To the Corresponding Secretary Essex Institute,
Salem, Mass.

SIR:

A public meeting was held here on the 12th September last, for the purpose of establishing an Historical Society for Prince Edward Island, a report whereof I beg to forward you herewith.

Under instructions from the Executive Committee of that Society, I take the liberty of addressing you to solicit on their behalf any books, pamphlets, or papers, or any information you may see fit to furnish us, calculated to assist us in our work, and we shall be glad to reciprocate any favors of this nature we may receive by sending you other books in return, and by communicating any information which may be of service to you at our command.

The early history of our Province is in some measure connected with the history of the United States, in their struggle for independence. During the Revolutionary war two American armed vessels from Marblehead were commissioned by Congress in 1775, to cruise in the Gulf

of St. Lawrence, for the purpose of intercepting some ordnance store ships, then supposed to be on their way to Quebec. Having failed in that object, they paid Charlottetown a hostile visit, where their crews landed and carried off as prisoners, Mr. Callbeck, the President of Council and Attorney General — then acting as Administrator of the Government in the absence of the Governor — and two other officers of government. These gentlemen were taken before General Washington at his camp at Cambridge, who ordered their release and the restoration of all the property taken when they were captured. In doing so he expressed his regret for their capture, and Mr. Callbeck bears testimony to his courtesy to the prisoners in a letter of thanks to be found in Irving's Life of Washington.

Some of the Public Records of the Colony were carried away at the same time, which have never since been returned. We would be glad to recover these records or obtain copies of them, if they are still in existence.

Our second Governor, General Edmund Fanning, was, during the war, a colonel in the King's American Regiment and received his appointment as Governor in acknowledgment of services claimed to have been rendered by him to the Royalist Cause in North Carolina and afterwards in New York, under Governor Tryon. He is the subject of frequent allusion in Bancroft's History.

The facts in our possession relating to the capture and release of Mr. Callbeck and the other government officials are somewhat meagre, and we shall be pleased to receive any information within your reach bearing on this subject, or on any other of an historical character which you may see fit to furnish us.

I remain, sir,
Yours respectfully,
GEORGE ALLEY.

Rooms of the Essex Institute,
Salem, Mass.,
November 22, 1881.

To the Hon. George Alley,
In behalf of the Historical Society for
Prince Edward Island.

Sir:

The Essex Institute, located at Salem in the County of Essex and Commonwealth of Massachusetts, met at Salem, November 22nd, and received and considered with much pleasure, your communication of the 17th instant. The undersigned was instructed to express, in return, the sentiments of the Institute.

It is with no ordinary gratification that we are able to greet and welcome one more member to the growing sisterhood of the Historical Societies of America. And if we can be of service in any way, either through an exchange of publications or otherwise, in furthering the noble objects of your research, or the general cause of fraternity among men and peoples, and especially in contributing to the culture and happiness of the people of your beautiful Island, it will give us great pleasure.

In this I speak the sense of every associate of this elder Society, and will add that we shall be especially happy if our contiguity to the town of Marblehead may possibly lead us to some discoveries bearing directly upon the points raised in your letter.

I am, sir,
In behalf of the Essex Institute,
Yours very respectfully,
Robert S. Rantoul.

The Secretary, in announcing the donations, particularized several interesting manuscripts that had recently

been received from Rev. George B. Jewett, being a portion of the papers left by his grandfather, the late John Punchard, who, during the early part of this century, was very prominent in our local affairs and in the church then under the ministry of the Rev. Drs. Worcester, father and son, and of the Rev. Drs. Elias Cornelius and John P. Cleaveland.

The SECRETARY also alluded to a donation from Rev. Benjamin Knight of several old English bricks, taken from the old Prince house now in the process of demolition. This ancient house, located on the corner of Pleasant and Forrester streets, was built about 1670 (the original town grant of land being made at that time), by Richard Prince for his son Joseph. The latter, dying unmarried, bequeathed it to his brother Richard, and it has been successively owned by descendants from that time to a recent period, the Princes, the Mascols and the Knights. This was one of the first houses built on the range of grants from the present Franklin building to the water eastward. There was a long tradition that it was built of wood from trees cut upon the common. This may not necessarily imply on what is now known as the common. The term "commons" was frequently applied to the common lands, of which there were large tracts in various parts of the town.

Richard Prince, Sen.,[1] was born about 1614, died July, 1675. His name appears frequently in the records, thirty acres granted 23, 10, 1638. His eldest son Joseph born 10, 7, 1643; died, probably unmarried, November, 1677. Richard, Jr., baptized 18, 1, 1655; died September,

[1] For a notice of Richard Prince of Salem and some of his descendants, by James A. Emmerton, M. D., see Historical Collections of Essex Institute, Vol. XIV, page 249.

1702; went to the Narragansett fight in 1675, probably in the company of his neighbor Capt. Joseph Gardner.

REGULAR MEETING, MONDAY, DECEMBER 19, 1881.

MEETING this evening. The PRESIDENT in the chair. Correspondence and donations announced.

Messrs. N. F. Merrill and Edward L. Rogers were elected resident members; also Miss Louisa Huntington, all of Salem.

Voted, That the President, Treasurer, and Robert S. Rantoul be a committee of the Institute to procure, if possible, from the Legislature, at its coming session, an amendment of the Charter which shall authorize the holding by the Essex Institute of personal property to the amount of ($100,000) one hundred thousand dollars, instead of twenty thousand dollars.

JOHN H. SEARS presented the following communication, which, according to the rules, was referred to the publication committee: accompanying the presentation of this communication, Mr. Sears gave a very interesting account of his collectings through Northern New York, embracing the well known Adirondack region, which is a favorite resort for the sportsman, and the lover of beautiful and varied natural scenery, with brief descriptions of the country, its mountains, its rivers, its lakes and its flora, more especially the trees and the shrubs.

NOTES ON THE FOREST TREES OF ESSEX, CLINTON AND FRANKLIN COUNTIES, NEW YORK.[1]

BY JOHN H. SEARS.

THESE notes give the age, size and general locality not only of the specimens that were collected but of some of the largest trees that were found, many of which are rare even in those forests, and which, except during the winter months, cannot be cut and removed. It is much to be regretted that these forest monarchs will soon be known only in the traditions of the past. Essex Co., Mass., during the earlier part of this century, probably possessed similar forest trees, and we can by these notes form some idea of what might then have been collected in this vicinity. In making this collection for the museum, it was desired that I should obtain as large a trunk specimen of each species as could be found or was practicable to obtain. The notes are arranged in the botanical order of the trees.

TILIA AMERICANA (*Basswood*). This is one of the largest forest trees. The one that was cut was 80 feet long: it stood in a grove of second growth maples that were probably 50 or 60 feet high.

This tree was so much taller that it was conspicuous for several miles; it was 4 feet in diameter and was thirty feet to the first limb. This tree and three others of nearly the same size which we began to cut were partially decayed. The largest sound tree that I could find was 2 feet 8 inches in diameter, and on the stump from which this tree was cut 194 annual circles of growth were counted. Allowing that the annual growth is about one-sixth of an

[1] Taken while collecting wood specimens for the American Museum of Natural History at Central Park, New York, during the months of September and October, 1881.

inch, the tree 4 feet in diameter would have been 288 years old.

ACER SACCHARINUM (*Sugar Maple*) grows to a larger size in Clinton county than in any other part of the state of New York.

On the foot-hills near Lyon Mt. and in Ellenburgh it is one of the principal hard wood forest trees. The forests in this section are the most extensive and most natural I ever saw. I have walked hour after hour in some of these grand old woods looking for different kinds of trees without seeing anything that would lead me to think I was not the first man to walk there with an axe: not a stump was to be seen, nor were any of the trees blazed or chipped, but all was one primitive forest. In such fine old woods as these the maple grows to a size not to be found elsewhere. One tree 12 feet in circumference was cut into and as nearly as one could judge it was 80 feet high, but after chopping three or four hours it was found to be decayed in the centre. Later, one tree 3 feet 6 inches in diameter and another 3 feet, were cut with the same results, so it was necessary to take a smaller tree.

The tree 3 feet 6 inches in diameter had 300 annual circles of growth: probably the trees 12 feet in circumference are over 400 years old as after the heart wood begins to decay the tree would naturally make a smaller annual growth. Trees of this species decay from the branches down, which is not the case with most other species of trees.

ACER PENNSYLVANICA, called *Whistle-wood* in New York, *Striped Maple* in Massachusetts, is very common in all parts of the state: it is seldom over 5 inches in diameter and 25 feet high.

ACER SPICATUM (*Mountain Maple*), like the last, is very abundant: a specimen 7 inches in diameter was collected.

It grows to about the same height as the Acer Pennsylvanica and in similar situations; the foliage is remarkable in autumn for its beautiful color.

ACER RUBRUM (*Red Maple*) is a rare tree in northern New York; the largest trees that were found were 18 inches in diameter and 30 or 40 feet high.

ACER DASYCARPUM (*White Maple*) is more abundant. One tree was measured that was 9 feet in circumference and 60 or 70 feet high.

NEGUNDO ACEROIDES grows equally large as far north as Montreal. Some of the trees that were found were 30 inches in circumference and 30 feet high.

PRUNUS PENNSYLVANICA (*Pin Cherry*) is a small tree, and a specimen 15 inches in diameter and 30 feet high was the largest found; it had 67 circles of growth which proves it to be a fast growing tree and short-lived. It is everywhere abundant.

PRUNUS SEROTINA (*Black Cherry*), in a section between Altona and West Chazy, often grows to be 3 feet in circumference and 60 or 70 feet high. On the end of one log 3 feet in diameter I counted 370 circles of growth; from 70 to 100 circles the growth was so slight that it was necessary to place pins every 3 or 4 circles to mark where I had counted and from 180 to 250 they were quite as close together.

PYRUS AMERICANA and PYRUS SAMBUCIFOLIA are the next trees in order. Specimens were found, four or five growing on the same clump as is the case with alders, good specimens of both species, but in no case did I find the leaflets differing in shape more doubly serrate as they should be on trees bearing the larger berries than could be found on some of the trees with small berries. The petioles and rachises were of a deep red on all the trees that were examined; and as to the leaves being bright green on both

sides on one tree and pale on the under side of the other, I could detect no such differences, but concluded that good typical specimens of both species could be collected from the same tree.

FRAXINUS AMERICANA (*White Ash*) is a fine timber tree growing to a height of 60 or 70 feet without a limb, and with a diameter of 2 feet and holding this size for 30 feet. Of course, such trees are found only in deep forests where they are surrounded by other tall trees.

FRAXINUS SAMBUCIFOLIA (*Black Ash*) grows equally large. Near Schuyler Falls, growths of these trees were seen several hundred in number and nearly all 6 feet in circumference.

FRAXINUS PUBESCENS (*Red Ash*) is a scarcer tree; the only locality where it was found in abundance was on the shore of Moon Lake in Ellenburgh where it grows larger than either of the other species of Ash.

One of the trees measured was 9 feet in circumference, Another which was cut was $2\frac{1}{2}$ feet in diameter and 100 circles of annual growth were counted on the end of the log.

ULMUS AMERICANA (*Common Elm*) is abundant, and with few exceptions is seldom over 2 feet in diameter but it is often 80 feet in height. On the side of one of the foot hills near Lyon Mt., a tree was measured that was 21 feet in circumference at 7 feet above the ground: it was 40 feet to the first limb and as near as could be judged was 100 feet high. It is so situated that it can be seen from five different townships though it is nearly surrounded by mountains. The owner of the land offered the tree for the Museum but it could not be cut and teamed excepting in the winter as there was much swamp land surrounding it.

CRATÆGUS COCCINEA (*Scarlet fruited Thorn*) is very

common on Cumberland Head, often assuming tree-like proportions; one was measured which was 40 inches in circumference with a head like an apple tree.

This tree was 20 feet high and completely covered with fruit but was partially dead on one side of the trunk. One tree was cut, which was 10 inches in diameter, it was 10 feet to the first limb, 25 feet high and had 80 circles of growth.

JUGLANS CINEREA (*Butternut*) is very abundant near Schuyler's Falls. Two trees that we measured there, growing on the edge of a maple growth were respectively 12 feet 6 inches, and 12 feet in circumference, but the trunks of these trees were hollow. The tree which was cut was 2 feet 8 inches in diameter, and had 180 circles of growth. The nuts from this tree were so much larger than is usual that some were collected for preservation. They were 4 inches long and 6 inches in circumference; the outer covering was of the usual thickness but the hard shell was of double thickness. The seed was small and inferior.

JUGLANS NIGRA (*Black Walnut*) is rare in Clinton county. The only place where this tree was found growing was near Salmon river, West Plattsburg; there most of the trees were partially decayed and the trunks twisted and crooked. The largest of them was not over 18 inches in diameter and 40 feet high.

CARYA AMARA (*Bitter-nut Hickory*) is very common all over Essex and Clinton counties. It is a beautiful tree often 2 feet in diameter, 50 to 60 feet in height with a large drooping head. Its delicate foliage gives it a beautiful appearance, and its size and shape were so different from trees of the same species found in eastern Massachusetts that it was the cause of much surprise to me. One reason that these trees are so large and thrifty is, that they

are perfectly free from the black wart which so disfigures this tree in eastern Massachusetts, nor were the leaves eaten by insects.

A few specimens of CARYA ALBA (*Square-nut Hickory*) were found on Cumberland Head, but it is supposed they were planted there as no trees of this species were found in the woods or surrounding forests.

QUERCUS BICOLOR, commonly called *Swamp White Oak*, is the principal oak. We cut one tree that measured 2 feet in diameter. It is a low tree, seldom over 40 feet in height.

QUERCUS ALBA (*White Oak*) is rare; all the trees noticed were on a ridge near Morrisonville, thirteen in number and none of them were over 8 inches in diameter and 30 feet in height.

QUERCUS RUBRA (*Red Oak*) is abundant in the southern part of Clinton county.

In Keeseville and in Peru it is a tall, slim growing tree seldom over 15 inches in diameter, but averaging about 70 feet in height.

FAGUS FERRUGINEA (*Beech*) grows in its most luxuriant form in Ellenburgh. Several beech trees were measured that were 12 feet in circumference and 80 or 90 feet high, smooth and straight, but all such old trees are partially decayed; this was the case with three different trees nearly this size which were cut. We finally cut one that was 3 feet in diameter and by cutting it a second time above, we secured a specimen 2 feet 8 inches in diameter: on the end of this specimen 290 annual circles of growth were counted; accordingly the largest trees (those 12 feet in circumference) would be 400 years old.

OSTRYA VIRGINICA (*Hop Hornbean*) is common in all parts of Clinton county, but it is seldom more than 6 inches in diameter, and 25 feet high.

CARPINUS CAROLINIANA (*Blue Beech*) is not so common but grows larger: a specimen was cut which was 10 inches in diameter and 5 feet long.

CETULA LENTA (*Black Birch*) is rare. Among a few trees in Belmont, one was cut from which was obtained a specimen 2 feet 4 inches in diameter, 5 feet long. The wood of this tree is very fine grained, dark colored and very heavy: it is good timber for cabinet work, is remarkably stringy and very hard to split.

BETULA LUTEA (*Yellow Birch*) is one of the largest trees in the forests of Ellenburgh, Altona and Champlain townships. The first tree of this species which was cut was 14 feet, 7 inches in circumference; 12 inches in the centre were hollow. Seven others nearly the same size were cut into, but they were all partially decayed.

The one from which a specimen was taken was 3 feet in diameter and on the end of the log 300 circles of growth were counted. The heart wood was as dark as Black Cherry and quite as hard. These trees are often 70 feet high and 50 feet to the branches; they make little or no new growth on the ends of the branches, consequently they have very few leaves.

BETULA PAPYRACEA (*Canoe Birch*) is equally abundant near Malone, Belmont and Chateaugay, growing near streams and in lowlands. The largest one found was 6 feet 7 inches in circumference: as we could not get permission to cut this tree, it was necessary to get a smaller one, which was 5 feet 11 inches in circumference, and on which were counted 180 annual circles of growth. This is a large size for this tree as 18 inches is the largest diameter usually found and the bark is so much used by wood-cutters for drinking cups, and parties of Canadian Indians for baskets, that it is seldom one can find a perfect tree.

SALIX NIGRA (*Black Willow*) grows very abundantly on the borders of Saranac river near Schuyler Falls. There is a continuous line of these trees for several miles in some places completely overarching the river and making a perfect shade. Some of the largest of these trees were measured—one was 10 feet in circumference, several were over 9 feet and 60 to 70 feet in height. Nearly all leaned over the water. These trees were decayed in the centre; indeed, there were so many either crooked or decayed that it seemed doubtful if a perfect specimen could be found. Forty trees were cut into and finally one was found 18 inches in diameter. One curious fact concerning these trees, is that there were no dead limbs or knot-holes for water to enter, yet they were wet and soggy the whole length of the trunk inside of the sap wood.

SALIX DISCOLOR (*Glaucous Willow*) is common in all low grounds. In Ellenburgh it grows to quite a tree in some situations. One tree in a quaking bog, on the border of Moon Lake, was 40 inches in circumference; there was so much risk incurred in walking in this bog that it was impossible to get this specimen. One was obtained, however, which was 12 inches in diameter and had 90 circles of growth.

POPULUS BALSAMIFERA (*Balsam Poplar*) is a large timber tree in Ellenburgh; it grows in all parts of Clinton county, but only in Ellenburgh to this size. Its foliage varies very much in different localities: in deep forests the leaves are ovate, taper-pointed, serrate smooth on both sides; on open, rocky hill-sides the leaves are broader and somewhat heart-shaped; and in young growths among maples, perhaps thirty years old, specimens were found whose leaves were exactly like forms of P. balsamifera and also the var. Candicans besides many other variations, including one, the leaves of which were ovate, obtuse, en-

tire whitish on the under side, the leaves as well as the buds giving off the peculiar fragrance of this tree.

POPULUS HETEROPHYLLA (*Downy Poplar*) is very common near Point of Rush, and on Block Island, Lake Champlain; it is a small tree 18 or 20 inches in diameter, 40 feet high.

POPULUS MONILIFERA (*Cotton-wood*) grows near Keeseville, Port Henry and Peru, and there is one in a piece of woods near Peru village 15 feet in circumference and 80 feet high. One that was cut and left lying on the ground measured 70 feet in length and 3 feet in diameter without the bark. This tree or log had 184 annual circles of growth: to estimate within bounds the larger tree which was left standing must be three hundred years old.

POPULUS ANGULATA (*Angled Cotton-wood*) is very common on the Vermont shore of the lake, but strange to say, it was not found on the New York shore though many places were visited.

POPULUS DILATATA (*Lombardy Poplar*) is very abundant: it is a beautiful tree, exceeding in height the tallest trees near it. It is entirely free from the attack of Borers. The lower limbs are often 20 feet in length, giving the tree the form of a spruce. It is an introduced tree, as it is in Massachusetts, and is found growing along fence rows.

POPULUS GRANDIDENTATA (*Large-toothed Aspen*) is very common, tall and straight. It is here considered one of the most valuable timber trees and for this reason it was difficult to obtain a good specimen. It is used for frames of buildings and is considered indispensable for floor timbers. Several stables and sheds were seen, the floors of which had been in use sixty to seventy years, and they were perfectly sound.

In one building there was a poplar timber very sound,

while the others, nine in number, one a pine, one an oak, the rest spruce, were so much decayed that the building was considered unsafe. A specimen of this poplar was finally procured 18 inches in diameter: the tree was 43 feet to the first limb, and 84 feet was the entire height.

POPULUS TREMULOIDES (*Common Aspen*) is everywhere abundant; its fine, bright green foliage making it very conspicuous. The bark of this tree is so white that it is hard to distinguish it from a birch at a distance of fifty feet. Its largest size is 18 inches in diameter and 40 feet high.

JUNIPERUS VIRGINIANA (*Red Cedar*) is quite a rare tree in this section and is restricted to the hills in the vicinity of Lake Champlain near Keeseville. The largest specimen was not over 6 inches in diameter and 15 feet in height.

THUJA OCCIDENTALIS (*Arbor Vitæ*, or, as it is called in New York, *Swamp Cedar*) has been very abundant, but it is now getting scarce as it seldom makes a second growth.

One reason for this is that, in the swamps where it flourishes, quantities of sphagnum and ferns grow most luxuriantly, and the dead wood, as soon as the old growth is removed, becomes as dry as tinder and is almost sure to be burned over. In any part of Clinton county one can find hundreds of acres, once a cedar swamp, now a mass of charred logs and unsightly blackened stumps. In Morrisonville there is a growth of these trees on the land of W. V. Hammond, several of which were cut and found to measure 12 feet in circumference. These trees are always the abode of large, black ants and often are partially decayed at the heart when they are over 2 feet in diameter. One of the old logs, with which the ground in this swamp is covered, was measured and found to be 77 feet long, and as the bark and sap wood had all decayed, leaving the upper

end over 4 inches in diameter, it is safe to conclude the tree must have originally been over 100 feet high: the broken end near the stump was 12 feet in circumference. The heart of this log was perfectly sound, which is rather remarkable, for all the other large logs were hollow.

ABIES BALSAMEA (*Balsam Fir*) is common and one of the handsomest trees in the forest. Its dark green foliage in exposed situations, softened down by the lighter green of the pines in the background, finally loses itself in the lighter blue green of the firs in the more shaded situations. This tree seldom grows to a large size, the largest that was found measured 22 inches in diameter and was 40 feet high. The specimen taken from the trunk of this tree was 5 feet long and 150 annual circles of growth were counted on the end of the log.

TSUGA CANADENSIS (*Hemlock*) is another of the large timber trees of this section as well as one of the most beautiful. It is often found near Morrisonville, 12 feet in circumference, and 60 feet high. The limbs begin near the ground, often as low as 5 feet on the old trees and project some 25 feet out from each side: this is not the case with trees 18 inches or 2 feet in diameter in the immediate vicinity as they are usually 15 or 20 feet to the limbs. The reason of this difference in form of growth is probably owing to the larger old trees growing in an exposed situation until these lower branches had attained this large size. One of these trees was cut which was 2 feet 6 inches in diameter and 257 circles of growth were counted. This tree is rare in the region of the Lake shore.

PICEA ALBA (*White Spruce*) is not a well known tree to farmers or wood cutters; but one man in Clinton county was found who knew it. He called it the "Cat Spruce" from its peculiar odor when the foliage was crushed, and

when a specimen was cut the name was found to be very appropriate. The largest tree found was 21 inches in diameter, and after it was cut it was found to be 85 feet long. It was covered on the upper limbs with full grown cones many of which were 3 inches long.

PICEA NIGRA (*Black Spruce*) is the most common of all the forest trees, growing abundantly from Essex Co., N. Y., to Montreal. In Ellenburgh it often attains a circumference of 12 feet and is from 90 to 100 feet high; but trees of this size are so far back in the forest that it is impossible to get a specimen in the autumn. The proper time to collect such specimens is in the winter, for in that section of the country, there is usually a solid crust on the snow which enables one to go where he likes, and with a horse one could select his own path and go over ground that it is impossible to pass over at any other season. A specimen of the Black Spruce was obtained which measured two feet in diameter and 190 circles of growth were counted.

LARIX AMERICANA (*Larch* or *Tamarack*) is one of the largest timber trees in Clinton county; several of the largest were measured. One in Altona was 13 feet in circumference and probably over 100 feet high. In Ellenburgh, there are hundreds of trees from 9 to 12 feet in circumference with a perfectly formed trunk slightly tapering and 30 feet to the first limb. There was one old log on the ground that was 110 feet long.

Before the large trees were found, a specimen had been secured in Morrisonville, 18 inches in diameter. It is a slow growing tree, the circles of growth being so near each other, it was difficult to count them. However 150 annual circles were found; the tree was 60 feet high.

PINUS RESINOSA (*Red Pine*) is abundant in all parts of Clinton and Franklin counties. In the town of Belmont, there is a growth of several acres and all the trees appear

to be of nearly the same size. They are tall and straight and with no limbs for fifty feet.

The trees stand so close to each other that the beautiful long dark green foliage shuts out the sky, and most of the sunlight, and makes this grove particularly interesting to the lover of nature. There was no undergrowth and the only thing on the carpet of yellow, formed by the annual deposit of dead leaves, was an occasional fallen tree. We cut one that measured 18 inches in diameter and was 94 feet high. There were 120 annual circles of growth on the stump. This was the largest tree found; but it was only 2 inches larger in circumference than many others and comparing observations made here and in eastern Massachusetts it was decided that these trees grow no larger at the north.

PINUS RIGIDA (*Pitch Pine*) grows abundantly on the light sandy soil in the vicinity of Lake Champlain, from Keeseville to "Point of Rush", a distance of forty miles and extending inland ten miles; and on the outskirts of villages, small groves of young trees of this species are found growing on sandy hill sides. No distinction is made here between the red and the pitch pines. A man was engaged to cut and haul a red pine 9 feet in circumference which he felt he could do. In three or four days he brought a pitch pine of the required size; it was not the species engaged, so it could not be taken. The following day he brought four men with him to ascertain why it was not red pine. They said one tree would sell as well as the other at the saw mill for red pine: all this was after both species had been shown, and the difference in bark, cones and leaves explained.

PINUS BANKSIANA (*Gray* or *Scrub Pine*) is quite a rare tree in New York. Seldom more than four or five growing within ten miles of each other. Solitary ones are most

common. As to size, they are seldom over 8 feet high though one was found in Altona 15 feet high and 8 inches in diameter, but this tree was partially decayed on one side of the trunk. In appearance, at a short distance, this tree resembles the black spruce more than it does a pine. The bark on the trunk is exactly like a spruce; the foliage is 1½ inches long and from ⅛ to ⅙ of an inch wide; the cones grow in pairs and close to the limb; and they are different in shape from all other pines. This tree is known as the "unlucky tree" by the people in this part of the country. The more observant ones call it a cross between the pine and spruce.

I met several men of good general education, who were convinced of the danger arising from this tree, and who cited cases of its malignant influences (similar to the stories told of the Upas tree of Java). It is considered dangerous to pass within ten feet of its limbs and more so to women than to men. It is equally dangerous to cattle; so that whatever ill befalls a man, his family or his cattle, if there is one of these trees on his land it must be destroyed,—burned down by wood being piled around it, for no one would venture to cut it down.

PINUS STROBUS (*White Pine*) is the next tree in order. Trees of large size of this species are very scarce. There is one in Morrisonville 15 feet in circumference and 4 feet above the ground, tapering but little for fifty feet. A specimen could not be obtained from this tree for the owner had some special use for the entire log. Near Peru village there are three grand old trees; one 12 feet, and the other two 9 feet in circumference.

In Clinton county, twenty years ago, there were probably hundreds of these large pines, for we came across the massive stumps in many places on Lyon Mountain and

on the hills near Demmora; now there are not even young trees on this land.

The reason for this is that old pines were cut for some particular purpose, one or two in a place as they happened to grow, and as they were surrounded by other kinds of large trees, there was not sufficient ground opened to the influence of the sun to allow the seeds to germinate and grow. The entire township of Demmora of some ten square miles was owned by the state; ten years ago it was covered with a heavy growth of forest trees. The pines were cut first, then the valuable black cherry and such trees as "Bird's Eye Maple" until at last the entire growth was killed. Another cause of the destruction of forests is the careless use of fire in clearing land for the purposes of tillage; often in burning over a ten-acre lot one hundred acres or even more are destroyed by allowing the fire to get beyond control. A few such fires in any county in New York will destroy the remains of its natural forest. To remedy this evil is difficult, as usually the parties to blame cannot possibly pay damages, nor is it now a crime punishable by imprisonment.

There should be a law making it as great a crime to start a forest fire as to set a factory on fire or any other building. The railroads are able to pay damages, and after paying for a few fires they will become of rare occurrence. In Danvers, Mass., for three or four years, there were fires originating from railroads, but the companies were obliged to pay heavy damages; the result is, the road is kept free from weeds and in early spring, when there is plenty of surface water, a number of men are sent to burn over a strip of land on each side of the track, the whole length of the road or that portion of it where there is danger of fires.