CHEMISTRY APPLIED TO THE ARTS: A LECUTRE DELIVERED BEFORE THE UNIVERSITY OF VIRGINIA, MAY 30, 1868

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J. W. MALLET

CHEMISTRY APPLIED TO THE ARTS: A LECUTRE DELIVERED BEFORE THE UNIVERSITY OF VIRGINIA, MAY 30, 1868

Trieste

Chemistry Applied to the Arts.

A LECTURE

DELIVERED BEFORE THE

UNIVERSITY OF VIRGINIA,

MAY 30, 1868.

By J. W. MALLET, PH.D.; M.D.; F.C.S.,
PROFESSOR OF ANALYTICAL AND APPLIED CHEMISTRY IN THE UNIVERSITY.

LYNCHBURG:
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1868.

CORRESPONDENCE.

UNIVERSITY OF VIRGINIA,
June 1st, 1868.

Professor J. W. MALLET,

DEAR SIR,—The undersigned committee of the members of your class earnestly request, for publication, a copy of your recent Lecture on the objects and plan of instruction in your department. We are prompted to this by the conviction that the best interests of the School of Analytical and Applied Chemistry, and of the University at large, would be advanced by bringing more before the public a Lecture that gave such universal satisfaction to those who heard it.

Hoping you will grant our request,

We remain with the greatest respect,

Your obedient servants,

KING WYLLY.	J. W. KYGER.
GARRETT WALKER.	S. T. EVANS.
H. W. JONES.	L. W. T. BRADFORD.
F. S. SAMPSON.	J. S. WALKER.
J. VAN DEVENTER.	JOHN H. POPE.

UNIVERSITY OF VIRGINIA,
June 2, 1868.

MESSRS. WYLLY, WALKER, AND OTHERS,
Committee of Class in Analytical Chemistry,
University of Virginia.

GENTLEMEN,—I beg to acknowledge receipt of your note of yesterday's date.

It is naturally gratifying to me to find that the Class has been interested by the Lecture in question, the manuscript of which is at your disposal in accordance with your request.

I am, gentlemen,

Faithfully yours,

J. W. MALLET.

LOAN STACK

GIFT

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1868
MAIN

Chemistry Applied to the Arts.

A Lecture delivered before the University of Virginia, May 30, 1868, by J. W. Mallet, Ph. D., M. D., F. C. S., Professor of Analytical and Applied Chemistry in the University.

"*Inter signa nullum magis certum aut nobile est, quam quod ex fructibus. . . . Quocirca quemadmodum in religione cavetur ut fides ex operibus monstretur; idem etiam ad philosophiam optimè traducitur, ut ex fructibus judicetur, et vana habeatur quæ sterilis sit; atque eo magis si, loco fructuum uvæ et olivæ, producat disputationum et contentionum carduos et spinas.*"

—Bacon—*Novum Organum. Aphor. LXXIII.*

Gentlemen,—A desire has been expressed by the Rector of the University, and by some of my colleagues of the Faculty, that, in entering upon the duties of the recently created Chair to which I have had the honor of being elected, I should bring before the University some general views with regard to the department of knowledge to which this new Chair is to be devoted, and the object and manner of embodying its teachings with the system of instruction in this time-honored institution.

In attempting to fulfil the duty imposed upon me by such desire, I will ask your attention to a brief discussion of the following topics, viz:

First.—The reasons which seem to render it desirable that the

applications of chemical science to the useful arts should be made the subject of formal instruction in the higher institutions of learning;

SECONDLY.—The character of the expectations which may be justly formed of the nature and value of such instruction; and,

LASTLY.—The special and practical form which it will probably be well to give to the teachings of the professorship in question in the University of Virginia.

Many reasons suggest themselves for the introduction, at the present day, of Applied Science, in all its forms, amongst the subjects taught in the institutions of learning of the highest order.

Prominent among these reasons is the great importance which the subject itself has assumed amongst civilized men in comparatively very modern times.

Our knowledge of the general laws and phenomena of external nature has been increased within the memory of those now living to an extent and at a rate far greater than for any equal period in the earlier history of mankind. In many of those branches of physical science which have long been recognized, investigation, constantly increasing in activity, has been rewarded by progress of the most striking character. Multitudes of new facts have been ascertained, and many new and important principles have been discovered. In several directions entirely new realms of intellect have been thrown open, and their exploration has been at once eagerly and actively entered upon. Several of the natural sciences—to-day of universally admitted interest and importance—bear names which a century ago were unknown or were employed with very different meaning. The number of those who devote their lives to the study of physical science has enormously increased, so that, instead of the few sturdy pioneers who in past times pushed forward before their fellows upon the frontier of the unknown, so far separated from each other as scarcely to exchange help or sympathy, and so far removed from the thoughts and interests of the rest of the world that their existence was often scarcely recognized, we see to-day thousands of busy laborers cultivating these recently opened fields of intellectual effort, encouraging each other by constant intercourse, and honorably known to their fellow-men for the success which they have achieved and the rich harvests which they gather into the store-houses of knowledge.

Particularly noteworthy have been the advances made in the application of our knowledge of scientific truth to the comfort and convenience of mankind. No longer are the man of learning and the artizan separated—as to a large extent they formerly were—by the distance between the unpractical speculation of the one and the unenlightened manual dexterity of the other. Nowadays each new discovery of fact or principle is at once seized upon, and its possible bearing upon any of the useful arts eagerly canvassed and examined. New wants and new desires are created as new means for their supply and gratification are brought to light. And, on the other hand, new trains of investigation are entered upon, and further efforts in abstract research are stimulated, as it becomes evident that the possession of knowledge not yet acquired can be made to minister in some particular direction to the comfort or the luxury of man.

It has become so common as almost to have become tiresome to refer in general terms to the great advantages which have been gained in modern times from the practical application of natural science to the arts of civilization—yet it may well be doubted whether most persons have any distinct idea of the immense influence upon the daily life of all—and especially of all except the very rich—which the progress of applied science for the last century, or even half century, has had.

Readers of MACAULAY'S History of England are charmed by the distinctness with which, in one of his best known chapters, he reproduces for us a sketch of the actual condition—material, social and political—of England towards the close of the seventeenth century. We are astonished to find how striking is the contrast brought out by such a detailed picture between the habits, comforts and enjoyments of the Englishman of to-day and those of his ancestor of but five or six generations back. An equally vivid picture, from as able a pen, of the state of the civilized world at even the beginning of the present century in reference to the useful and ornamental arts would furnish an instructive standard by which to measure the progress these arts have made since the days of our grandfathers, and to estimate the blessings which the scientific industry of the last sixty or seventy years has conferred upon us.

Many of the examples most frequently quoted of the advances made during this short period are drawn from other than the chem-

ical arts. There are numbers of men now living who need not to be reminded that they have themselves seen the development of railroads, and the transportation upon them of passengers and goods at a speed five or ten times as great as was formerly possible, and upon a scale previously unattempted—an increase of at least five fold in the size of sea-going vessels, and their propulsion by an agent that defies wind and weather and makes the ocean a punctually traversed highway—the establishment of cheap, rapid and effective communication by mail—the truly wonderful interchange of thought between distant countries and opposite continents by the electric telegraph—the production of weapons of war and means of defence such as had not formerly been dreamed of—the substitution of the labor of the untiring steam-engine for that of untold millions of men and other animals—extensions and improvements in the production of food, clothing, and shelter, such as have thrown open to the laboring man of the present day advantages of life that seventy years ago could only be enjoyed by the wealthy, and in many respects were not even at their command.

But if we confine our attention to those arts alone which depend upon Chemistry, the most hasty retrospect presents us with a surprising list of advances made within the same period.

The streets of our cities and our public buildings have been illuminated by coal gas with a brilliancy, cleanliness, cheapness and safety formerly unknown. Our private houses are lighted in the same way, or with the rival hydro-carbons drawn in the liquid state from beneath the solid rock and refined to the limpid clearness of water. The clumsy and uncertain flint and steel have been replaced as a source of fire by the effective and convenient friction match. The smelting of iron from its ores, and its production in the various forms of cast-iron, wrought-iron, and steel, have been extended upon a scale that dwarfs the manufacture of the last century into insignificance. The important process of Mr. Bessemer for the direct conversion of cast-iron into steel even now opens to us the prospect of vast changes in the uses which may be made, and the quantity that may be consumed of this most valuable metal. The production of sulphuric acid upon an immense scale, and the adoption of the process of Leblanc and Dizé for making carbonate of soda from common salt have led the way to striking improvements in the manufacture of glass

and soap, in the methods of dyeing and calico-printing, and in a hundred arts besides which require the possession of acids and alkalies in abundance and at a reasonable price. The bleaching agency of chlorine has been made practically available, and gives us the snowy whiteness of the fabrics we wear and the paper on which we write. Many improvements of detail have been made in the manufacture and decoration of porcelain. Sugar boiling and sugar refining have gained largely by the application of chemical knowledge, and the extraction of sugar from the root of the beet—suggested by MARGGRAF as early as 1747, but not practically brought into use until the dearth of colonial sugar caused by the continental wars of the first NAPOLEON—has grown up as an important and very perfect branch of chemical manufacture. Quite recently the application of the laws of osmose or liquid diffusion through porous septa has furnished an entirely new method of separating crystallizable sugar from the organic impurities which accompany it, and this method has been put in practice upon the large scale. The working of indian rubber in its thousand protean forms, and the "vulcanizing" process, by which we confer upon it at pleasure most dissimilar and most strongly marked physical properties, are discoveries of our own day.

Several new arts have arisen which depend in part upon other than chemical principles, but have drawn largely upon chemistry, both in their origin and development—such as electro-metallurgy, which produces the sharpest casts by means of metals in liquid solution at common temperatures, and coats with a brilliant film of gold or silver objects moulded in the baser metallic alloys—and photography, which fixes for us the pictures of natural objects with the fidelity of nature herself.

Other arts—as that of agriculture—, long pursued by man empirically, have begun to assume a rational form with the aid of the light which, it is now seen, chemistry is capable of throwing upon them.

A host of new and valuable substances—unknown to our forefathers—have been added to our resources by the progress of chemical discovery. Malleable platinum, indispensable to the chemist himself, and lending most important aid to the great manufacture of sulphuric acid—iodine and bromine, with the services they render in medicine and photography—quinine, morphine, strychnine and atropine; potent but reliable weapons in the struggle with disease—