

SCIENCE

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FRIDAY, NOVEMBER 1, 1901.

THE RELATIONS OF YALE UNIVERSITY TO
LETTERS AND SCIENCE.*

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IN the mediæval convents, from which our academic usages are derived, there were annalists who noted the passing events. Dry and meager are such records—dry and meager will our annals seem unless we see in them the working of principles and methods during a period of two centuries. It will be my endeavor to set forth the relations of Yale to science and letters in such a way that with historic insight you may discover the tendency and the influence of the school in which we have been trained, and may thus appreciate its benefits more fully than ever before. I shall not follow closely the order of chronology, and under the circumstances of this address, I must omit the praise of living men, however richly deserved, nor can I mention many of the departed, however honored and beloved. Law, medicine and theology must be avoided; 'it is so nominated in the bond.' It will be good for each one of us to bear in mind the seven searching questions of an ancient critic—

Quis, Quid, Ubi, Quibus auxiliis, Cur, Quomodo, Quando,

and to remember also that there is no process by which we can draw forth in forty

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minutes the rich vintages stored up in a period of forty lustrums.

The Collegiate School of Connecticut began well; Yale College improved upon the Collegiate School; Yale University is better than Yale College. The process has been that of evolution, not of revolution; unfolding, not cataclysmic; growth, and not manufacture; heredity and environment, the controlling factors. What we are, we owe to our ancestry and our opportunities. Hence the 'Relation of Yale to Letters and Science' cannot be adequately treated without looking outside the walls, as well as inside—by considering the wilderness of Quinnipiac; the dependence of the colony upon the mother country; the bicephalous State of Connecticut; the prosperous city of New Haven and its proximity to the great metropolis; and especially by considering what has been going on in the macrocosm of literature and knowledge where we represent a microcosm. Such a survey I shall not attempt, for I must keep close bounds. Yet even brevity must not suppress the fact that among the original colonists of New Haven, the real progenitors of Yale College, were three broad-minded men of education—John Davenport, a student of Oxford and a minister in London; Theophilus Eaton, the King's ambassador at the Court of Denmark; and Edward Hopkins, a merchant of enterprise and fortune, and earliest benefactor of American learning. Their successors also, the men of 1701, James Pierpont at the front, were worthy exponents of the ideas they had inherited; they were the wisest, broadest and most learned men of this region in that day. Liberal ideas were then in the advance and, thank God, are not yet in the background.

New England brought from Old England the customs, the studies, the graduates of Oxford and Cambridge, not those of Scotland or France or Germany. The exotic

germs were nurtured by Harvard for more than sixty years before the times were ripe for a second college in this region. Harvard instructors, laws, courses, phrases, were then adopted by the Collegiate School of Connecticut, and our alma mater began her life as a child of the new Cambridge and a grandchild of the old. 'Harvard has nourished Yale eighty years kindly ordered in Providence,' are the words of President Stiles. Yale has never ceased to be grateful for this noble ancestry, nor broken the chain of historic continuity. Yale does not forget that an honorable pedigree is its priceless possession, and delights to-day to honor its ancestry.

The seventeenth century was not the most brilliant period of university education in the mother country. The functions of universities had been usurped by colleges. Their scope was restricted; their regulations rigid and petty. Science and letters were subordinate to logic and grammar, and the maintenance of orthodoxy. Nevertheless, the new school made the best of it—and while still without a fixed habitation or a name, acquired both influence and reputation. It began with books, not bricks; with teachers, the best that could be had; and with ideas in respect to intellectual discipline which soon bore fruit in the service of Church and State.

The division between our first and second centuries, corresponding with the eighteenth and nineteenth centuries of our era, is not simply determined by the calendar. There are two periods to be considered as well as two centuries, each deriving its characteristics from the spirit of the age. The first of these, our forefathers went through the good old colony times of dependence upon England; the Revolution; the establishment of constitutional government; and the enlargement of national life and hope. It was the period too when a free church was to be established in a free state, when Chris-

tianity was to be promoted without the rule of hierarchy. The business of a college was to train two sets of leaders, those who would develop and administer republican government under new conditions, and those who would be ministers of the word of God among a Christian people separated from the Establishment. For scholastic discipline the books and methods approved in the mother country and adopted in Harvard were the only instruments. Such words as letters and science were not in their vocabulary. Religion and law, or as they said, the church and state, were the dominant concerns of patriot and sage.

Days of privation, anxiety, dispute, apprehension and experiment, introduced a time of stability, prosperity and union—years of plenty after years of want—and the second century opened with courage equal to opportunities. It is true that the ideas of original research, of experiment and observation, now so familiar, were hardly perceptible, but science had begun its triumphal march, and the humanities, in a broad sense, were destined to engage more and more the attention of educated men.

In the first decade, our record of 'the noble living and the noble dead' includes the name of one who was trained by alma mater for more than provincial usefulness and fame, Dr. Jared Eliot, who like the sages of antiquity, had the cure of souls and the care of bodies. A physician as well as a presbyter, living in a country town, preaching constantly, traversing a wide district on errands of mercy, he showed the qualities of an original investigator. He could ask hard questions and proceed to search for their answers; he would make no assertions that were not based upon observation or experiment, and he submitted his conclusions, by the printing press, to the scrutiny of the world. These are his sayings: "Entering on the borders of terra

incognita I can advance not one step forward, but as experience, my only pole-star, shall direct: I am obliged to work as poor men live, from hand to mouth, and as light springs up before me, as I advance." Again: "As all theory not founded upon matter of fact and that is not the result of experience, is vague or uncertain, therefore it is with great diffidence that I have offered anything in way of theory which is only conjectural and shall always take it as a favor to be corrected and set right."

It is not too much to claim that he made the first contribution from this land of iron and gold to the science of metallurgy in a memoir entitled, 'The art of making very good if not the best iron from black sea sand'; and he was a century or more in advance of his times in the promotion of scientific agriculture, as any one may see by looking up the six tracts, which he published in quick succession, and afterwards collected in a volume, on 'Field Husbandry in New England.' His science did not drown his humor, and he has left this short biography of his laboratory assistant, who was skeptical about results and needed stimulus: "He being a sober man (says Eliot) who could use strong drink with moderation and temperance, I promised him if he could produce a bar of iron from the sand, I would send him a bottle of rum." Such in colonial days was the spirit that promoted research.

No wonder that Benjamin Franklin found Eliot out and wrote him affectionately, "I remember with pleasure the cheerful hours I enjoyed last winter in your company, and I would with all my heart give any ten of the thick old folios that stand on the shelves before me, for a little book of the stories you then told with so much propriety and humor." Poor Richard, when he ranked ten folios below the wit and wisdom of his friend in Guilford, paid a compliment to the collegiate school of Connec-

ticut, but he had not in mind the folios with which the college was founded.

If it be true that Eliot was chosen a member of the Royal Society of London, the distinction is very great, for only David Humphreys, among Yalensians, had the like honor before the recent triumvirate, Dana, Newton and Gibbs.

Of Jonathan Edwards, the philosopher and theologian, I have no right to speak, but he must not be exiled from men of letters, especially since it is customary in recent years to call him by the name of one of the most illustrious of epic poets. His contemporaries placed no limits on their praise, and even wrote on his tombstone *Secundus nemini mortalium*, thus transcending the well-known Florentian epitaph, *nulli ætatis suæ comparandus*.

His grandson, with pardonable atavism, declares that he

in one little life the Gospel more
Disclosed, than all earth's myriads kenne'd before,
and then, alarmed by his own eulogy, he adds, "The reader will consider this proposition as poetically strong, but not as literally accurate."

Edwards may be called a poet suppressed. His writings are often noteworthy for the graceful language in which refined thoughts have expression, and although no rhymes or verses of his are extant, some passages have a Miltonic ring. The most orthodox among us may hazard the opinion that his visions of the future state are fitly classified as works of the imagination.

Many years ago this extraordinary man was likened by Dr. Samuel Osgood, of New York, to Dante, and this comparison has been recently amplified in two brilliant addresses by Dr. Allen and Dr. Gordon in the commemoration of Edwards at Northampton, a century and a half after his banishment. A cooler critic has called him a great glacial boulder, one of the two huge literary boulders deposited in New England

thought by the receding ice of the eighteenth century. These striking terms may excite a smile, but they are not uttered carelessly, nor are they misfit. The logic of Edwards is like a rock, fixed as those masses of stone upon yonder hill where the regicides took refuge, hard to move and not easily broken up. Cotton Mather was his fellow traveler upon the ice fields which once covered New England, leaving scratches and furrows on many an eminence.

It is pleasanter to think of the flaming preacher as the Dante of New England. His language often glows with fire; his words burn; his fancy carries him to the borders of the Inferno and to the gates of Paradise. Nor is this all we can say. Our Dante had his Beatrice, and the words in which he speaks of her may well be placed in a parallel with that which narrates the love of the Italian for the daughter of Folco. Hear the earliest record that has come down to us of Dante's precocious and enduring love. "She was perhaps eight years old, very comely for her age and very gentle and pleasing in her actions, with ways and words more serious and modest than her youth required; and besides this, with features very delicate and well formed, and further so full of beauty and of sweet winsomeness that she was declared by many to be like an angel." "Although a mere boy, Dante received her sweet image in his heart with such appreciation that from that day forward it never departed thence while he lived."

Four centuries after Dante, Jonathan Edwards made this note in respect to the New England maiden of fourteen years, who became his wife. "They say there is a young lady in New Haven who is beloved by that Great Being who made and rules the world, and that there are certain seasons in which the Great Being comes to her and fills her mind with exceeding great delight. * * * She is of a wonderful sweetness,

calmness and universal benevolence, especially after this Great God has manifested Himself to her mind. She will sometimes go about from place to place, singing sweetly, and seems to be always full of joy and pleasure, and no one knows for what. She loves to be alone, walking in the fields and groves, and seems to have some One invisible always conversing with her."

Dante and Edwards alike in love, alike in their spiritual fervor, and in their impressive imagery, were alike in exile—both were driven from their homes, both died among strangers, both have been honored with increasing reverence by the descendants of those who rejected them.

In his youth Edwards showed a noteworthy proclivity toward the study of nature. An article is extant which he wrote at the age of twelve, recording his observations upon spiders and displaying the same qualities as those of Lubbock and Maeterlinck. Moreover, his undergraduate notebook gives evidence that his mind was alert for knowledge in other fields, and that he could ask searching questions in physics, including electricity, meteorology, physical geography and vegetation. One who was familiar with these precocious memoranda remarks that if they were written, as supposed, between the ages of fourteen and sixteen, 'they indicate an intellectual prodigy which has no parallel.' If he had been taught to use the lens and the meter as he used the lamp, he might have stood among the great interpreters of nature—the precursor of Franklin, Rumford and Rowland.

He was nurtured by theological dialectics, and he excelled not in physics, but in metaphysics, so to-day instead of honoring him as a leader in literature or science, we can only acknowledge with filial reverence, his wonderful influence upon the opinions and characters of six generations. The laws of intellectual inheritance are obscure, and the

influences he has handed down cannot be measured. It is, however, noteworthy that three of his descendants occupied the presidential chair of Yale for nearly sixty years, many others have been among our teachers; indeed there are few years in our second century in which the faculty has not included one or more of his posterity. I have read the printed verses of seven of his descendants—no small part colored (may I be pardoned for saying so) with the cerulean hue of religious fervor.

It is interesting to dwell upon the names of Edwards and Eliot as men of more than provincial fame, because the number of Yalensians who can be regarded as contributors to literature and science prior to the Revolution is small. The historian, Tyler, has taken the year 1765 as the close of the sterile period, when colonial isolation was ended and American literature began to be worthy of the name. Before that time neither Harvard nor any of the other colleges has much to speak of; yet afterwards, until the close of the eighteenth century, the product is almost as scanty. A recent paper enumerates the texts by which the youthful minds were disciplined.* Although the manuals and the methods were not inspiring, they encouraged discrimination and that power which used to be called ratiocination, 'generation of judgments from others actually in our understanding.' You may say that this is not 'experimental science nor literary culture,' and you say well. The ore, indeed, may have been extracted by the Eliot process, from black sand, but the Bessemer process had not been invented for turning iron into steel; nevertheless, we have the assurance of a recent Massachusetts critic,† that the highest literary activity of the later eighteenth century had its origin at Yale College.

* By Professor Schwab.

† Barrett Wendell.

Our elder brethren of the eighteenth century, with whom most of us have no more acquaintance that we get from the hortus siccus of a biographical dictionary, were men quite as intellectual as men of our day. When their acquaintance is cultivated and when the minute incidents of their lives and their quaint characteristics are sought out, they are as interesting as our contemporaries. Let us cease to regard them as mummies. The story of Manasseh Cutler is a succession of romantic incidents. Bishop Berkeley's transitory interest in the college and his permanent influence upon it is a captivating record. Jeremiah Dummer, little more than a name to most of us, was called by Charles Chauncey one of the three greatest New Englanders. The story of Liberty Hall, where William Livingston lived with his charming family of daughters, might be commended as the basis of a novel to the author of Hugh Wynne. Rector Clap, the fighting rector, led a life full of racy incidents, and certainly we have no more picturesque character on the roll than Dr. Stiles, now reintroduced by Professor Dexter to the society of which he was once a distinguished ornament—that extraordinary polyhistor to whom all knowledge was attractive, all tongues appetizing and all events pregnant.

As we recall the writers of influence and distinction among our brethren, we cannot fail to observe the dominant religious spirit which most of them show, and it may be well at the outset to remind you that the identity of theology and poetry is not peculiar to New England. The earliest biographer of Dante declared that 'theology was nothing else than the poetry of God.' 'Not only is poetry theology, but theology is poetry,' says Boccaccio, and then he adds that if these words of his merit but little faith, 'the reader may rely on Aristotle, who affirms that he had found that poets were the first theologians.' Judged by this

standard, we might find a good deal of poetry in our Yalensian products, during the eighteenth century, but by the criteria of modern scholarship, not much that would be commended by Matthew Arnold, not much that our own anthologist would cull for preservation.

Before the middle of our first century there appeared in New York a volume containing seven hundred lines of verse, entitled 'Philosophical Solitude; or the choice of a rural life: by a gentleman educated at Yale College.' This anonymity did not long conceal the authorship of William Livingston, one of the brightest students of his time, distinguished in many ways—once as 'the Presbyterian lawyer,' and later as Governor of New Jersey and member of the Constitutional Convention. His brother, also a Yalensian, was a signer of the Declaration. The verses show the influence of Pope, and among other points of interest in them, are allusions to the writers whom this young graduate desired for his intimate friends in the rural life he intended to lead.

In the Revolutionary War, two of our brethren, while acting as chaplains, were composers of patriotic songs. Many years later, the inspiration of the muses descended upon a number of recent graduates, who became known as 'the Hartford wits,'—'four bards with Scripture names,' John, Joel, David and Lemuel, any one of whom could produce an epic as surely, if not as quickly, as the writer of to-day would compose an article for the *Yale Review*. The group included John Trumbull, a precocious youth fitted for college at the age of seven, whose burlesque treatment of the Revolutionary war called 'McFingal,' ran through thirty unauthorized editions; the versatile Joel Barlow, author of 'Hasty Pudding,' who worked for half his life, we are told, upon the 'Columbiad,' having in the interval of his engagements adapted Watts's Psalms to the use of Connecticut churches.

and added several original hymns; David Humphreys, who translated a French tragedy, entitled the 'Widow of Malabar,' and composed several ambitious poems; and finally, Lemuel Hopkins, an honorary graduate. The Harvard historian whom I have already quoted has said that at the time the Hartford wit wrote, no Harvard man had produced literature half as good as theirs.

Perhaps one may, without offence, at this late day, refer to the ponderosity of this early poetry. 'McFingal' and 'Hasty Pudding' and the 'Progress of Dulness' would hardly be found amusing in these days, although they were mirthful. 'Greenfield Hill' is hard reading. The seriousness of such subjects as the 'Conquest of Canaan,' the 'Vision of Columbus,' the 'Anarchiad,' and 'The Last Judgment, a Vision,' was characteristic of the times and was adequately sustained by the serious treatment to which these themes were subjected. Indeed, in this period, lofty ideals were entertained, and long and elaborate poems were so naturally attempted that a commencement orator (as late as 1826) delivered a discourse on 'some of the considerations which should influence an epic or a tragic writer in the choice of an era.' The spirit of Hebrew poetry hovered over our elms, more constant than Calliope or Euterpe. It suggested dramas, which have died, it found expression in hymns, which have lived. I could name five of these. Brethren, answer the question of Emerson—

Have you eyes to find the five
Which five hundred did survive?

At the beginning of our second century we come upon the name of John Pierpont, preacher, patriot, advocate of every cause which would improve his fellow men, whose verses are at the front of two recent anthologies. Bryant just missed enrolment among us. He took a dismissal from Williams in

order to enter Yale, but he did not fulfil his purpose. Fitzgreen Halleck, a native of this county, did not go to any college. Not long after Pierpont, the two Hillhouses were graduated. The elder, James, was author of 'Percy's Masque' and three other dramas, the last of which, entitled 'The Judgment, a Vision,' was intended (says the author) to present 'such a view of the last grand spectacle as seemed most susceptible of poetical embellishment.' He was a gifted writer of fine taste and lofty ideals; and his writings were most highly esteemed by the generation to which he belonged. His name is dear to us as the poet of Sachem's wood, the beautiful park at the head of Hillhouse Avenue—the park and the avenue alike commemorating his distinguished father, to whom the city of Elms is beyond estimate indebted. For East Rock and West Rock he suggested the names of 'Sassacus' and 'Regicide.'

Later came Brainard, cut down in his youth, and brought to life at the call of Whittier; and William Croswell, son of the rector of Trinity Church, one of the most cultivated of churchmen, whose poems, ten years after he died, were edited by Bishop Coxe. In the class of 1820 were two men whom we honor for so many other reasons that we forget their poetry—Woolsey and Bacon. As the first quarter of the century closed, the college diploma was given to James G. Percival, that unique, eccentric, impracticable combination of science and literature, learned to superfluity, versatile to inconstancy, loving nature, books, words, yet disliking men as he met them; geographer, geologist, linguist, lexicographer, poet, with much of the distinction and a fair amount of the infelicity which characterizes genius. His metrical studies are remarkable illustrations of the Laws of Verse. Next came N. P. Willis, graceful in prose and verse, remembered by some for his Biblical lyrics, and by others

for lines in praise of New Haven elms; and soon, Ray Palmer, whose sacred song has been translated into twenty languages, and sung in Arabic, Tamil, Tahitian, Mahratta and Chinese, as well as in the tongues of Christendom. George H. Colton, one of a family that has cultivated the muses, published a poem on Tecumseh soon after he graduated in 1840. Twenty years later came Weeks and Sill—Weeks who died before he had stretched his wings for the flights of which he was capable; and Sill, bright and beloved Sill, whose verses, collected since his death, exhibit as do his essays and letters, an intellect strong, unconventional and suggestive. These are not all the departed whom we may hold in honorable remembrance.

It is no part of my plan to say much about the living, but there are two writers entitled to special mention—Finch, the author of stanzas which have brightened the fame of Nathan Hale; and Stedman, anthologist and historian of Victorian poetry, the poet of yesterday and to-morrow, the youth who won his laurels as an undergraduate writer in the *Yale Literary Magazine*; the singer who wears them still upon his frosty brow.

The comparison has been made between the graduates of Harvard and of Yale, and the long and brilliant list of historians and poets of Cambridge has been contrasted with the shorter and less famous list of New Haven. Our friends at heart will doubtless attribute something, as is their wont, to the proximity of Boston, a beacon set upon the hill, a port of entry for the culture of other lands, where the Athenæum, still foremost among the society libraries of the United States, was an inspiring resort, close akin to the London Library, giving to men of letters both sustenance and stimulant. It is however, probable that the difference between the two colleges is due to the fact that in Eastern Massachusetts during the last century

dogmatic theology has been neglected and the ablest intellects have been free to engage in literary production. Perhaps this is true. I do not know. We may claim this, however, without making any comparison, that Yalensians from the beginning were brought up in obedience to 'Duty, stern daughter of the voice of God'; that the College was founded for the fitting of men to serve the church and state, and that the graduates of Yale, whether famous or unknown, are devoted to the service of their country and show that they have been trained to think, to reason, to write and to speak with freedom and with force. We can every one of us recall classmates and friends, men we have heard and men we have heard of, who have been like village Hampdens, or mute inglorious Miltons; and we can also recall those who have shown, at the bar and on the bench, in the cabinet and in diplomacy those qualities which under other conditions would have made them orators and authors. The point I make is this, that the Yale training has tended to the development of strength rather than of grace. "I thank God" said a famous preacher who studied in both places, "that I struck no literary roots at Yale and no theological roots at Harvard." "I thank God too," said one of his teachers at New Haven.

It is certainly true that hundreds of the graduates of Yale have been accurate and forcible writers, who have known what to say and how to say it; and that they have in this way rendered an incalculable service to the country, far and wide, even though we admit that, under the pressure of strenuous life, but few of them have shown those literary qualities which are usually evoked where writers and critics come in close relation to one another, as they do in cities and in large universities. Long ago, Bishop Fraser said of the United States, that the people were the most generally edu-

cated, if not the most highly educated, people in the world. Something like this we may say of the Yale alumni—if they number few men of genius, they number many men of talents, usefulness and power; if there are none who are equal to Tennyson and Schiller and Victor Hugo, there are many who have been the advocates of truth and the promoters of social reform, in terse and vigorous English. They have excelled in the pulpit and at the bar, and in the halls of legislation, so that without mentioning the names of men whom we have personally known, I will remind you of that long line of jurists and statesmen who were living near the beginning of our second century, William Samuel Johnson, Pelatiah Webster, John C. Calhoun, James Kent, Jeremiah Mason, and that constellation of New England theologians, an innumerable host, from Edwards to Taylor.

Professor Kingsley was called the Addison of America, and he had such wit, knowledge and grace as might have given him distinction in literary composition if he had so directed his energy; but he was one of those 'generally useful men' that this college produces, who held at one time what we should call four chairs. We should all be proud to claim as the product of our alma mater James Fenimore Cooper, but we cannot, for like Shelley from Oxford, he was driven out because of a boyish misdemeanor. Professor Kingsley once told me this story: The novelist Cooper, Judge Kane, of Philadelphia, and Hon. John C. Spencer, of New York met at a dinner. 'Where were you educated?' said one. 'I had the honor of being turned out of Yale College,' was the reply. 'And so did I,' said the second; and 'I had the same honor,' said the third. *Hæc fabula docet* that boyish liveliness is not always fatal to mature success. If we cannot claim Cooper, Theodore Winthrop is ours—the essayist and novelist, whose posthumous

fame shows what was lost to letters when he died a patriot's death upon the field of battle.

Lounsbury says that Cooper left Yale with little learning in his head and then he wittily adds, "No one will doubt this who has learned to view with profoundest respect the infinite capability of the human mind to resist the introduction of knowledge."

In the second quarter of the nineteenth century the influence of Coleridge is apparent. William Adams, Horace Bushnell, Lyman Atwater, William Watson Andrews and Noah Porter are conspicuous examples of this infusion of idealism. Their writings are in evidence. The powerful imagination which produced 'The Ancient Mariner' and 'Christabel' had been directed to the transcendent study of the Infinite, and many who turned away from the most rigid tenets of Calvin, and from the literal interpretation of the Old Testament, were strengthened and guided by the philosopher of Highgate. Bushnell confessed greater indebtedness to the 'Aids to Reflection' than to any other book—save the Bible. Of the theological emancipator, I am not called upon to speak—of the gifted writer more than passing mention must be made. His sermons, addresses and essays always arrested the attention and excited the imagination of those who heard and those who read them. For example, his estimate of Connecticut, his 'Age of Homespun,' indeed all the contents of his 'Work and Play,' and many parts of 'Nature and the Supernatural,' glow with life and fancy, and will be as good reading for our grandchildren as they were for our fathers. The incisive notes of his voice as I first heard it when an undergraduate, still ring in my ears—and his racy sentences, his inspiring and suggestive phrases, and the eloquence of his thoughts were even more impressive than his voice. The name of Horace Bushnell

is a precious heirloom handed down from the Yale of the last century to the Yale of the present. He was an orator, a poet, a lover of nature, and of man—fearless, original, persuasive, too liberal for the conservatives, too conservative for the liberals of that day, now honored in both their schools. Horace Bushnell is the greatest of this group. Indeed I should place him, in genius, next to Jonathan Edwards.

Not a few of our brethren have excelled in historical writing. Stiles wrote a history of the exiled Judges, and Benjamin Trumbull the history of Connecticut; Samuel Farmer Jarvis was designated historiographer of the Episcopal Church; Moses Coit Tyler is the historian of American literature; Andrew D. White is the defender of science versus bigotry, whose history should make us grateful that Yale has been one of the most important American agencies for the emancipation of the human intellect from ignorance and dogmatism; Charles L. Brice is the exponent of Gesta Christi; George P. Fisher, an honored member of the faculty for almost fifty years, stands in the foremost rank among the ecclesiastical historians of this country, and Leonard Bacon, the Puritan, always remarkable for clearness and vigor, whether religion or politics was his theme, is the author of discourses on the early days of New Haven, which remain unsurpassed in the field of local history. He was like a modern Isaiah, the trenchant defender of political righteousness. Stillé's pamphlet, 'How a Free People conduct a Long War,' was one of the most inspiring products of the uprising for the Union; and Schuyler's studies in Turkistan and his essays in diplomacy are enduring memorials of another 'all round man,' observer, critic, traveler, essayist, historian, diplomatist—good in whatever he undertook.

Comparative philology was introduced among us by Josiah W. Gibbs, but the

chief impulse in this direction came from Salisbury, the first to teach Sanskrit in America. He recognized the ability and secured the services of one who was not a graduate, it is true, but an adopted son, whose honors are our honors, whose fame carries the name of Yale to every university of the Indo-European world, that illustrious scholar, William D. Whitney. We must remember that James Murdock in 1851 published a translation of the Peshito Syriac version of the New Testament; that Moses Stuart at an earlier day carried from New Haven to Andover, an enthusiastic, if not always accurate, devotion to Biblical literature; and that a learned and devoted scholar, Eli Smith, within sight of Mt. Lebanon, translated nearly all the Bible into Arabic, as in later days Hiram Bingham translated it into one of the languages of the Pacific Ocean.

Another interesting phase of philological study is shown in the attention given to the study of the languages of the North American Indians. This began very early, when Sargent, Brainard, Spencer and Edwards were engaged as missionaries to the aborigines in Western Massachusetts and in Central New York. The philological importance of the American speech was recognized in recent days by James Hammond Trumbull, who with rare aptitudes for the elucidation of knotty problems, directed his attention to the Indian languages of the Eastern States, and was soon acknowledged as foremost in that uninviting and perplexing field of inquiry. Before long we shall have his lexicon of the Natick Speech, so that he who will may cultivate the love of comparative literature by reading Eliot's Indian Bible. Daniel G. Brinton in other branches of aboriginal research has also won renown.

An unusual manifestation of the love of letters is shown by the attention given during the last century to lexicography. For

a time Yale was a veritable storm-center. Webster versus Worcester, and Worcester versus Webster were chieftains in this 'Battle of the Books,' and both authorities were graduates of Yale. Lately, Whitney, W. the Third, has taken rank with the best antecedents, and a score of co-operative Yalensians, many of them specialists, have been engaged in the improvement of the three great dictionaries. It is customary to laugh at the changes in spelling proposed by Noah Webster, and certainly some of the Johnsonese definitions which he propounded were mirth-provoking—('sauce,' for example)—but revised and improved by Goodrich, Porter, Kingsley and others, his dictionary holds its own. Its popularity was due in part, no doubt, to Webster's spelling book, of which the annual sale at one time was twelve hundred thousand copies. By this primer a very great service was rendered to letters—for it helped to counteract any tendency toward provincial or dialectic peculiarities among the heterogeneous people of the United States.

Apart from theology, philosophy has engaged the attention of many of our ablest brethren. This is especially true of the time since Porter was called to the professorship which he held with conspicuous distinction for almost half a century, including the years of his presidency. A recent investigator has traced the influence of this able teacher, well versed in the modern writers of Germany, who made metaphysics interesting to those who were indifferent, and at his best in the analysis of conflicting theories and in the detection of subtle errors. As a lawyer for the defense, he would have been the peer of Rufus Choate. Not a few of his pupils have been led through philosophy to pedagogics and are winning distinction in this field.

This review would be incomplete if I did not mention the *Yale Literary Magazine*,

which for more than three score years has kept up the love of literature among the undergraduates, and has furnished them with appreciative readers, critical enough and friendly enough for discipline. Many editorial writers have been trained by their service on this magazine, since Evarts set the press in motion. Older Yalensians have had their opportunities in magazines of wider circulation, the *Christian Spectator*, the *New Englander* and the *Yale Review*, not officially connected with the college, but supported by the faculty.

The literary societies also, which for more than a century were maintained with vigor, seem to me to have been one of the very best agencies for youthful discipline. The spontaneous efforts of young men, excited by the emulation of their comrades, and controlled by the friendly criticism of their peers, were admirable exercises for the development of the love of poetry, oratory, essay writing and debate.

One of the greatest services which this college has rendered to literature and science has been the preparation of an innumerable host of teachers and professors. The list is too long for recapitulation here—but a few names must be recalled. The earliest was Jonathan Dickinson, first president of Princeton, deemed in his time the peer of Edwards, whose immediate successors were likewise Yalensians. Next came Samuel Johnson, the friend of Berkeley, first president of Columbia University, elected president of the University of Pennsylvania, and his more famous son, William Samuel Johnson, who succeeded to the presidency of Columbia, and stood in the first rank among the statesmen of the period just subsequent to the Revolution. From the Wheelocks, of Dartmouth to Sturtevant, of Illinois, Chauvenet, of St. Louis, and Chapin, of Beloit, the file leaders in our colleges have constantly been elected from Yale. At a recent date lived Thomas H. Gallaudet,

pioneer in the instruction of deaf mutes, and Henry Barnard, ever to be associated with Horace Mann, as advocate, expounder and promoter of the American system of common schools. Nor can I forget Henry Durant, and the other graduates of this college, who went to the Pacific coast, 'with college on the brain,' and planted in California the seeds of learning which now bear harvests of golden grain. A happy thought gave the name of Berkeley to the site near the Golden Gate, where an institution begun by our brothers fulfils the remarkable prophecies of Timothy Dwight, written in 1794 :

All hail ! Thou Western World ! by heaven designed

The example bright to renovate mankind !

Soon shall thy sons across the mainland roam
And claim on fair Pacific's shore a home.

Where marshes teemed with death, shall meads unfold,

Untrodden cliffs resign their stores of gold.

Where slept perennial night, shall science rise,

And new-born Oxfords cheer the evening skies !

Let us turn from letters to science. As I scan the administrative records, from the beginning onward, with the aid of our right well beloved and trustworthy archivists, the two Kingsleys and Dexter, when the scepter passes from one president to another, the balance is kept true. Pierson was an exponent of geometry and a defender of the faith, who wrote out lectures upon physics, and dictated them to successive classes ; Cutler's short service gives little indication of his attitude ; Williams loved public life more than academic perplexities ; Clap was a writer on ethical and astronomical subjects, a student of the Bible, scarcely equalled, says his successor, in mathematics and physics by any man in America ; Daggett, extremely orthodox, was scientific enough to warn his townsmen, scared by 'the Dark Day,' not to be alarmed nor 'inspired to prophesy any future events—till they should come to pass'; Stiles was familiar with

every department of learning, 'theology, literature, science, whatever could interest an inquisitive mind * * * he included among the subjects of his investigations';* the elder Dwight is well known for the impulse that he gave to the expansion of the college in all directions ; the judicious Day was the author of a metaphysical study and of mathematical text-books ; Woolsey is distinguished as the promoter of classical literature, and at the same time as the president under whom the School of Science was developed ; Porter and the younger Dwight brought the University forward to its present comprehensiveness and influence in all branches of knowledge. Indeed, science and letters have always been the care of the corporation, and such will be the care while the helm is held by the discerning and vigorous pilot under whom the bark begins another voyage and so long as the alumni crew support the master and the mates.

Considering the hesitation with which the English universities recognized the study of nature as their concern, and how easy it is to awaken hostilities between the students of science and letters, or between ecclesiastics and naturalists, it is well to remember how early science came into the Yale curriculum, and how steadily it has held its place. A chair of mathematics, physics and astronomy was instituted thirty years before the professorship of ancient languages. As it is pleasant to associate the name of Sir Isaac Newton with the beginning of our library, it is likewise pleasant to remember Benjamin Franklin as a donor of scientific apparatus. 'Immortalis Franklinus' he was called by Stiles.

Before the college was fifty years old he became its valued friend, and was enrolled among the laureati in 1753. Four years previous, he had sent here an electrical

* J. L. Kingsley.

machine which enabled the young tutor, Ezra Stiles, to perform the first electrical experiments tried in New England. A Fahrenheit thermometer was a subsequent gift, and his influence led the University of Edinburgh to confer upon Stiles a Doctor's degree.

At the dawn of scientific activity in New England we see the commanding and attractive figure of our elder brother, Manasseh Cutler, storekeeper, lawyer, soldier, statesman, pastor, preacher, physician and naturalist, member of the Legislature and of Congress, appointed to the federal bench, advocate of the 'homestead' policy, and a pioneer among the settlers of the wilderness of Ohio. His greatest distinction is the part that he took in drafting and passing the ordinance of 1787, by which slavery was excluded from the Northwest Territory and a grant of the public domain was secured for the promotion of education. That is a record to be proud of, brethren of the Alumni, but it does not include the whole story. Cutler, a man of the true scientific spirit, an observer of the heavens above and of the earth beneath, is the father of New England botany. He made a noteworthy contribution to the memoirs of the American Academy, collected and described between three and four hundred plants of New England, and left seven volumes of manuscript notes, which are now in the Harvard herbarium, awaiting the editorial care of a botanical antiquary. Franklin and Jefferson valued him as a friend, and his correspondents in Europe were among the chief naturalists of the day.

About the beginning of the nineteenth century, Dwight and his three professors, who only uttered *sotto voce* the word university (though Stiles had written it in 1784), lest they should be regarded as pretenders, introduced a new era in which the progress has been constant and of increasing rapidity. In this new era, classical studies have been

promoted by Kingsley, the lover of antiquity, whose keen sword defended the study of classics; Woolsey, the lover of letters, who introduced to us Plato and the dramatists of Greece; Thacher, the lover of students; Hadley, the lover of lore; Packard, the lover of learning—and by the accomplished standard bearers still living; and science likewise had its skilled promoters: Silliman, leader in chemistry, mineralogy and geology, the alluring teacher, the captivating lecturer, unsurpassed by any, equalled only by Agassiz; Olmsted, the patient, inventive instructor, whose impulses toward original investigation were not supported by his opportunities; Loomis, interpreter of the law of storms and master of the whirlwind; Dana, the oceanographer, [who wore the tiara of three sciences; Newton, devoted to abstract thought, who revealed the mysteries of meteoric showers and their relation to comets, not before suggested; and Marsh, the inland explorer, whose discoveries had an important bearing on the doctrine of evolution—these all with the brilliant corps of the Sheffield Scientific School were men of rare ability who expounded and illustrated the laws of nature with such clearness and force that the graduates of Yale are everywhere to be counted as for certain the promoters of science.

Two agencies are conspicuous in the retrospective of this second era, the *American Journal of Science*, and the Sheffield Scientific School. Benjamin Silliman showed great sagacity when he perceived, in 1818, the importance of publication, and established of his own motion, on a plan that is still maintained, a repository of scientific papers, which through its long history has been recognized both in Europe and in the United States, as comprehensive and accurate; a just and sympathetic recorder of original work; a fair critic of domestic and foreign researches; and a constant promo-

ter of experiment and observation. It is a unique history. For more than eighty years this journal has been edited and published by members of a single family—three generations of them—with unrequited sacrifices, unquestioned authority, unparalleled success. In the profit and loss account, it appears that the college has never contributed to the financial support, but it has itself gained reputation from the fact that throughout the world of science Silliman and Dana, successive editors from the first volume have been known as members of the faculty of Yale. I am sure that no periodical, I am not sure that any academy or university in the land has had as strong an influence upon science as the *American Journal*.

A century has nearly passed since Benjamin Silliman was chosen a professor and went to Scotland, there to fit himself for the duties of the chair. What a century it has been! The widespread interest among our countrymen, in geology, mineralogy and chemistry is due in no small degree to his instructions here, and to the lectures that he delivered in every city between Boston and New Orleans.

The Sheffield school celebrated three years ago its semicentennial, and its useful services were rehearsed by one who will not venture to offer you a twice told tale. You must, however, permit him to remind you that fifty years ago the choice of studies was but timidly permitted in the traditional college, and that there was a strong demand for courses less classical, more scientific than were then offered. These wants the school supplied without antagonism or rivalry, though not without the awakening of alarm. It proved to be a rich addition to the resources and the renown of Yale, as every one admits. Its faculty was made up chiefly of men whose ideas were broad, whose distinction was acknowledged, whose methods were approved, and this, with the

munificent support of the benefactor whose name the school has been proud to bear, enabled Yale to stand forth as the ready, wise and resolute promoter of education in science. The alumni of the school are the proofs of its success.

Agricultural science in the United States owes much to the influences which have gone out from the Sheffield School. John P. Norton, John A. Porter, Samuel W. Johnson, William H. Brewer, each in his own peculiar way, has rendered much service. Johnson is preëminent, and in addition to his standing as a chemist, is honored as one of the first and most persuasive advocates of the experimental stations now maintained, with the aid of the Government, in every part of the country. We cannot forget the value of 'the crops'—we may forget how much their value has been enhanced by the quiet, inconspicuous, patient and acute observations of such men as those whom I have named, the men behind the men who stand behind the plow. They are the followers in our generation of Jared Eliot, the colonial advocate of agricultural science.

In the thirties there was an informal association which may be called a voluntary syndicate for the study of astronomy. Its members were young men of talents, enthusiasm and genuine desire to advance the bounds of human knowledge, but their time was absorbed by various vocations, and their apparatus seems lamentably inadequate in these days of Lick and Yerkes, of spectroscopes, heliometers and photography. Yet we may truly claim that the example and success of these Yale brethren initiated that zeal for astronomical research which distinguishes our countrymen.

The Clark telescope, acquired in 1830, was an excellent glass, though badly mounted, and was then unsurpassed in the United States. One of its earliest and noteworthy

revelations was the appearance of Halley's comet, which was observed, from the tower in the Athenæum, weeks before the news arrived of its having been seen in Europe. This gave an impulse to observatory projects in Cambridge and Philadelphia, and college after college soon emulated the example of Yale by establishing observatories in embryo, for the study of the heavens. The most brilliant luminary in the constellation was Ebenezer Porter Mason, a genius, who died at twenty-two, having made a profound impression on his contemporaries by discoveries, observations, computations and delineations. After his death, which was lamented like that of Horrox, it was not thought an exaggeration to compare his powers with those of Sir William Herschel—or even of Galileo. Under the leadership of Olmsted, Herrick, Bradley, Loomis and Hamilton L. Smith were associate observers, and they were afterwards reinforced by Twining, Lyman and Newton. Chauvenet became a writer and teacher of renown, and Stoddard carried to the Nestorians the telescope that he had made at Yale under the syndicate's influence.

The investigations of these astronomers were directed to the aurora borealis, the zodiacal light, the recurrence of comets, the meteoric showers, and the possible existence of an intra-mercurial planet. Newton became the most distinguished of the group. Partly by antiquarian researches in the records of the past, continuing the notes of Herrick, partly by mathematical analysis and a careful comparison of the paths of meteors he determined the periodicity of these mysterious and fascinating phenomena, and their relation to comets.

The astronomical syndicate of Olmsted and his pupils was long ago dissolved, but its spirit hovers near us, and beyond Sachem's wood, in the Winchester Observatory, skilled astronomers with their great heliometer are engaged upon problems

which were not even thought of by the discerning intellect of Mason and his brilliant confreres.

In the science of mineralogy Yale has long maintained the American leadership. Every one of us has heard the story of the candle-box of specimens, which Silliman carried to Philadelphia to be named, and every one of us has seen the subsequent accretions to the nucleus, beginning with the Gibbs cabinet, now shown in the Peabody Museum. No one is likely to overestimate the influence of this collection upon the mind of James D. Dana, nor to overestimate the value of his treatise on mineralogy which, revised and enlarged by able cooperators, continues to be a standard text-book in every country where mineralogy is studied.

In view of its recent acquisition, I am tempted to speak of the Museum as the 'House of the Dinosaur.' Its choice collections give an epitome of the sciences of mineralogy, crystallography, meteoroids, geology, paleontology and natural history, from the days of Silliman to those of the Danas, Brush, Marsh and Verrill.

The heart of a university is its library. If that is vigorous, every part of the body is benefited. Our college began with books; the incunabula were given by the founders, good books no doubt, if not a single volume relating to classical literature or the sciences was among them. Noteworthy accessions came at an early day, some of them from Elihu Yale. Think of eight hundred volumes sent from England, including the gifts of many famous writers. Remember such donors as Sir Richard Steele, of the *Spectator*, and the great Sir Isaac Newton, and then be grateful to forgotten Jeremiah Dummer, who collected and forwarded this precious invoice. Fifteen years later than Dummer's donation came nine hundred volumes from Bishop Berkeley, which with his bequest for scholarships and prizes, entitle him to receive the highest praise as

an early and liberal promoter of the humanities. Renewed homage should now be given to the benefactor whose timely and catholic bounty enriched this adolescent college. Therefore, let us repeat once more the verse of Alexander Pope and ascribe 'to Berkeley, every virtue under heaven.' Gratitude to this great philosopher shall not diminish our acknowledgments to that long line of donors who have made the library worthy of the university which has grown up around it.

Bibliographers and librarians are the servants of the temple—*servi servorum academiae*—and such as Edward C. Herrick, Henry Stevens, William F. Poole, and James Hammond Trumbull, are rare men, conspicuous among the promoters of historical research.

In controversial periods the attitude of Yale has been very serviceable to the advancement of truth. The Copernican cosmography was probably accepted from the beginning, although elsewhere the Ptolemaic conceptions of the universe maintained their supremacy, and the notes which Rector Pierson made on physics when he was a student in Harvard come 'between the Ptolemaic theory and the Newtonian' (Dexter). When geology became a science, its discoveries were thought to be in conflict with the teachings of the scripture. Ridicule answered the arguments of science, and opprobrium was thrown upon the students of nature. Brave Silliman stood firm in the defense of geology, and although some of the bastions on which he relied became untenable, the keep never surrendered, the flag was never lowered. When the modern conceptions of evolution were brought forward by Darwin, Wallace and their allies, when conservatists dreaded and denounced the new interpretation of the natural world, the wise and cautious utterances of Dana at first dissipated all apprehensions of danger, and then accepted

in the main the conclusions of the new biological school. The graduates who came under his influence were never frightened by chimæras. Marsh's expeditions to the Rocky Mountains, and his marvelous discoveries of ancient life, made the Peabody Museum an important repository of geological testimony to the truth of evolution.

I remember the surprise of Huxley in 1875 when, at a dinner of the X Club in London, I told him of Marsh's discovery of the fossil horse. In the following year, the great English naturalist came to New Haven to see in the Peabody Museum that of which he had heard and read. In his lectures at New York he soon described the work of Marsh, and subsequently referred to its important bearings.

Scant justice has been done in this discourse to the sciences promoted at Yale—and the deficiency is the more apparent when I think of the men now living whose work has been precluded from our scope. The next centennial discourse will do justice to them. Among the departed whose careers were made outside the walls of Yale, Percival, the geologist of Connecticut and Wisconsin; J. D. Whitney, the geologist of California; Chauvenet, the mathematician; Hubbard, the astronomer; Sullivant, the chief authority in mosses as Eaton is in ferns; F. A. P. Barnard, the accomplished president of Columbia; Eli Whitney, the inventor of the cotton-gin, and S. F. B. Morse, whose name is familiar from its relation to the electric telegraph—are especially entitled to honorable mention in this jubilee. So is a much older graduate, David Bushnell, the inventor of submarine explosives—the precursor of the modern torpedists.

There is a good deal to think about in the annals of Yale. It is not a perfect record. Deficiencies, errors, failures are met with from time to time—such as are

found in every human institution, even in those most sacred. It is not my business to seek them or point them out. It is rather my privilege to honor the good men that have built up for us and for our successors this great edifice, upon the firm foundations of devotion and faith; to admire the skill, the prudence and the honesty with which inadequate resources have been husbanded; and especially to appreciate that admirable union of conservative and progressive forces which keeps hold of that which is good until the better is reached, that believes in the study of nature and all its manifestations, and of man and all that he has achieved in language, philosophy, government, religion and the liberal arts.

This honored and reverend seminary has taught thousands of men of talent to be wise and good citizens, avoiding avarice and pretense, ready for service wherever Providence might call them, in education, philanthropy, diplomacy, statesmanship, church-work, literature and science; not a few men of genius have submitted themselves to her discipline and acknowledged the inspiration derived from her counsels; some of her sons have laid down their lives for God and their country; many have carried to the ends of the earth her precepts and principles; all, or nearly all, have been the friends and supporters of republican institutions, the lovers of sound learning and good books, the promoters of science whenever their aid was wanted, its alert defenders against bigotry and alarm, confessors of the christian doctrine.

The new order which gives to adolescence an extreme freedom in the choice of studies may be more favorable than the old to the production of men of letters, poets, orators, historians, essayists—and of investigators who will extend the bounds of mathematical, physical and natural science. Nobody can tell. Every one is hopeful. But with

all their gettings, may the new generation emulate their forebears in wisdom, self-control, sound judgment, and in hearty appreciation of all that books have recorded and all that nature has revealed.

Much reproach has been thrown upon the studies of colonial days because they were mainly directed toward theology and philosophy, and because there was so little study of the natural world. It is well to reply that nature studies are the growth of the last century, since Berzelius, Cuvier and Liebig initiated the modern methods of inquiry, carried on by Faraday, Darwin and Dana. Remember also that rigid discipline in logic and dialectics makes clear and accurate thinkers, fitted to treat the current questions of society with discrimination, perspicuity and persuasion. If our grandfathers did not excel in what we are pleased to call literature, they were taught to follow the rule of an illustrious writer, 'to use words coinciding as closely as possible with what we feel, see, think, experience, imagine and reason.' Such men were fitted to take part in the great Revolution of 1776, and in the war of 1861; to be influential in the formation of the Constitution of the United States, and in the administration of justice and order in every State of the Union, qualified likewise to lead in the organization and development of academies of science and schools of learning, defenders of the faith, upholders of right conduct, advocates of civil service reform, promoters of literature and science, and in general, trained by such discipline as they here received in mathematics, logic, history, language, philosophy and science, to be the leading men in every community where their homes were placed.

On fame's eternal camping ground
Their silent tents are spread,
And glory guards, with solemn round,
The bivouac of the dead.

DANIEL C. GILMAN.