THE

AMERICAN JOURNAL

OF

SCIENCE AND ARTS.

CONDUCTED BY

PROFESSOR SILLIMAN

AND

BENJAMIN SILLIMAN, JR.

VOLUME L.

GENERAL INDEX TO FORTY-NINE VOLUMES.

NEW HAVEN:

PRINTED FOR THE EDITORS BY B. L. HAMLEN,

Printer to Yale College.

PREFACE.

THE project of the American Journal of Science and Arts was first suggested by Col. Gibbs, in November, 1817, during an accidental interview on board the steamboat Fulton in Long Island Sound.* The American Mineralogical Journal, by the late Dr. Archibald Bruce, (our earliest purely scientific journal,) which had been begun a few years before, was most favorably received both at home and abroad, but it never passed beyond one volume of 270 pages; and as the declining health of Dr. Bruce rendered the prospect of its continuance hopeless, it was thought that we ought not to lose the advantage already gained, and that a high demand of duty required that some man devoted to science, should undertake to sustain its interests and those of the connected arts, in our rising country. Although a different selection of an editor would have been much preferred, and many reasons, public and personal, concurred to produce diffidence of success, the arguments of Col. Gibbs, whose views on subjects of science were entitled to the most respectful consideration, and had justly great weight, being pressed with zeal and ability, induced a reluctant assent; and accordingly, after due consultation with many competent judges, the proposals were issued early in 1818, embracing the whole range of physical science and its applications. The Editor in entering on the duty, regarded it as an affair for life, and the thirty years of experience which he has now had, have proved that his views of the exigencies of the service were not erroneous.

This Journal first appeared in July, 1818, and in June, 1819, the first volume of four numbers and 448 pages was completed. This scale of publication, originally deemed sufficient, was found inadequate to receive all the communications, and as the receipts proved insufficient to sustain the expenses, the work, having but

* Vol. xxv, p. 215. Obituary notice of Col. Gibbs.

three hundred and fifty subscribers, was, at the end of the year, abandoned by the publishers.

An unprofitable enterprise not being attractive to the trade, ten months elapsed before another arrangement could be carried into effect, and therefore No. 1 of Vol. ii was not published until April, 1820. The new arrangement was one of mutual responsibility for the expenses, but the Editor was constrained nevertheless to pledge his own personal credit to obtain from a bank the funds necessary to begin again, and from this responsibility he was, for a series of years, seldom released. The single volume per annum being found insufficient for the communications, two volumes a year were afterwards published, commencing with the second volume.

At the conclusion of Vol. x, in February, 1826, the work was again left upon the hands of its Editor; all its receipts had been absorbed by the expenses, and it became necessary now to pay a heavy sum to the retiring publisher, as an equivalent for his copies of previous volumes, as it was deemed necessary either to control the work entirely or to abandon it. The Editor was not willing to think of the latter, especially as he was encouraged by public approbation, and was cheered onward in his labors by eminent men both at home and abroad, and he saw distinctly that the Journal was rendering service not only to science and the arts, but to the reputation of his country. He reflected moreover that in almost every valuable enterprise perseverance in effort is necessary to success. He being now sole proprietor, a new arrangement was made for a single year, the publishers being at liberty, at the end of that time, to retire, and the Editor to resume the Journal should he prefer that course.

The latter alternative he adopted, taking upon himself the entire concern, including both the business and the editorial duties, and of course, all the correspondence and accounts. From that time the work has proceeded without interruption, two volumes per annum having been published for the last twenty years; and its pecuniary claims ceased to be onerous, although its means have never been large.

Forty-nine volumes having been published, ending with Number 100, October, 1845, it was deemed expedient to close the

series with a fiftieth volume, which should contain an ample and well digested INDEX of the whole. This great labor, vastly more arduous and protracted than had been anticipated, is at last accomplished. The strict verification of every reference in this Index, by actual comparison of the proof with the volume and page, has been a labor surpassed only by the toil of constructing the Index itself. The printing was commenced in October, 1846, and so toilsome and time-consuming has been the correction of the proofs, that although the work has gone steadily forward, without interruption, it is only at this late day completed. We may confidently believe that the volume will prove useful, not only to those who may possess the whole series, but to all who are connected in any way with the arts or sciences; for, whatever the department, the reader is directed by it to the various memoirs that have been published in the Journal on the subject that interests him, whether relating to the progress of science, to details of facts in the different departments of knowledge, or to the various resources of this and other countries: with such a guide, the entire copies of the work in public libraries or in those of individuals, become available.

As this volume may be consulted by many who have never seen the plan and prospectus of the Journal with which the first volume began, we republish, on this occasion, both the "Plan of the Work," and also those parts of the "Introductory Remarks" in which our early views were explained. Our readers will thus be able to judge how far we have fulfilled our engagements, and also how far our prospective views have been realized in the course of our now long experience. They will have moreover before them in this Prospectus of 1817, the principles that are still to guide us in our continued editorial labors.

"PLAN OF THE WORK.*

"This Journal is intended to embrace the circle of the PHYSICAL SCIENCES, with their applications to the ARTS, and to every useful purpose.

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* Taken from Vol. i, Am. Jour. Sci. and Arts, pp. v, vi; also pp. 1 to 8, July, 1818.

It is designed as a deposit for original American communications; but will contain also occasional selections from Foreign Journals, and notices of the progress of Science in other countries.

Within its plan are embraced,

Natural History, in its three great departments of Mineralogy, Botany and Zoology:—

Chemistry and Natural Philosophy, in their various branches; and Mathematics, pure and mixed.

It will be a leading object to illustrate American Natural History, and especially our Mineralogy and Geology.

The Applications of these sciences are obviously as numerous as physical arts and physical wants; for no one of these arts or wants can be named which is not connected with them.

While Science will be cherished *for its own sake*, and with a due respect for its own inherent dignity; it will also be employed as the handmaid to the Arts. Its numerous applications to Agriculture, the earliest and most important of them; to our Manufactures both mechanical and chemical; and to our Domestic Economy, will be carefully sought out, and faithfully made.

It is also within the design of this Journal to receive communications on Music, Sculpture, Engraving, Painting, and generally on the fine and liberal, as well as useful arts:—

On Military and Civil Engineering, and the art of Navigation:—

Notices, Reviews and Analyses of new scientific works, and of new Inventions, and Specifications of Patents:—

Bibliographical and Obituary Notices of scientific men; essays on Comparative Anatomy and Physiology, and generally on such other branches of medicine as depend on scientific principles:—

Meteorological Registers, and Reports of Agricultural Experiments: and we would leave room also for interesting miscellaneous things, not exactly included under either of the above heads.

Communications are respectfully solicited from men of science, and from men versed in the practical arts.

Learned Societies are invited to make this Journal, occasionally, the vehicle of their communications to the public.

The Editor will not hold himself responsible for the sentiments and opinions advanced by his correspondents; but he will consider it as an allowed liberty to make slight verbal alterations, where errors may be presumed to have arisen from inadvertency."

"INTRODUCTORY REMARKS.

"The age in which we live is not less distinguished by a vigorous and successful cultivation of physical science, than by its numerous and important applications to the practical arts, and to the common purposes of life.

"In every enlightened country, men illustrious for talent, worth, and knowledge, are ardently engaged in enlarging the boundaries of natural science; and the history of their labors and discoveries is communicated to the world chiefly through the medium of Scientific Journals. The utility of such Journals has thus become generally evident; they are the heralds of science; they proclaim its toils and its achievements; they demonstrate its intimate connexion as well with the comfort, as with the intellectual and moral improvement of our species; and they often procure for it enviable honors and substantial rewards.

"In England, the interests of science have been, for a series of years, greatly promoted by the excellent Journals of Tilloch and Nicholson; and for the loss of the latter, the scientific world has been fully compensated by Dr. Thomson's Annals of Philosophy, and by the Journal of Science and the Arts, both published in London.

"In France, the Annales de Chimie et de Physique, the Journal des Mines, the Journal de Physique, &c. have long enjoyed a high and deserved reputation. Indeed, there are few countries in Europe which do not produce some similar publication; not to mention the transactions of learned societies and numerous medical journals.

"From these sources *our* country reaps, and will long continue to reap, an abundant harvest of information: and if the light of science, as well as of day, springs from the east, we will welcome the rays of both; nor should national pride induce us to reject so rich an offering.

"But can we do nothing in return?

"In a general diffusion of useful information through the various classes of society, in activity of intellect, and fertility of resource and invention, producing a highly intelligent population, we have no reason to shrink from a comparison with any coun-

try. But the devoted cultivators of science in the United States, are comparatively few; they are, however, rapidly increasing in number. Among them are persons distinguished for their capacity and attainments, and, notwithstanding the local feelings nourished by our state sovereignties, and the rival claims of several of our larger cities, there is evidently a predisposition towards a concentration of effort, from which we may hope for the happiest results, with regard to the advancement of both the science and reputation of our country.

"Is it not, therefore, desirable to furnish some rallying point, some object sufficiently interesting to be nurtured by common efforts, and thus to become the basis of an enduring, common interest? To produce these efforts, and to excite this interest, nothing, perhaps, bids fairer than a SCIENTIFIC JOURNAL.

"No one, it is presumed, will doubt that a Journal devoted to science, and embracing a sphere sufficiently extensive to allure to its support the principal scientific men of our country, is greatly needed; if cordially supported, it will be successful, and if successful, it will be a great public benefit.

"Even a failure, in so good a cause, (unless it should arise from incapacity or unfaithfulness,) cannot be regarded as dishonorable. It may prove only that the attempt was *premature*, and that our country is not yet ripe for such an undertaking; for *without the efficient support of talent, knowledge*, and *money, it cannot long proceed.* No editor can hope to carry forward such a work without the active aid of scientific and practical men; but, at the same time, the public have a right to expect that he will not be sparing of his own labor, and that his work shall be generally marked by the impress of his own hand. To this extent the editor cheerfully acknowledges his obligations to the public; and it will be his endeavor faithfully to redeem his pledge.

"Most of the periodical works of our country have been short-lived. *This*, also, *may* perish in its infancy; and if any degree of confidence is cherished that it will attain a maturer age, it is derived from the obvious and intrinsic importance of the undertaking; from its being built upon permanent and momentous national interests; from the evidence of a decided approbation of the design, on the part of gentlemen of the first eminence, ob-

tained in the progress of an extensive correspondence; from assurances of support, in the way of contributions, from men of ability in many sections of the union; and from the existence of *such a crisis* in the affairs of this country and of the world, as appears peculiarly auspicious to the success of every wise and good undertaking.

"As regards the subjects of the contemplated work, it is [illegible] in our power to do much in the department of the natural history of this country. Our Zoology has been more fully investigated than our mineralogy and botany; but neither department is in danger of being exhausted. The interesting travels of Lewis and Clark have recently brought to our knowledge several plants and animals before unknown. Foreign naturalists are frequently exploring our territory; and, for the most part, convey to Europe the fruits of their researches, while but a small part of our own productions is examined and described by Americans: certainly, this is little to our credit, and still less to our advantage. Honorable exceptions to the truth of this remark are furnished by the exertions of some gentlemen in our principal cities, and in various other parts of the Union.

"Our botany, it is true, has been extensively and successfully investigated; but this field is still *rich*, and rewards every new research with some interesting discovery. Our mineralogy, however, is a treasure but just opened. That both science and art may expect much advantage from this source, is sufficiently evinced by the success which has crowned the active efforts of a few ardent cultivators of this science: several new species have been added to it in this country; great numbers of American localities of minerals discovered, and interesting additions made to our materials, for the useful and ornamental arts.

"Mineralogy is most intimately connected with our arts, and especially with agriculture. Such are the disguises worn by many most useful mineral substances, that an unskilful observer is liable to pass a thing by, as worthless, which, if better informed, he would seize with avidity; and, still more frequently, a worthless substance, clothed perhaps in a brilliant and attractive exterior, excites hopes altogether delusive, and induces expense, without a possibility of remuneration. A diffusion of correct

knowledge on this subject is the only adequate remedy for either evil.

"Our geology, also, presents a most interesting field of inquiry. A grand outline has recently been drawn by Mr. Maclure, with a masterly hand, and with a vast extent of personal observation and labor: but to fill up the detail, both observation and labor still more extensive are demanded; nor can the object be effected till more good geologists are formed, and distributed over our extensive territory.

"To account for the formation and changes of our globe, by excursions of the imagination, often splendid and imposing, but usually visionary, and almost always baseless, was, till within half a century, the business of geological speculations; but this research has now assumed a more sober character; the science of geology has been reared upon numerous and accurate observations of *facts;* and standing thus upon the basis of induction, it is entitled to a rank among those sciences which Lord Bacon's Philosophy has contributed to create.

"The outlines of American geology appear to be particularly grand, simple, and instructive; and a knowledge of the important facts, and general principles of this science, is of vast practical use, as regards the interests of agriculture, and the research for useful minerals. Geological and mineralogical descriptions, and maps of particular states and districts, are very much needed in the United States; and to excite a spirit to furnish them will form one leading object of the contemplated journal.

"The science of natural philosophy, with its powerful auxiliary mathematics, and the science of chemistry, the twin sister of natural philosophy, are of incalculable importance to this country. A volume would not suffice to trace their applications, and to enumerate the instances of their utility.

"As one which may be allowed to stand, *instar omnium*, we may mention the steam engine; that legitimate child of physical and chemical science—at once more powerful than the united force of the strongest and largest animals, and more manageable than the smallest and gentlest; raising from the bowels of the earth the massy treasures of its mines, drawing up rivers from their channels, and pouring them, in streams of life, into the

bosom of cities; and, above all, propelling against the currents, the winds, and the waves, of the ocean, those stupendous vessels, which combine speed with certainty, and establish upon the bosom of the deep the luxuries and accommodations of the land.

"The successful execution of this magnificent design was first effected by Fulton and witnessed upon the waters of the Hudson, but is now imitated in almost every civilized country; and it remains to be seen whether steam will be applied in war.

"The mechanical inventions of this country are numerous; many of them are ingenious, and some are highly important. In no way can a knowledge of them be so readily and extensively diffused as in a scientific journal. To this object, therefore, a part of our labors (should there be a call for it) will be devoted, and every necessary aid will be given by plates and descriptions.

"Science and art mutually assist each other; the arts furnish facts and materials to science, and science illuminates the path of the arts.

"Geometry, and mathematics both pure and mixed, can never cease to be interesting and important to man, as long as the relations of quantity shall exist, as long as ships shall traverse the ocean, as long as man shall measure the surface or heights of the earth on which he lives, or calculate the distances and examine the relations of the planets and stars; and as long as the iron reign of war shall demand the discharge of projectiles, or the construction of complicated defenses.

"In a word, the whole circle of physical science is directly applicable to human wants, and constantly holds out a light to the practical arts; it thus polishes and benefits society, and every where demonstrates both supreme intelligence, and harmony and beneficence of design in the CREATOR."

Such was the pledge which, on entering upon our editorial labors in 1818, we gave to the public, and such were the views which we then entertained, regarding science and the arts as connected with the interests and honor of our country and of mankind. In the retrospect, we realize a sober but grateful feeling of satisfaction, in having, to the extent of our power, discharged these self-

imposed obligations; this feeling is chastened also by a deep sense of gratitude, first, to God for life and power continued for so high a purpose; and next, to our noble band of contributors, whose labors are recorded in half a century of volumes, and in more than a quarter of a century of years. We need not conceal our conviction, that the views expressed in these "Introductory Remarks," have been fully sustained by our fellow laborers.

Should we appear to take higher ground than becomes us, we find our vindication in the fact, that we have heralded chiefly the doings and the fame of others. The work has indeed borne throughout "the impress" of editorial unity of design, and much that has flowed from one pen, and not a little from the pens of others, has been without a name. The materials for the pile, have however been selected and brought in, chiefly by other hands, and if the monument which has been reared should prove to be "*ære perennius*," the honor is not the sole property of the architect; those who have quarried, hewn and polished the granite and the marble, are fully entitled to the enduring record of their names already deeply cut into the massy blocks, which themselves have furnished.

If a retrospective survey of the labors of thirty years, on this occasion, has rekindled a degree of enthusiasm, it is the natural result of an examination of all our volumes, from the contents of which we have endeavored to make out a summary both of the laborers and their works.

We find that there have been about 600 contributors of original matter to the Journal, and we have the unexpected satisfaction of believing that probably five-sixths of them are still living; for we are not certain that more than fifty are among the dead; of perhaps fifty more we are without information, and if that additional number is to be enrolled among the "stelligeri," we have still 500 remaining. Among them are not a few of the veterans with whom we began our career, and several of these are still active contributors. Shall we then conclude that the peaceful pursuits of knowledge are favorable to long life? This we think is, *cæteris paribus*, certainly true: but in the present instance, another reason can be assigned for the large amount of survivorship. As the Journal has advanced and death has removed its scientific

contributors, younger men and men still younger, have recruited the ranks, and volunteers have enlisted in numbers constantly increasing, so that the flower of the host are now in the morning and meridian of life.

We have been constantly advancing, like a traveller from the equinoctial towards the colder zones,—as we have increased our latitude, stars have set and new stars have risen, while a few planetary orbs visible in every zone, have continued to cheer us on our course.

The number of articles, almost exclusively original, contained in the Journal is about 1800, and the Index will show how many have been contributed by each individual; we have doubtless included in this number *some few* articles republished from foreign Journals—but we think they are even more than counterbalanced by original communications without a name and by editorial articles, both of which have been generally omitted in the enumeration.

Of smaller articles and notices in the Miscellany, we have not made any enumeration, but they evidently are more numerous than the regular articles, and we presume that they may amount to at least 2500.

Of party, either in politics or religion, there is no trace in our work; of personalities there are none, except those that relate to priority of claims or other rights of individuals. Of these vindications the number is not great, and we could heartily have wished that there had been no occasion for any.

During twenty years from the inception of this Journal, the editor labored alone, although overtures for editorial coöperation had been made to him by gentlemen commanding his confidence and esteem, and who would personally have been very acceptable. It was, however, his opinion that the unity of purpose and action so essential to the success of such a work were best secured by *individuality;* but he made every effort, and not without success, to conciliate the good will and to secure the assistance of gentlemen eminent in particular departments of knowledge. On the title page of No. 1, Vol. xxxiv, published in July, 1838, a new name is introduced: the individual to whom it belongs having

been for several years more or less concerned in the management of the Journal, and from his education, position, pursuits and taste, as well as from affinity, being almost identified with the editor, he seemed to be quite a natural ally, and his adoption into the editorship was scarcely a violation of individual unity. His assistance has proved to be very important:—his near relation to the senior editor prevents him from saying more, while justice does not permit him to say less.

It may be interesting to our readers to know something of the patronage of the Journal. It has never reached one thousand paying subscribers, and has rarely exceeded seven or eight hundred —for many years it fluctuated between six and seven hundred.

It has been far from paying a reasonable editorial compensation; often it has paid nothing, and at present it does little more than pay its bills. The number of engravings and the extra labor in printer's composition, cause it to be an expensive work, while its patronage is limited.

It has a large gratuitous distribution, both at home and abroad, and an extensive good-will exchange with works often having no particular bearing upon its peculiar objects. It has incurred a heavy extra expenditure in reprinting exhausted numbers, for the purpose of furnishing entire sets of the work. No application for an entire set has ever yet been disappointed, and complete sets of the volumes are to be found in many institutions and in the hands of many individuals, both in Europe and in the United States. Entire sets have often been presented gratuitously to our infant colleges and to scientific institutions and distinguished individuals in Europe. A few remain on hand, and it is our intention to furnish them as long as we can afford to republish, or can repurchase numbers that have run out.

The series of volumes must ever form a work of permanent interest on account of its exhibiting the progress of American science during the long period which it covers. Comparing 1817* with 1847, we mark on this subject a very gratifying change. The cultivators of science in the United States were then few—now they are numerous. Societies and associations of various

* The date of the incipient movements.

names, for the cultivation of natural history, have been instituted in very many of our cities and towns, and several of them have been active and efficient in making original observations and forming collections. The American Philosophical Society at Philadelphia, the American Academy of Arts and Sciences at Boston, and the Academy of Natural Sciences also at Philadelphia, numbered distinguished names among their members, and had published valuable volumes of Transactions before our publication began. The Connecticut Academy of Arts and Sciences had also published a single volume as early as 1813. Since that time the Lyceum of Natural History of New York, the Boston Society of Natural History, the Albany Institute, and the Maryland Academy of Sciences have stood prominent among associations of a like nature, and their memoirs now constitute an important item in our scientific history. Other associations for the departments of history and ethnography have also published memoirs; and we must not omit to mention the American Geological Society, and the Geological Society of Pennsylvania, which has issued one valuable volume.

Of scientific collections we may say, that in the Institution from which we date these remarks, going back only fourteen years from the issuing of our first number, the entire mineralogical and geological collection of the college was transported to Philadelphia in one small box, and there, for lack of information elsewhere, the specimens were named by the late Dr. Adam Seybert, then fresh from the celebrated school of Werner at Freiburg in Germany, perhaps the only man then in this country who could be regarded as a mineralogist scientifically trained. Now, mineralogy and geology are familiar to our legislators and our youth; and the institution which sent forth its little box of unknown mineral treasures, unfolds to its pupils and the world a magnificent collection not surpassed, if equalled, in the United States.

Boston, which at our earliest date presented only the limited collection of the Linnæan Society, now opens to the student a rich and beautiful museum of natural history; and Harvard University at Cambridge has a fine botanical garden under an able and zealous botanist—a well furnished and successful observatory,

and a rich collection of minerals and fossils, including a skeleton of the Mastodon, which is rivalled only by the specimen of unexampled magnitude and perfection, in the private museum of Dr. John C. Warren in Boston.

Philadelphia may also boast of her cabinets of natural history, public and private: and one of the noblest collections of birds in the world,* bestowed on his country by Mr. Wilson of Delaware, has been, within a few months, added to the valuable collections of the Academy of Natural Sciences at that place.

When we began our Journal, not one of the States had been surveyed in relation to its geology and natural history; now those that have not been explored are few in number. State collections and a United States Museum hold forth many allurements to the young naturalist, as well as to the archæologist and the student of his own race. The late Exploring Expedition with the National Institute, has enriched the capital with treasures rarely equalled in any country, and the Smithsonian Institution recently organized at Washington, is about to begin its labors for the increase and diffusion of knowledge among men.

It must not be forgotten that the American Association of Geologists and Naturalists—composed of individuals assembled from widely separate portions of the Union—by the seven sessions which it has held, and by its rich volume of reports, has produced a concentration and harmony of effort which promise happy results, especially as, like the British Association, it visits different towns and cities in its annual progress.

Astronomy now lifts its exploring tubes from the observatories of many of our institutions. Even the Ohio, which within the memory of the oldest living men, rolled along its dark waters through interminable forests, or received the stains of blood from deadly Indian warfare, now beholds on one of its most beautiful hills, and near its splendid city, a permanent observatory with a noble telescope sweeping the heavens, by the hand of a zealous and gifted observer. At Washington also, under the powerful patronage of the general government, an excellent observatory has been established, and is furnished with superior instruments,

* Late the *Rivoli* collection of Paris.

under the direction of a vigilant and well instructed astronomer—seconded by able and zealous assistants.

Here also (in Yale College) successful observations have been made with good instruments, although no permanent building has been erected for an Observatory.

We only give single examples by way of illustration, for the history of the progress of science in the United States, and of institutions for its promotion, during the present generation, would demand a volume. It is enough for our purpose that science is understood and valued, and the right methods of prosecuting it are known, and the time is at hand when its moral and intellectual uses will be as obvious as its physical applications. Nor is it to be forgotten that we have awakened an European interest in our researches: general science has been illustrated by treasures of facts drawn from this country, and our discoveries are eagerly sought for and published abroad.

While with our co-workers* in many parts of our broad land, we rejoice in this auspicious change, we are far from arrogating it to ourselves. Multiplied labors of many hands have produced the great result. In the place which we have occupied, we have persevered despite of all discouragements, and may, with our numerous coadjutors, claim some share in the honors of the day. We do not say that our work might not have been better done—but we may declare with truth that we have done all in our power, and it is something to have excited many others to effort and to have chronicled their deeds in our annals. Let those that follow us labor with the like zeal and perseverance, and the good cause will continue to advance and prosper. It is the cause of truth—science is only embodied and systematized truth, and in the beautiful conception of our noble Agassiz—"*it tells the thoughts of God.*"

Although we are writing a preface to our first series already closed, we may, without impropriety, say something of the Second Series now in successful progress. It began on the first of January, 1846; instead of being quarterly like the First Series, it ap-

* Especially our ancient compeer, The Journal of the Franklin Institute at Philadelphia.

pears once in two months—six times in a year, giving two volumes of 450 pages each. In this Series, the name of a third editor appears upon the title page, and the remarks which have been already made are, in their spirit and almost in the letter, applicable in the present instance. The *unity* is still preserved, and both counsel and action—favored by juxta-position and constant intercourse—are almost as if one individual presided alone. It will be perceived, therefore, that we have not departed from the principle which has governed us from the beginning, and when our mantle shall fall, there are those at hand who may, if it be worth the effort, arrest it in its descent and wear it more worthily than we have done.

The portrait prefixed to this volume was engraved for a very different purpose and for others than the patrons of this Journal. It has been suggested by friends, whose judgment we are accustomed to respect, that it ought to find a place here, since it is regarded as an authentic, although, perhaps, a rather austere resemblance. In yielding to this suggestion, it may be sufficient to quote the sentiment of Cowper on a similar occasion, who remarked—"that after a man has, for many years, turned his mind *inside out* before the world, it is only affectation to attempt to hide his face."

In tracing back the associations of many gone-by years, a host of thoughts rush in, and pensive remembrance of the dead who have labored with us casts deep shadows into the vista through which we view the past.

Anticipation of the hour of discharge, when our summons shall arrive, gives sobriety to thought and checks the confidence which health and continued power to act might naturally inspire, were we not reproved, almost every day, by the death of some co-eval, co-worker, companion, friend or patron. This very hour is saddened by such an event,—but we will continue to labor on, and strive to be found at our post of duty, until there is nothing more for us to do; trusting our hopes for a future life in the hands of him who placed us in the midst of the splendid garniture of this lower world, and who has made not less ample provision for another and a better.

Yale College, April 19, 1847.

EXPLANATIONS.

NAMES of authors and subjects are arranged together alphabetically.

References to species of animals described or noticed in the Journal, though to some extent distributed through the Index, are systematically catalogued under the word *Zoology*. The same plan is followed with *Botany*.

Obituary notices are collected together under *Obituary*.

The references under authors' names, when numerous, are sometimes alphabetized, or distributed according to subjects, but often follow the order of the volumes.

Works reviewed are mentioned under the names of their authors, and also under the word *Works*.

When an article is illustrated by figures or plates, the fact is noted by adding to the number of the page, the letter f.

A Supplement, (page 317,) is added, containing some omitted references.

The list of plates and wood cuts, (page 323,) is arranged according to volumes, and the page or article is mentioned which each illustrates. The numbers in this list indicate the proper order of succession in each volume, and not the numbers that may appear on the plates.

ERRATA.

Page 14, col. 1, line 24 from bottom, for "Lea," read "Lee."
" 22, " 2, " 22 " " for "368," read "367."
" 23, " 2, " 12 " " dele "Barnes, D. W."
" 75, " 1, " 15 from top, for "156," read "157."
" 86, " 2, " 22 " " for "358," read "354."
" 98, " 2, " 4 from bottom, for "xxxiii," read "xxxii."
" 156, " 2, " 12 and 13 from bottom, dele the lines.
" 185, " 1, " 16 from bottom, for "xxxiii," read "xxiii."
" 185, " 1, " 21 " " for "271," read "371."
" 212, " 1, " 12 from top, dele "x, 203; xi, 335," and insert the same in the 2d line from top.
Page 287, col. 2, line 21 from top, insert xliii, 390.
" 287, " 2, " 3 from bottom, insert xxiv, 151.

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C.

Coal Mines and Formations, characters and localities of.

* At this place, erroneously called *Faye's* comet.

D.

E.

F.

G.

* We have arranged the references under this head according to the States, placing first a few of a general character. The references to *mines*, will be found under the names of the several metals; those of fossils, under *Fossil*, the *names* of the species, and also *Zoology;* those of tracks of animals under *Footprints;* of coal, under *Coal;* of boulders, under *Boulders* and *Drift;* of scratches or furrows, under *Scratches.*

I.

J.

K.

L.

M.

N.

O.

P.

Q.

R.

S.

T.

U.

V.

W.

X.

Y.

Z.

* Fossil species are indicated by an Asterisk.

SUPPLEMENT.

CORRIGENDA TO VOL. XXVIII.

"*Extreme cold*" *of* 1766–7.—In Volume xxviii, at page 183, are quoted observations at New Haven, Conn., on the cold of 1766, 1767, stated in "*degrees of extreme cold.*" This phrase being obscure, was then erroneously interpreted to be equivalent to "*degrees below zero.*" An examination of the MS. Meteorological Journal of Pres. Stiles, shows that the words "*extreme cold*" were marked on the thermometer (which was probably Hauksbee's) as comprehending a region, on the scale, of 20° H., viz. from 85° to 105°; 100° H. being equal to 0° Fahr. Immediately above this region of *extreme cold*, is a region of 20° marked "*frost*," extending from 65° to 85° H. (65° H. being equal to +32° Fahr.) The cold at New Haven ascertained from other sources was, Dec. 31, 1766, — 1° F., Jan. 1, 1767, $-8\frac{1}{2}$ F., Jan. 2, $-9\frac{3}{4}$ F., which numbers correspond very nearly with the statements in *extreme cold*, when explained on the principles above mentioned. The cold of Jan. 5, 1835, at New Haven, still appears to be more intense than any previously recorded here.

CORRIGENDA TO VOL. XXXII.

East Bridgewater Meteorite.—I have examined the East Bridgewater, Mass., Meteorite referred to in vol. xxxii, p. 395, of this Journal, and find the specimens which were collected to be nothing more than old slag from an iron-furnace, which had been spread over the field in former times. Some rounded balls of these had been washed up during the severe thunder shower during which the fall was believed to have occurred. One of the specimens submitted to my inspection was from the identical parcel collected by the lad with whom the report originated. Its surface was much invested, (and its substance partially penetrated) with rootlets of grasses!

CHARLES U. SHEPARD.

New Haven, April 22, 1847.

PLATES, MAPS AND OTHER ILLUSTRATIONS

IN THE

AMERICAN JOURNAL OF SCIENCE AND ARTS.

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* An asterisk prefixed, as above, indicates that the cut forms a separate sheet.

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