M F MAURY

ADDRESS

WASHINGTON D.C.

ADDRESS

DELIVERED BEFORE

THE PHILODEMIC SOCIETY,

AT THE

COMMENCEMENT OF GEORGETOWN COLLEGE,

AUGUST 28, 1846.

BY M. F. MAURY, LIEUT. U. S. NAVY.

WASHINGTON:
PRINTED BY J. AND G. S. GIDEON.
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WASHINGTON, JULY 30, 1846.

Lieut. M. F. MAURY, U. S. N.

DEAR SIR: The undersigned, a committee appointed at the last annual meeting of the PHILODEMIC SOCIETY, to procure a copy for publication of your able address, delivered at the late Annual Commencement of Georgetown College, take great pleasure in complying with their instructions, and respectfully request a copy for that purpose.

We have the honor to be, with great respect, your obedient faithful servants,

JOHN CARROLL BRENT,
EUGENE CUMMISKEY,
ALEXANDER J. SEMMES.

OBSERVATORY, JULY 31, 1846.

GENTLEMEN: Accept my thanks for the agreeable manner in which you have made known the wishes of the Philodemic Society, with regard to the address I had the honor to deliver before them at the late commencement of Georgetown College.

As it is the wish of the Society to have a copy of the address for publication, I herewith enclose it.

Respectfully, &c.

M. F. MAURY.

Messrs. JOHN CARROLL BRENT,
EUGENE CUMMISKEY, and
ALEXANDER J. SEMMES,
} *Com. Philodemic Society, Present.*

ADDRESS.

It has often been remarked, that the most sublime moral spectacle which the world affords, is an honest man struggling with adversity. But to me, the most beautiful is that which we here have before us—a band of generous youth, full of gay dreams, and bright hopes, just ready to launch out upon the world; their untried barques freighted with college treasures, many noble resolves, and high aspirations.

The business of life, the world and its ways, are to them like an unknown island to the mariner in the midst of the ocean—beautiful in the distance, rich with verdure and enchanting to the imagination, but surrounded with shoals he knows not where, and peopled with inhabitants he knows not whom. The prudent sailor, after he has passed, like my young friends here, the difficulties of the first approach, proceeds to land with the utmost caution. Dreading nothing so much as the snares which may be laid for him in treachery or deceit, he goes armed; but his arms are only for defence. Firm of purpose, unjust to none, true to himself, he is resolved to follow the line of his duty. If difficulty and danger beset in such a path, he faulters not, but meets them with a will.

Whenever and wherever I meet a youth just starting out upon this sea of life, my heart instantly warms towards him. I always feel a desire to come within hail, to run alongside and speak him kindly; to mark down upon his unbeaten chart, those shoals and quicksands, sunken rocks, and hidden dangers, which experience has taught me are in his course.

Cherish a taste for the pursuits of science; it so chastens the mind, and ennobles the man. The age teems

with intelligence. Your advantages are rare. Human knowledge is the aggregate of human experience; daily something is added to the general stock—every new principle, every fresh fact gathered from nature or her laws, is a link the more to the chain by which we hope to escape from the labyrinths of ignorance, and approach the gates of everlasting knowledge. With the clue thus lengthened and strengthened to guide them, and an increasing stock to draw from, these graduates have enjoyed advantages of education which none before them have ever possessed. Many of the theories which were taught to us in youth, have been exploded. The text books, which you and I, Mr. President, used at school, have become obsolete. New lights have dawned since then. The world is older and wiser now, than it was when we were young.

The youth here have had not only all the advantages of education which we had in our day, but they have had the benefits also of all the new lights, the discoveries and improvement that have since been made. They are the greybeards, we the striplings.

As knowledge increases, our views are enlarged, our wants multiplied, and our social condition improved; under the pressure of newly constituted wants, there has gone forth from the schools a spirit of philosophical research which gives new strength to the human mind, and imparts to the ingenuity of man energies whose compass cannot be measured. Ever urging on to fresh conquests of mind over matter, the achievements of this spirit are seen in the discoveries, the inventions, and improvements which mark the times. Almost daily we hear of some new thing, of some triumph of mind over matter, which those who witness it are ready to pronounce the ne plus ultra of human

ingenuity. But to-morrow, the ever busy mind of man, acting under the impulse of an age eminently utilitarian, pushes on with its discoveries, and finds more room for improvement: the powers of ingenuity are again taxed with a new idea, and the next day brings forth a *plus ultra.*

We were not content to snatch the lightning from the clouds, and to turn the thunder-bolt aside from its mark; for in the act electricity was discovered to be an important agent of nature. Finding that man might rule the lightning, the utilitarian sought to use it; as knowledge with regard to it has increased, its uses have been extended, until ingenuity has contrived to fashion it into wings for thought, and then to charge it with the instant delivery of messages as far asunder as the poles.

Philosophers have found new elements. The old dogma of fire, earth, air, and water, is exploded. Light, heat, and electricity are now the agents; with these we send invisible couriers through the air; with these we print and paint, spin and weave, and endow machinery almost with the attributes of intelligence. With such agents the world is set in motion. Nature employs them in all her works, and when man begins to enlist them into his service, he may well boast of a step gained, and talk of advancement and improvement.

Studying nature and her works, he has discovered that, so far at least as we may judge, all matter is ponderable or imponderable; that the natural state of the former, is a state of rest; and of the latter, a state of motion. That the imponderables, as light, heat, and electricity, are the agents which, acting upon ponderable matter, set the world in motion. Life, animate or inanimate, is the power by which

the thing endowed enlarges itself, and overcomes the force of gravitation. It is the imponderables, as light, heat, and electricity, which gives this power, which enables the trees to lift themselves above the earth, and high up in the air to stretch forth their arms to heaven, despite the forces of gravitation. These are the agents which give animation to things here below, impart motion and preserve harmony among the spheres in the firmament above.

Following up the idea thus expressed by nature, men of science, operating with the same agents, have produced such revolutions in the moral world, have so enlarged the boundaries of knowledge, and that, too, at a rate so rapid, and in a time so short, that if the sages of but one generation ago could be brought back to life among us, they would find themselves at fault in a thousand ways. Discoveries and inventions, founded on principles of which the wisest of them were ignorant, would meet them at every turn. In the place of old dogmas, they would discover theories and doctrines to them entirely new. Such have been the acquisitions to knowledge and the achievements of science since their day, that to overtake us they would find themselves, instead of teachers, cloistered students. Notwithstanding the contrast, *we* are not yet out of the woods. We see here and there a light spot, it is true; still the views of which we boast are made through narrow openings and a misty medium. At least we may so infer, for the view is actually expanding before our eyes.

But limited though they be, where is the country to which these discoveries do not extend, or what the mind not utterly barren and opake that they have not enlightened and improved?

They are heard on the sea, they are seen on the land; and though not so obvious, their impress is as palpable upon

the schools. They work in a circle. In the schools they begin, to the schools they return. Improvements in education gave rise to the spirit of research, of discovery, and invention, which now pervades the world. Action and re-action are reciprocals. This spirit reflects its achievements back upon education, and every time it returns to Alma Mater, it acquires fresh energies, and continues its round with renewed vigor.

Beauties far more lovely, poetry far more sublime, lessons inexpressibly more eloquent and instructive than any which the classic lore of ancient Greece or Rome ever afforded, are now to be seen and gathered in the walks of science. Physics have ceased to be considered a dry study; they are called beautiful. The discoveries of modern science have realized the wildest imaginings of the poet; its realities far surpass in grandeur and sublimity the most imposing fictions of romance; its empire is the earth, the ocean, and the heavens; its speculations embrace all elements, all space, all time—objects the most minute, objects the most grand. Carrying its researches to the smallest atoms which the microscope can render accessible to our visual organs, it comprehends all those glorious and magnificent objects which the telescope reveals in the boundless regions of space.*

It is a discovery of modern science that the atmosphere in one point of view is a sort of laboratory for receiving dead organic matter, and that the plants and trees are condensing machines for preparing it again for animal use. All breathing creatures, with every respiration, cast out into the air a quantity of matter that has coursed their veins, and exhausted its force in giving vitality to their systems. Every moment millions and millions of pounds of this ex-

*Dr. Mantell.

hausted matter are cast into the air. From the lungs and organs of respiration of each one of you here present, there are thrown off nearly 1000 lbs. per annum of what to each has been flesh and blood. Imagine, then, the quantity from the whole animal kingdom, including every living creature, from the smallest insect up to lordly man; and yet this thin air, which receives it all and is never surcharged, is to the earth in extent but as the down to the peach.

By the action of light upon this ejected matter it is decomposed, and resolved into gaseous substances, which enter largely into the components of trees, plants, and vegetables, constituting in them the nutritious parts of animal food. We hunger, and take for nourishment this same carbon again into the stomach, there elaborate it into flesh and blood, and again, with every breath, after it has performed its office and expended its vitality, cast it forth, like the exhausted steam of an engine, into the atmosphere, where it is again, in never ceasing round, filtered through the vegetable process, and re-adapted for animal use.

This flesh and blood, which I call mine, has passed this round—the animal, the inorganic, the vegetable—and been renewed upon me a hundred times since I came into the world.

What a sewer and laboratory may we now see in the atmosphere, by taking into the view the myriads upon myriads of moving things that cast out their dead matter into it. Yet notwithstanding the extent of the operation, the ages that it has been going on, the two parts—the animal which corrupts, and the vegetable which purifies—are so beautifully adjusted and arranged, so wonderfully compensated and balanced, that the nicest analysis can detect in the atmosphere not the slightest change as to its components or their

relative proportions. From such views we are led to the conclusion that the animal and vegetable parts of creation are in exact counterpoise. In infinite wisdom they are so balanced, that there is never an insect too much on one side, nor a green leaf too little on the other. Arrived at this point, the student of science turns from the book of nature to the volume of inspiration, and under the lights of these profitable studies, finds new beauties in the assurance that a "sparrow falls not to the ground without knowledge."

The idea that the grass, the herb, and the fruit tree yielding fruit, are "condensing machines," is of French conception. And that machine must be a powerful condenser indeed, which can compress invisible gases into tangible substances, and present them to our senses in the shape of the hardest wood and the tallest trees that are grown in the forest. It is a discovery of modern chemistry that this machine derives its power from the action of the yellow ray of the spectrum upon the gases of which I have spoken.* The "wave theory" of light explains the motion. Making more vibrations in a single second of time than the pendulum of a clock would have done since the world began, this ray of light gives the force which, operating upon the ponderable molecules that float in the air, produces alike the smallest sprig and the largest tree. Think only for a moment of the whole vegetable world; consider the magnitude and extent of its productions, the weight and size of the trees of the forest, the power it must have required to lift their broad tops so high up in the air; yet they are but the resultants of this force, the exponents of an imponderable something acting upon ponderable matter.

The right contemplation of this subject fills the mind

*Professor Draper's lecture.

with wonder and admiration. Bowed down under a sense of his littleness, the man of science thus finds tongues in the trees, which in mute eloquence teach him lessons and impress him with truths more sublime, beautiful, and instructive, than all that were ever conceived in ancient Rome, or uttered by sage in classic Greece.

As we extend the view, we find room for more enlarged and lofty conceptions. Though chemical analysis does not reach back far enough to detect any changes in the components of the atmosphere, we know that there have been changes. Nature has recorded the fact on tablets of the rock, and left evidences of it in the coal fields and other remains which are scattered through the earth. The light and heat from the anthracite fire, which cheers and warms us in a winter's day, came from the sun ages and ages ago, and have been bottled away, as it were, in the earth for man's use, and the present economy of nature and the world. The coal measures of the earth cover many thousand square miles; they, too, are filled by the work of the yellow ray; for it is well known that coal is of vegetable origin. It is almost all carbon. When the trees and plants flourished which produced this coal, the components of the atmosphere were very different from what they now are, for the carbon of this coal was abstracted from the air. Why, then, it may be asked, seeing the quantities of coal that are now consumed, returning its carbon back into the atmosphere, does not the air become tainted, and again unfit for animals constituted as we are? Reasoning by analogy, the answer is plain. Are not the vegetable productions of the earth, and the population of the world, greater now, than they probably have ever been? Under the improvements of agriculture, one acre of ground is now

made to produce as much as many acres formerly did. Taking one year with another, the amount of vegetable productions is just sufficient for the sustenance of the animals. Supply and demand are in as rigid proportions here as elsewhere. Nature is no doubt as admirably endowed with the regulating principles for the conservation of quantities, as we know she is with those for the conservation of areas. If from the combustion of coal, and the consumption of food, there be a greater quantity of gases evolved and discharged into the air, there is on the other hand an increased vegetable production sufficient to absorb and condense it. The stream is not enlarged, its current only is quickened. Like the water in the pipes through which our cities are supplied: the population of the city and the consumption of water may have doubled or trebled, yet the quantity in the pipes is a constant—the stream through is only more rapid, but the volume is the same; so with these gases through the atmosphere.

Which way so ever we turn, we see the most exquisite display of wisdom and harmony, symmetry and beauty, every where preserved between cosmical arrangements and terrestrial adaptations. Following up the clue which, by the achievements of science, has been placed in our hands, we might go on and trace out the beneficent designs with which wisdom assigned the proportions between the water and the dry land, the sandy deserts and the fruitful plains. The Potomac river, the St. Lawrence, the great lakes, and all those waters which run down to the sea, are again taken up by this downy atmosphere, and carried back to the mountains. Imagine the rivers of only this continent—the Mississippi and the Amazon among them—running back in constant streams through the air to their sources in the

upper country. There is a constant ratio between the quantity that runs down and the quantity that is carried back. Were evaporation to cease, or the atmosphere to stand still—were the winds never to blow, our rivers would become dry, and the earth itself unfit for man's use. What a circulator, purifier, cooler, and condenser! In every point of view this atmosphere is a grand machine—perfect in all its parts, wonderful in its offices, sublime in its operations.

There are certain nodding flowers of the field which give an instructive lesson upon the subject of cosmical arrangements, and show how beautiful are the views which open out before the student of nature, as patiently he turns over leaf after leaf of her exquisite works. These flowers are so constituted, that at a certain stage of their growth they must bend the stalk and hang their heads for the purposes of fecundation. When they have been duly impregnated with the seed-bearing principle, their vegetable health requires them again to lift their heads and stand erect. Now, it is as easy to show, that if the earth had been greater or smaller, the stalk of this flower stronger or weaker, it could not bow its head at the right time, fecundation could not take place, the plant never could have borne seed after its kind, and its species would have become extinct with the first individual planted by its maker.

Hence we infer that, on the morning of creation, the future well-being even of the little snow-drop, whose appearance by our garden walks in early spring we hail with so much delight, was considered—that when it was made, the magnitude and dimensions of the whole earth, from the equator to the poles, from centre to circumference, were taken into the account and weighed with it; and that exactly that degree of strength was given to its fibres which is best suited to its vegetable health.

If, therefore, such care was had for only one flower of the field, how much more in the whole system of terrestrial adaptations, between the air and its gases, the land and water, the animal and the vegetable, must care have been taken for the well-being and preservation of all things; and above all for man, for whose use all things were made.

Arrived at this point, our favorite studies lead directly from nature up to nature's God; and the youth, with his mind thus directed, finds only a greater force in the emphasis of the prophet, "Who hath measured the waters in the hollow of his hand; and meted out heaven with the span; and comprehended the dust of the earth in a measure; and weighed the mountains in scales, and the hills in a balance?"

Disquisition is stale; commentary is tame; all the works of nature abound with lofty doctrines, wholesome in their effects, useful in their results. They chasten the mind and ennoble the disposition. He who reads by such lights and doubts, is no philosopher, but the drivelling companion of the undevout astronomer. When I see a youth enter college, having in him the true spirit of mathematical investigation and philosophical research, I mark him for a useful man, and a noble example in his generation. "God works by geometry." Impressed with the sublime precept of his favorite study, his course from the beginning is like the first flight of the lark in the morning, "upward and onward, with a hymn in his heart."

There are minds whose exuberant fancy leads them off from the paths of science into the regions of fable and romance; there they build their airy castles, and lighting them up with the brilliancy of their imaginations, they revel on with fairy queens or goblins bold. There is a reality in store

for the youth of such a mind. Under the pressure of an age eminently utilitarian as this is, he will learn at last, when perhaps the spring time of life is past and gone, and it is too late for the lesson; but sooner or later he will learn the truth, that "where fairies have danced their mystic ring, though flowers may blow, fruit will hardly come."