

**An introductory address, delivered at the Sheffield School of Medicine,
October the 1st, 1867 / by William Baker.**

Contributors

Baker, William, F.C.S.
Sheffield School of Medicine.
University of Glasgow. Library

Publication/Creation

Sheffield : [Pawson and Brailsford, Printers], [1867]

Persistent URL

<https://wellcomecollection.org/works/gdtszv5z>

Provider

University of Glasgow

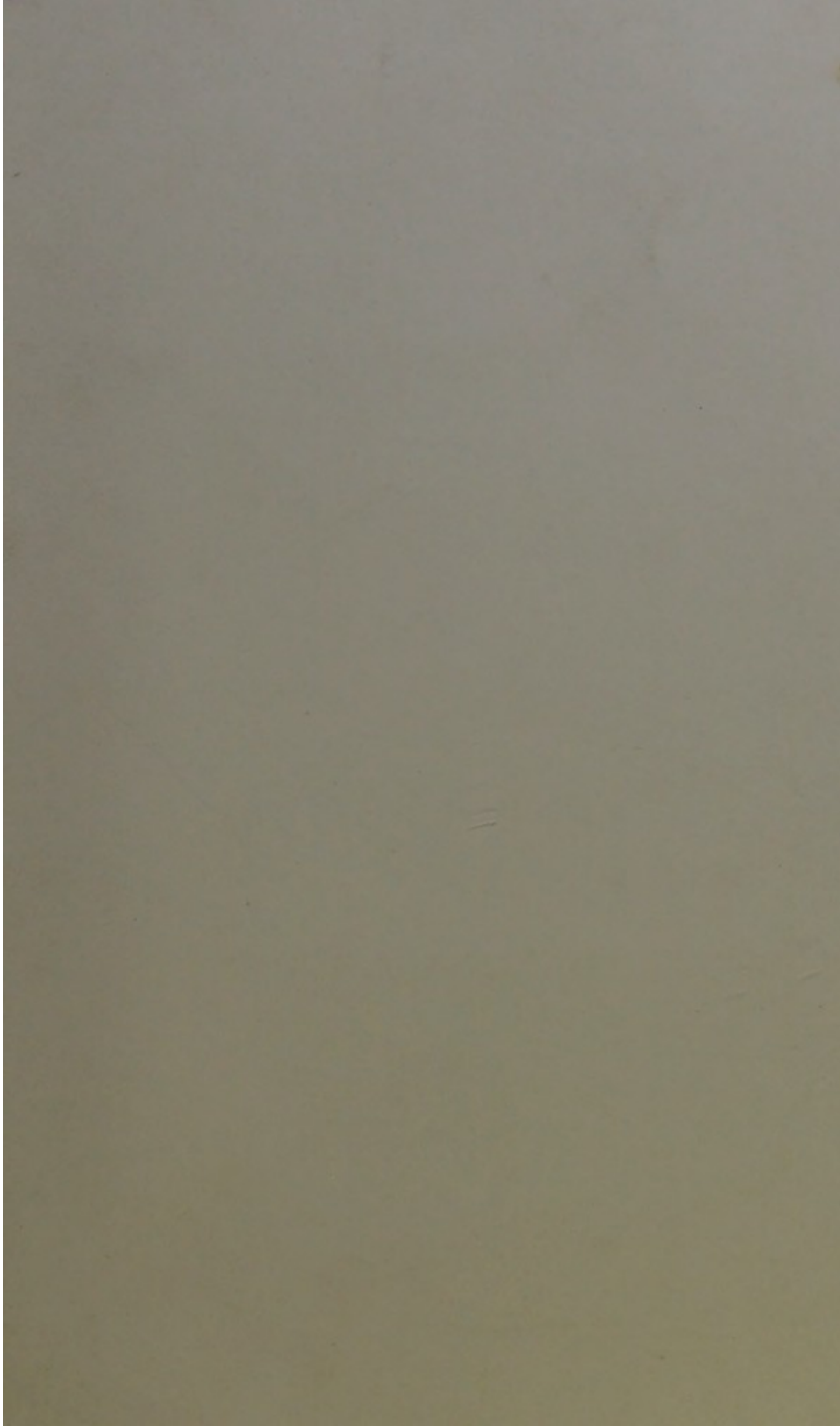
License and attribution

This material has been provided by This material has been provided by The University of Glasgow Library. The original may be consulted at The University of Glasgow Library. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>





12

AN
Introductory Address,

DELIVERED AT THE
SHEFFIELD SCHOOL OF MEDICINE,

OCTOBER THE 1ST, 1867,

BY
WILLIAM BAKER, F.C.S.,

*Associate of the Royal School of Mines ; Lecturer on Metallurgy
at the Sheffield School of Medicine ; Lecturer on Chemistry
and Physics at the Sheffield Collegiate School.*

SHEFFIELD :

PAWSON AND BRAILSFORD, PRINTERS, HIGH STREET.

Introductory Address

SHEPHERD SCHOOL OF THEOLOGY

NEW YORK

1882

THE

SHEPHERD SCHOOL OF THEOLOGY

NEW YORK

1882

THE

SHEPHERD SCHOOL OF THEOLOGY

NEW YORK

1882

THE

SHEPHERD SCHOOL OF THEOLOGY

NEW YORK

1882

INTRODUCTORY ADDRESS.

SHEFFIELD SCHOOL OF MEDICINE, OCT. 1ST, 1867.

THE opening of another session of the Sheffield School of Medicine, like that of a new year or other festival, may be contemplated with various emotions. Once again a study seductive, ennobling, but laborious and exacting, is placed before the aspirant to membership of one of the most self-denying and honourable professions. Once again the student who has already grappled with the vast array of facts which it comprehends may be refreshed with encouraging advice, aroused to fresh exertions, comforted by a retrospect of the difficulties overcome. To the medical officers and lecturers of the institution it is a time of anxious hopefulness. They know full well the worth of these opportunities; the golden prizes, the laurel crowns, now placed within the reach of every earnest student, as well as the long course of hard work which must precede their enjoyment.

As the mystery of life makes itself known chiefly by pulsations, and the short span of our existence is an alternation of activity and slumber—a pulsation of day and night—it seems also that our mental exertions may be promoted by a similar method of work. We may gird up our loins at epochs and anniversaries for increased efforts, and form new resolutions with better chance of fulfilment.

Such are the thoughts which fill my mind on this occasion upon which your Council has honoured me with the invitation to address you. I have myself trodden but a little way the path which lies before you in the curriculum

offered by this institution. As a student of the natural sciences which lie at the base of those more complex studies taught here, I have perhaps some title to claim sympathy with your pursuits and your aims; but still I speak without the authority of professional experience, and I feel that I need your indulgence if I stray from the contemplation of the more obvious thoughts you might expect to have unfolded on this occasion.

I have said that natural philosophy, which comprehends physics and chemistry, is the substratum of the theory and practice of the art of healing. I intend to enlarge upon this theme, and to call your attention especially to the great importance of an early and thorough acquaintance with the principles of those branches of knowledge.

For a long time a certain class of educational theorists, observing what is called the practical character of our age, have deemed the somewhat exclusive studies of mathematics and classics at our higher schools and universities unsuitable to the generality of our youths. A party gradually increasing in number has agitated for the introduction of modern languages and modern science as more useful in the wider career now open to all men of cultivated minds. It is to be feared that if the cry for science classes be very loud we may fall into a superficial knowledge of those subjects. The president of the chemical section of the British Association thus lately commented upon the method of teaching natural science hitherto adopted at our schools:—"The practice has been to give a course of "lectures from which the discussion of principles and of "everything which exercises and develops the mind is "eliminated, and only that which it is supposed will entertain or surprise is retained, and boys are thus led to "look upon science merely as a pastime." If this error be made in endeavouring to spread the seeds of scientific

truths, we shall have a number of men who will talk about magnetism and resistance coils, ozone and osmosis, none of whom have ever applied Ohm's law, made a single determination of the volume of a gas, or put into figures the laws of its diffusion. The medical man until lately has been almost the sole authority looked up to in our social circles for information upon these and kindred matters. But now the vast array of scientific facts has called forth a class of men devoted to their co-ordination and elucidation, experts in the science of matter recognised by a special degree by one of our universities. It is therefore hardly to be expected that a deep study of chemistry or physics can be compassed by men who, whilst attending to the inevitable duties of their profession, find the biological discoveries alone almost beyond their mental grasp. But let this be surely undertaken by all aspirants to the dignity which the successful study of medicine confers: a sound knowledge of the fundamental properties of the inert matter composing the organic and inorganic kingdoms. There are many cultivators of science, and discoveries are daily made of direct application to surgical practice. It is incumbent, then, upon the student of medicine to prepare himself to appreciate and to test new appliances and new thoughts.

Before the study of matter controlled by vital force must necessarily come that of its general properties as taught in our manuals of natural philosophy. Nor must we lose sight of the fact that some of these are yet imperfectly known and understood. Let me illustrate this remark by reference to one of the latest discoveries to be recorded in the chapter on molecular forces, and which has opened our eyes to the almost incredible force residing in the pores of substances as dense as platinum and iron. The researches of the master of the Mint have shown

that not only do gases diffuse through heated metals, but that they may be absorbed within the pores of the metal, in some cases to the extent of several times their volume. Following on this discovery we have lately seen that hydrogen was burned in the theatre of the London Institution which had been brought down from celestial space shut up in a piece of meteoric iron. Here is an apparent affinity of inert metal towards gas which may be compared to chemical affinity in its power, and which furnishes a curious example of those obscure phenomena which puzzle us on the border-land of chemistry and physics. But if a simple element possesses such properties it is more than probable that the complex substances which compose our body should exercise powers of occlusion as well as osmosis, and may indeed enjoy a selective affinity for certain gases to which their surfaces are exposed. A piece of white of egg absorbs ammoniacal gas with almost the same rapidity as water does. This displays in a striking manner this extraordinary physical property of some colloid substances. That this body in its soluble state is one of the chief constituents of the blood is full of suggestion to the chemical physiologist. I heartily trust that these discoveries may lead to greater attention being given to the state of the unseen gaseous medium which surrounds us, upon which the conditions of a healthy life so largely depend, and I hope I may enlist your sympathies and your co-operation in the work I am going to point out as one specially in the province of medical men. That it has reference to an intangible, invisible agency is only a reason that the more educated intellects should master its secrets, and, by the force of precept and example, stem the wide-spread torrent of ignorance on this matter.

Not many years ago it was thought that the composition of the air was invariably the same. The keen blasts from

the summit of Mont Blanc, the fog-laden canopy of London, the fiery sirocco, and the balmy winds of Araby, all yielded to the researches of the chemist the proportion of 21 volumes of oxygen to 79 volumes of nitrogen. Wonderful was the diffusive power of gases, and vast the operations of nature compared with the pigmy disturbances of men to account for this grand stability of composition; and wonderful and vast they still remain. The geologist in contemplating the stereotyped forms of extinct vegetable life first caught a glimpse of the possibility of a different atmosphere having existed in those ancient times,—one not quite so suitable to the wants of the higher forms of life. What would not a chemist give now for an occluded volume of gas from the carboniferous era to compare with our atmosphere! By the more refined methods of analysis of our day we can prove not only that the air is not of constant composition, but that the pollution inseparable from humanity can be traced unmistakably to its source. The variations of carbonic acid gas and oxygen can now be readily estimated, and they go far to account for the different effects upon the animal economy of the crowded gas-lighted room and the open air of the fields.

We have means of rendering visible the variations of temperature and pressure by physical instruments which the unscientific can read and understand. He would be no small benefactor to the denizens of cities who should render visible the unseen poison of carbonic acid as it accumulates, exhaled by the breath of men, or evolved by the combustion of gas and fuel, lingering in our rooms, prevailing the streets, hovering over the whole town. Until some such physical instrument be found these invisible sources of discomfort and ill health can only be spoken of and treated as the realities they are by those who see them in the light of scientific knowledge. It is especially to this

view of your function as sanitary guardians that I wish to direct your attention.

It is difficult to realize from time to time the unnatural conditions which social custom and ignorance have accumulated to hinder the development of a healthy life. Such things have been, such things are, and so they pass unquestioned. But surely none can study the principles of physiology and the chemical and physical properties of gases, without at one time or another being deeply impressed with the prevalent disregard of the quality of the air we breathe. It is true, ventilation has been preached and taught and acknowledged, but the practice of our daily life ignores it to an immense extent. Until the scientific truths connected with pure air are spread broader and deeper in all ranks of society, we must make shift to live in boxes like flies in a paper cage, with one pinhole for air—the chimney. This represents too truly the rooms in which a vast number of a toiling, thinking population pass a great portion of their existence. Take an average sitting-room, for example. Its capacity may be 2000 cubic feet. Three or four persons are present, and at least three jets of gas are burning. Observe the accumulation of carbonic acid alone exhaled by the occupants and evolved by the combustion of the gas. What wonder is it that with doors and windows shut, and only a small area of chimney, the normal quantity rises from four volumes to nine or ten in 10,000 volumes of air. Roscoe has recorded observations in which the amount reached even twelve to thirteen volumes, and in a school-room to thirty-three volumes, in 10,000.*

* Roscoe, "On the Atmosphere of Dwelling Houses."—*Quarterly Journal of the Chemical Society*, 1858. See also a valuable paper by Angus Smith, "On the Air of Towns."—*Quarterly Journal of the Chemical Society*, 1859.

Invention is not idle. Long ago the great physicist who has lately passed away (Faraday) showed how we might enjoy the light of gas in our houses without being poisoned by the products of combustion. We do not lack skill, but contrivances for the full and sufficient supply of pure air are thrown away upon men who do not feel their necessity. Well-educated people exhibit an indifference to the effect of vitiated air upon their system which would be amusing if it did not involve a serious offence against the laws of health. I have seen a lady remove a vase of flowers to the outer hall when the gas was lighted, and then calmly expose herself to the baleful atmosphere for the rest of the evening. Such palpable facts about the matter as this are so curiously unobserved or rather unheeded. The proverbial difference of town and country air, the languishing vegetation as the former is approached, the struggles of suburban horticulturists to save their commonest plants—all this should awaken us to a startling reading of the old saying, "God made the country, and man made the town."

But when we consider this matter with reference not only to the few occupants of a house but to the population of a town, how important becomes the duty of influencing public opinion. Many of us doubtless have exercised a kind of petty providence, and ruled over a collection of vegetable and animal life such as is common in our aquariums, and to compare small things with great, we may judge from the disasters of our imperfect government of such a microcosm how fatal to the public health are some of the regulations and conditions of human life in large towns. You, gentlemen, will deplore with me from this point of view, whence we see the lives of thousands in the hands of a few, that the sanitary department of the local government is almost entirely controlled by men chosen

for political opinions rather than for scientific knowledge, and that the imperative necessity for guardians of the public health who have made these things their study is not at once acknowledged and provided for.

The adoption of the local government act has been of great benefit to the town, and we may expect an improved state of things as regards the disposal of sewage from the scheme which is now in hand; but no one can visit amongst our bye-lanes and courts, as the medical man has to do, without being convinced of the need of more extended powers to remove nuisances affecting public health. I have reason to know that only a few months ago, within a stone's throw of the Parish Church, in a back lane, fourteen pigs were kept. Complaint was made to the sanitary inspector, who accordingly set the prescribed machinery of a slow velocity in motion, so that whilst fever was raging on the right and left, with one case ending fatally, the owner of the swine had time to sell off half his store and practically to defy the legal machinery which was employed against him. On another occasion some dozen houses were visited, and the occupants instructed to provide the means which are common for removing the dejecta in towns. Two complied, but the others still exist virtually in a state of outlawry and practically a nuisance to the neighbourhood.

I can point out a place where the surface water which collects during heavy rains soaks through a mass of filth, and spreads a noisome infiltration under whole blocks of houses. The most industrious sanitary inspector cannot always reach this mute obstinacy of ignorance. The evil weeds are of such thick and equal growth, it is difficult to seize on the prominent ones to cut them down, whilst the task of a wholesale mowing requires a larger capital and machinery of legal force. Such a state of things we must

fight against. It is not a strife to bring much glory on our side. Opposition will meet us at every step. These imps of darkness, ignorance, and prejudice cannot be easily dislodged. But if it is the duty of the government in the abstract to provide for the moral and physical welfare of the people, it is still more the duty of the highly cultivated medical man to lead the way in exposing and purifying the centres of corruption to which I have alluded.

To a man having a keen sense of the exhaustless and beneficent powers in nature, which are ever at work to renew, refresh, and purify the face of the earth, the atmosphere of a town is the cause of a righteous anger. When one thinks of the great atmospheric waves, the elastic air yielding to their pressure, the aqueous vapour borne on its sweeping winds, from time to time carrying down dissolved in sheeted rain matter foreign to its purity, the immense resources of vegetable life modifying climatic conditions, one cannot help regretting that men possessing a knowledge of the fundamental laws which govern this vast machinery have done so little towards preserving its powers unimpaired when congregated together in cities.

I can imagine how one might look down upon a few square miles of our populous country and see how its surface lies blemished by these plague spots where men do dwell. The architect may build his stately temple, the engineer may span with iron lines the valley and the stream: the work of the first crumbles under his eye beneath the corrosive vapours of the city, and men seek the other's help to flee from the places they have spoiled. This is by no means an exaggerated view of the matter. Why, I ask, are we condemned to toil in smoke and dirt, we, who know that these things need not be, we, who have applied electricity, the expansive power of steam, and the like physical forces to so many useful and marvellous results. * We may

not invent a machine to dispose of sewage, nor a reagent to precipitate smoke, but we may cultivate a wider knowledge of the properties of matter, and may abate the evil of such nuisances by bringing them under the rule of intelligence. Of this we may be sure, that whilst engineers and chemists combine with local authorities in carrying out large sanitary schemes, greater immediate benefit can be obtained by personal influence upon the habits and modes of thought of those around us. That men follow like sheep at a brook is proverbial. If, therefore, example as well as precept be held up for the guidance of the people, we shall see fewer gross hygienic errors in our houses and streets. Gas stoves unprovided with chimnies will no longer find a sale. Houses without proper means of ventilation will remain unlet. Our evening light will not mix its products of combustion with the air we breathe. Water cisterns will not be placed so as to absorb offensive vapours. Lastly, the rainfall will reach the unpolluted river and the sewage will be conveyed unnoticed to the soil.

I will now revert to the applications of chemistry to physiology. The discoveries in this direction seem so important that more than ever must the demand be made upon the medical student for a thorough acquaintance with the principles of this science. It is true, as it has been well said to those who would push chemical theories too far, the stomach is not a test tube. But this organ and others can supply substances for examination in test tubes which materially aid the intelligent observer in the diagnosis of disease.

Other applications of chemistry and physics to the elucidation of the living economy may be adduced. I may instance the optical and chemical investigations by Professor Stokes and Mr. Sorby on the oxidation and deoxidation of the colouring matter of blood. The researches

of the latter upon the spectrum of various coloured organic fluids, at present restricted only to the vegetable kingdom, may not improbably aid the physiologist at a future time in ascertaining some useful facts in connection with the animal economy. Such for instance as the nature and function of the colouring matter of bile.

Chemistry, in the hands of Frankland, has admirably confirmed the results of the experiments made by Fick and Wislicenus in Switzerland. We now are certain that the mechanical force and heat developed by muscular exertion is not derived solely or principally from the oxidation of proper muscular tissue. To chemistry we must look for anæsthetics of various powers and action. In the new substance proposed by Dr. Richardson, the bichloride of methylene, we have one which for general use may be exhibited as safely as ether, whilst imparting insensibility as surely as chloroform. It is not unlikely that surgeons skilled in the chemical and physical properties of these agents may find cases in which a discriminating selection must be exercised according to the nature of the operation or the habit of the patient. Armed with the microscope the chemical physiologist may hope to discover the choleraic germs, if such exist, or those other active sources of epidemic diseases which are so striking and uniform in the stages attending their fatal course, but so obscure and various in their origin.

The phenomena of fermentation are yielding invaluable facts to the industrious researches of M. Pasteur, and these again lie on the border land of chemistry and biology.

What need is there for further illustration of my argument that a sound knowledge of these fundamental sciences is absolutely necessary to the medical practitioner. You cannot prescribe, operate, nor observe successfully without comprehending thoroughly physical and chemical laws.

Now, let me address myself particularly to those gentlemen who have chosen for their career in life this honourable profession. It is not easy to estimate how far a man's idiosyncrasy may prevent his own experience being of any value to others. So diverse are we in our ambitions and our aims. What may stimulate one to a noble emulation may have little effect upon another. But this at least I may postulate. You have chosen this path for honour or for profit. A guiding taste for study may have induced some to enter. If it be pursued earnestly the taste will grow, the honours will be reaped. Here I pause to exhort you to seek these first, to seek them only, and doubtless the others will be added thereunto. The Hebrew king, who asked for wisdom, received with it riches and honour beyond any other kings of his day.

One of the chief objects of this address is to prepare your mind for the work before you. As an athlete measures the leap before him, so I bid you face the obstacles in your way, and strengthen yourselves for the effort. It needs much self-denial. The time is short to acquire the riches of wisdom you come to inherit. Let it not be passed without a constant and active response to the wise words which tell us to do everything with our might, whatsoever we find to do. Some practical advice will, I have no doubt, be accepted in a kindly spirit. Having registered yourselves students of one of the most noble professions to which the human intellect can devote its energies, let your conduct be fitly framed to a life which shall be a picture of mental force overcoming pain and disease. Death, indeed, is inevitable, but the laws of a healthy life can be known. The ministers of these laws you are or will become to the so called saving, that is, prolongation of life. It is a constant source of regret how soon the light of the brightest intellects fades away. The long-garnered experience of

many years is obliterated or but imperfectly handed down to others. We truly inherit the facts accumulated by our fathers, but which of us can adjust our mental vision to the focus of those, the honoured and the learned, who, with their long experience, left us whilst still arranging, co-ordinating, and generalising upon the results of their inestimable labours. Such a one, but three days ago, has departed, and we who come after him may learn from his colleagues in the earliest days of the Sheffield Medical School, how Mr. William Jackson promoted its interests and supported other schemes of mental culture whilst pursuing an active medical career. Do not then waste your time in perusing with aimless intent the popular literature of the day. You have imagination which needs no such fostering as modern fiction can render. Taste rarely and but lightly of such mental food as can be obtained in magazines and reviews. I would earnestly press upon you, if you wish to obtain eminence in your pursuits, to concentrate your mind, for these two or three years before you, almost entirely upon your studies. They offer variety and novelty unsurpassed by any other profession, and the well-regulated mind, with elastic strength, may dwell untiringly upon one or other of the sciences they embody. The themes of fiction, invested with the most brilliant figures, and moving the inmost feelings of a sympathetic mind, pass without touching the deepest nature of our being. Whereas the facts of natural science once understood are ours for ever. For us they remain, binding us in sympathy with all creation, until it may be we shall one day awake to higher spheres of thought to find them controlled by higher laws surpassing our grandest earthly conceptions.

I wish to remind you that, in becoming members of the Sheffield School of Medicine, your duty is to uphold its character. It remains with some of you—perhaps with

one of you here present—to make it famous in the annals of medical education. There is good reason for hoping that amongst men devoted to scientific study and its applications to the personal wants of humanity there may arise some who may help to dissipate the cloud with which ignorance and crime have covered the name of Sheffield. We see foremost in society men who have made themselves places by mental toil of a certain kind, rulers of vast business and manufacturing establishments. I am inclined to ask, Where are there sons? Where are our young men? If these are they meeting the observer's eye, lounging about the High-street, swinging a useless cane, whose talk is about betting and billiards, whose pursuit is pleasure, I can only say, the places their fathers have provided for them will be filled by others, who, it may be, walk unobtrusively amongst us with books under their arms and thoughts in their head, whose pursuit is knowledge.

I trust what I have said may induce you to signalize your career, whilst students at this place, in a manner which shall bring honour to yourselves, the school and the society in which you move. Keep ever before your minds the dignity of your profession. Let your thoughts often dwell in the calm regions of scientific truths. As interpreters of the most mysterious phenomena of life, be reverent in your treatment of them, and you may rely upon it that men will in return honour and reverence the profession of medicine which you have adopted.

VENTILATION IN ROOMS.

The following remarks in reference to what I have said upon this subject at page 8, are taken from the appendix to Dr. Angus Smith's third Annual Report on the Alkali Act of 1863, which also contains an admirable proof of the possibility of abating the evils arising from the production of large quantities of acid vapours by manufactories:—

"The amount of air which from domestic fires is sent up the chimneys is estimated at twenty times more than is needful for combustion, abstracting heat and doing very little good. We suppose that it ventilates the rooms, but it chiefly ventilates the lower part of small rooms, whilst above the level of the chimney the air may be very impure. the introduction of gas often makes the air still more unwholesome than oil, candles, or our breath usually make it, and the excessive use of gas is increasing the evil, so that we may safely say that our houses are daily becoming less wholesome. Some persons are able to combat the evil by enlarging their rooms, but even they are scarcely able to return to the condition of wholesomeness enjoyed in some very inferior buildings. We ought to alter our mode of ventilating with our mode of lighting, and we should then not require to complain even of our luxuries. We do not know the best mode of avoiding the evil, but if every man would try some method we might soon make progress. It is long since Dr. Arnott told us of the unwholesome state of our rooms. It will be seen that when a clear house fire is burning brightly, but without any strong draught, the whole of the oxygen of the air passing through it may be consumed, and this is no doubt the reason why the large amount of boiler room with quiet fires is considered the most economical. The violent current carries so much away that it is difficult to produce heat in excess of the amount wasted, and so the greater the heat we require the more we waste. I am not attempting to cure this, I am only explaining a table of analyses. When the air is passing along the flues at the rate of three to five feet in a second, as in house chimneys, the combustion is complete; when it passes at from twelve to twenty we find the oxygen only half consumed, or even less. If pure carbon were burnt the carbonic acid and oxygen would always amount to the quantity of the oxygen of the air. As it is the hydrogen and the sulphur prevent this. The hydrogen, too, comes off at first firing, and is at one time in excess, at another time absent, preventing uniformity in the most regularly fed furnaces. The water formed has not been taken into the calculation."

THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST

BY

JOHN BURNET

OF THE UNIVERSITY OF OXFORD

IN TWO VOLUMES

LONDON

Printed by J. Streater, in Strand

1679

THE SECOND PART

OF THE

REIGN OF

CHARLES THE FIRST

BY

JOHN BURNET



