A letter to the ... Lord Provost, magistrates, and council, patrons of the University of Edinburgh, on the present state of practical chemistry : with remarks on ... a pamphlet by Dr Anderson / by D. B. Reid.

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A LETTER

TO THE

RIGHT HONOURABLE

THE LORD PROVOST, MAGISTRATES, AND COUNCIL,

PATRONS OF THE UNIVERSITY OF EDINBURGH,

ON THE PRESENT STATE OF

PRACTICAL CHEMISTRY:

WITH

REMARKS ON SOME STATEMENTS IN A PAMPHLET BY DR ANDERSON, ASSISTANT TO DR HOPE.

By D. B. REID, M. D., F. R. S. E.,

LECTURER ON CHEMISTRY AND TEACHER OF PRACTICAL CHEMISTRY,
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, FORMERLY SENIOR PRESIDENT
OF THE ROYAL MEDICAL SOCIETY, &c.

EDINBURGH:
MACLACHLAN AND STEWART.

MDCCCXXXIV.

A LETTER

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AND COUNCIL

ALLETTER, SE MORNING

MACTICAL CHEMISTRY

MY LORD AND GENTLEMEN

Is the Letter which Dr Andresson, assistant to Dr Hore, has addressed to you, he has stated, four the Practical Cheken the College was Valmost annihilated in consequence of the low price of my ricket, and leads the reader necessarily to mire that I owed my Class to the same cause. Had Dr Andresson confined himself to a statement of facts, and been as careful as he professed to be, to admit nothing merely on surmise, I would not have considered it necessary to have made say comment on his statements; but, as he has mentioned circum stances that are altogether at variance with the fact, and has brought them forward in a manner which I consider highly in gurious to me, I am compelled to address you on this occasion purious to me, I am compelled to address you on this occasion wery erroneous idea of the nature and objects of Practical Chemistry, I consider myself called upon, as a reacher of Chemistry, who has devoted much time and attention to that branch of education, to put you in possession of such facts as may assist in enabling you to judge of the comparative merits of the lation which Practical Chemistry appears destined to effect in the teaching affects of Chemistry appears destined to effect in the teaching affects of Chemistry appears destined to effect in the teaching affects of Chemistry appears destined to effect in the teaching affects of the teaching affects and the affects of the teaching affects of the teachin

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A LETTER, &c.

MY LORD AND GENTLEMEN,

In the Letter which Dr Anderson, assistant to Dr Hope, has addressed to you, he has stated, that the l'ractical Class at the College was "almost annihilated" in consequence of the low price of my ticket, and leads the reader necessarily to infer that I owed my Class to the same cause. Had Dr Anderson confined himself to a statement of facts, and been as careful as he professed to be, to admit nothing merely on surmise, I would not have considered it necessary to have made any comment on his statements; but, as he has mentioned circumstances that are altogether at variance with the fact, and has brought them forward in a manner which I consider highly injurious to me, I am compelled to address you on this occasion. As his pamphlet also is calculated, in my opinion, to give you a very erroneous idea of the nature and objects of Practical Chemistry, I consider myself called upon, as a teacher of Chemistry, who has devoted much time and attention to that branch of education, to put you in possession of such facts as may assist in enabling you to judge of the comparative merits of the Theory and Practice of Chemistry, and of the complete revolution which Practical Chemistry appears destined to effect in the teaching of Chemistry.

In the first place, Dr Anderson endeavours to prove, that the attendance at my Practical Class, and that the deficiency

of Students at the College Practical Class, arose from the low price of the tickets to my lectures.

This statement, which occupies so large a portion of Dr Anderson's pamphlet, and which he has so often reiterated, is utterly incorrect; and had he inquired, instead of merely surmising, he would easily have found out his error.

The circumstances which disprove it are the following:-

During the present year, upwards of 300 tickets were taken at my new class-room, part for the Lectures and part for the Practical Course. But 160 of the Practical Class Tickets were taken by gentlemen who never attended the Lectures he alluded to, and who, accordingly, had access to the College Class and to mine on the very same terms. Each paid L. 3, 3s. for his ticket, the sum announced in the College advertisement.

Farther, in the Summer Practical Classes at present going on, 61 of the Students attending paid L. 3, 3s. each for their ticket. They had no privilege whatever held out to them. They entered my Classes precisely on the same pecuniary terms as were held out to them at the College; and, if more proof were necessary that the price was not the sole cause at least of the difference in attendance at the College Class and mine, I can point out a number of gentlemen, who, while they paid L. 4, 7s. for attending a Course of Lectures, at the same time paid me L. 3, 3s. for my Practical Ticket.

I have not stated these things, my Lord and Gentlemen, "merely on surmise;" there is no room for the possibility of mistake, and my books are here, as well as a great number of the gentlemen who have attended me under these circumstances, to

testify to the accuracy of my statements.

But indeed a moment's reflection might have satisfied Dr Anderson of the palpable slip he made in bringing forward this assertion; for, as Dr Hope had a class of 250, how happened it that, out of those who had paid Dr Hope L.4, 7s. and therefore were not influenced by my Course, no practical class was formed?

Secondly, Dr Anderson gives you a long detail of the great disapprobation expressed by some gentlemen at the steps I

pursued last winter, though he tells you that he did not agree with them. I am not ignorant of what he alludes to, and was well aware of the overbearing manner in which many conducted themselves towards me, though I considered it unnecessary to take any public notice of it, leaving with confidence every one, who was disposed to inquire candidly into what had taken place, to his own opinion. But when Dr Anderson publicly announces these matters in his pamphlet, it is time that I should request to be heard; and, in answering his remarks, I trust I shall be able to throw some light on the present state of Practical Chemistry.

Dr Anderson states in his pamphlet: "Whatever others may imagine, I am sure that Dr Reid himself will acquit me of all wish to detract from his merits, when I express my opinion that much still remains to be accomplished in this department, ere the Classes in the University can be said to have accomplished all the ends which such instruction is fitted to effect. I speak, of course, of the state in which I found matters on my return to the College in the capacity of Assistant to Dr Hope. What improvements Dr Reid may since have introduced into his Classes, I have not had any opportunity to know, nor, situated as I was, could I have been justified in inquiring."

Whatever may have been the state of matters when Dr An-DERSON entered the College after my resignation, I may be allowed to state, that I considered I had introduced some improvements at least in a Class which was a dead loss to the teacher previously (I use his own words in saying so), but which afterwards numbered on an average 200 Students annually while I was there. When I felt it incumbent on me to resign my situation there, and saw that the Town-Council, by the casting vote of the late Lord Provost, had decided against the institution of a Professorship of Practical Chemistry, I immediately resolved to build an extensive class-room on a new plan, and make the experiment of teaching both Theory and Practice in the same Class, as far as it was possible, according to the regulations at present in force, with the view of conjoining both ultimately, if the results of the experiment should be sufficient to justify me. Instead, therefore, of confining myself to the Practice

alone with all my Practical Pupils, I have, during the last Session, made the trial with several, and seen enough to convince me that an improvement of the utmost importance may be effected in the system of teaching Chemistry. In making this attempt I had numerous difficulties to contend with; and I had no sooner announced my Course, than some gentlemen thought proper, in the most overbearing and dictatorial manner. to object to my allowing Students who paid me L. 3, 3s. for the Practical Course, attending my Lectures for L. 1, 1s. Had they, instead of assuming a tone of dictation, while utterly ignorant of the experiment I was then making, or of the objects which I had in view, communicated with me in a more civil manner, I would have gladly gone a great way rather than have done any thing to displease them; but from the tone of their statements to the Students, I told them that I would not in any way retract, but should hold by my plan to the last, till it had received the most thorough and scrutinizing investigation.

A combination was then entered into against me, and one of the gentlemen told me openly, that he as well as many others would do every thing in their power against me. A report at the same time was industriously circulated, that my tickets would not qualify, so that numbers of students did not take tickets, who otherwise would have done so. Placards also were daily distributed, announcing practical courses and lectures at a lower price than what I charged. With respect to the charge I made for my lectures to those attending the Practical Course, nothing could be more preposterous than that any individuals should have taken up such a subject. Many Teachers have been in the habit of giving tickets to one class at a reduced rate to Students who attended others. Thus, in the University, Dr Monro, when he lectured on Surgery, gave a ticket to his Surgical Class for nothing to those who paid the fee of the Anatomy Class. I am prepared with a whole list of Private Lecturers who have, one way or another, followed out a similar course, in holding out inducements to Students to attend their Classes. The fact, indeed, as it is openly advertised, is too notorious to be questioned.

attendance to all who had ever attended my Classes in the College. This, my Lord and Gentlemen, is as utterly incorrect as it is possible for any statement to be. I announced in my bill, that those who had attended my Practical Classes, either in the High School Yards, or afterwards in the College, would be admitted to my Lectures on the same terms as those attending the Practical Class during the winter. This Dr Anderson construes in a very different manner.

MY LORD AND GENTLEMEN,

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I now beg leave to be permitted to lay before you the views I have been led to adopt with respect to the teaching of Chemistry.

I have no hesitation in affirming, and feel confident that every inquiring mind will agree with me, on investigating the subject, that the progress of science, and the wants of society, imperatively demand that the present system of chemical education shall be thoroughly revised, and put on a footing altogether new.

In a science like Chemistry, altogether based on experiment, and so eminently practical, it is universally acknowledged, that it is to the Practical Course alone that we must look for the acquisition of that knowledge that will fit the student for entering with advantage upon professional avocations. As a means of information, in every thing that is purely theoretical, now that the press teems with works of first-rate excellence in every department of science, it may be safely affirmed, that the last good book is as likely to be of as much use to the student as any course of lectures; for, though it may want the interest which a viva voce communication may present, it has this very great advantage, it can be turned over and compared again and again without any additional fee. But neither books nor lectures can supply the place of a teacher, whose main duty is to attend to the discipline of his pupils, to exercise them in such a way as may call forth the activity of their minds, and fit them, as far as possible, for the duties of their future stations. In a course of lectures on Chemistry, the experimental illustrations, and the authority of the teacher, are the circumstances that give to them their more peculiar interest; and would it not be an object of the most paramount importance, if arrangements could be made, so that the experiments should be performed by the student instead of the teacher, while he is studying the theory, and every thing at the same time included that has been peculiar to the Practical Class?

In such a class, the teacher, instead of merely lecturing an hour a-day, would require to divide his students into parties, and attend to them for several hours every day; instead of a formal discourse delivered to a passive audience, the students would in reality begin to reap the real advantage of studying under a professional teacher. Besides, what must be considered as of the utmost importance in a system of effective teaching, the intercourse, in such a system, between the teacher and his pupils would be free and unreserved; he would always be ready to explain their difficulties, and direct their attention to whatever is most interesting. Their minds would thus be continually kept on the alert by a familiar series of discussions and examinations, naturally suggested by the subject before them, and under circumstances the most favourable to a lasting impression. Indeed, this course, with due attention from the teacher, along with its other objects, combines all the advantages of a continued series of examinations. To vibile

It is admitted on all hands, that one of the main objects of education is the training of the mind and the strengthening of its different faculties. In this respect the student, at a course where the theory and practice are conjoined, would be placed in a situation eminently calculated to give new vigour and activity to all his powers; so much so, that as a discipline of the mind alone, it would have decided advantages over almost every other branch of education. To teach to any rational purpose, the faculties of the understanding must be exercised; some talent must be cultivated, and the student must be led to the formation of some useful habit; all these objects are admirably combined in a course of Practical Chemistry, conjoined with the Theory, and properly conducted. To leave the mind without discipline at the very time it needs it most-to allow the faculties to lie dormant at the time that that impulse is commonly given, and those habits formed which fix the character

for future life, is a blunder in education only to be equalled by him who should expect to reap the fruit in autumn without sowing the seed in spring.

No person can be properly instructed in the principles of Practical Chemistry, or have a command of its resources, without performing a wide range of experiments in all its departments. These, in a science so strictly founded on experiment as Chemistry, may be made, with the addition of a few lectures, and a proper extension of the practice to embody all its leading facts and principles; and can there be any time so fitting for inculcating the theory of the science with effect, as while the student is conducting the operations which display the power and effect of the different agencies that are brought into play, at the very time he is engaged in observing them, and while the success of the experiment so entirely depends on their accurate application? Indeed, the interest the student uniformly takes in the processes, which he himself conducts, is eminently calculated to awaken the general activity of his mind, fix his attention, and force upon him habits of accurate and discriminating observation. Knowledge thus acquired and connected with habits of action, stands upon a proper foundation; it is neither vague nor gratuitous, but has all the freshness, precision, and solidity of actual experience. Knowledge of this kind does not serve merely to oppress the soil, but (according to the happy illustration of Bacon) like a plant transplanted with all its roots and native earth, it contains within itself a living spring and principle of growth. On the best method of teaching, Edmund Burke remarks, with no less force than truth, "I am convinced that the method of teaching which approaches most nearly to the method of investigation, is incomparably the best; since, not content with serving up a few barren and lifeless truths, it leads to the stock on which they grew."

A Course of the kind proposed would also have these great advantages; the student, during his constant intercourse with the teacher, would make much more progress than he could in any other way, and the extension of the Practical Course would enable him to dwell upon the experiments he performs with more attention than he could otherwise bestow upon them, and the theory and practice would be inseparably united, and mu-

tually assist each other. When the theory is taught in one room, and the student restricted to making experiments in another, the Practice and Theory are certainly as much disjoined to the student as it is almost possible for them to be, though both may be taught by the same individual; nor can they with any propriety be said to be conjoined, where the student does not attend to both at the same time.

But, it will be inquired, what is to be done with the lectures? Do you not admit Dr Anderson's position, that nothing must be done, whatever the progress of education may require, which shall "encroach upon, interfere with, or do any injury to the existing Chair?"

The Chemical Chair in the University of Edinburgh undoubtedly owes much, and the University also, to the acknowledged eminence of the distinguished individual who now fills it; whose Course of Lectures has been too long known, both abroad and at home, to require any comment from me. But it must be acknowledged also, that the Chemical Chair owes much to the progress of a science, whose extraordinary career during the last fifty years has arrested the attention and excited the deepest interest in every civilized community. Is it, then, I would say, to be loaded with every benefit that years can heap upon it, and to reap the fruit of every passing improvement, but to present an impenetrable barrier to every thing which may in the slightest way tend to affect it, however important for the general interest of society, and even of the University itself? This would, indeed, be to roll back the tide of improvement; and with the same justice that this demand is now made upon the Patrons, they might in return require of the Professor to give up every advantage which his class has reaped from the progress of the science during the last forty stendiness, and certainty in the acquisition of a knowl. sray

But though I would object most strenuously to the unlimited application of the principle which Dr Anderson advocates, still the precise nature of the appointment proposed cannot be too thoroughly examined, that the Patrons may see distinctly the effect which the different classes will have upon each other; and how far they may be compatible with each other, at a time when the Practical Class is changing its character so much.

This is still more essential on the present occasion, in justice to the present Professor, as, from the intimate connection, now every day increasing, between theory and practice, the lectures may be severely injured by the new arrangement. Had a Professorship of Practical Chemistry been instituted last year, it would have been confined to practical purposes; the students of Chemistry, according to such an arrangement, would only have conducted experiments in the laboratory.

But it appears to me to be exceedingly doubtful whether such a professorship would now be supported by the Students. From the trial I made last winter, I am firmly persuaded that the attendance on one conjoined course, such as I have mentioned, will benefit the Student more than attendance on lectures, however often repeated. During the whole of last winter I explained my views to many of the Students individually, and in my summer course I explained it openly in my introductory lectures, and I am perfectly satisfied that the general impression which a great body of Students now entertain, is, that Practical Chemistry will be the best way, when the course is sufficiently extended, for teaching both the theory and the practice. To those who have inquired why I do not appear as a candidate for the proposed new appointment, though I was so anxious last year for the institution of a professorship, I have but one answer,-the experience of last year has convinced me of the practicability of the plans I have described, and unless the teacher of Practical Chemistry in the University be allowed to give the fullest instructions in the theory as well as the practice, he may enjoy a nominal appointment, but he will never be able to compete with the lecturer out of doors. Hearing lectures at one time and experimenting at another, will never enable the Student to advance with so much pleasure, steadiness, and certainty in the acquisition of a knowledge of Chemistry, as when he studies the theory, while he is conducting the experiments which illustrate it.

But, in conducting even a three months' course of Practical Chemistry, more attention is now paid to the theory by all teachers, so far as I have understood; and I am perfectly satisfied, that, in the course of a very few years, the attendance at practical courses on the improved plan will, with a great num-

ber of Students, entirely supersede attendance at lectures. It is proper, then, that the Lord Provost and Council should be informed of the manner in which the tide has begun to flow. Practical Chemistry, if restricted and fettered in the manner Dr Anderson proposes, will become a burden to the Student which he will not bear, when he considers the infinitely greater progress which he would be able to make, when it is conducted in another way.

Were a Professorship of Practical Chemistry appointed, with full power to teach the theory by practice, the only way by which such a Professorship could now be maintained, I should take the liberty of proposing myself as a Candidate. But as such an appointment is very different from what was formerly contemplated by the Council, and as any appointment at present would necessarily force the teacher to turn his attention to instruction in theory as well as practice, I consider that, however anxious I might be to obtain such an appointment, I am called upon to state precisely what the effect would be upon the present Chair of Chemistry, nor do I see that such an appointment could be made without interfering with it in the most serious manner.

I am well aware that such a change as I propose would require to be most minutely and carefully investigated before it is adopted. I am also well acquainted with the slow progress with which every improvement makes its way which has to contend with long established custom and long established interest. But I have the satisfaction of knowing that my views are supported by numerous eminent scientific gentlemen, who have examined them in their details, and also by the more advanced students, those who are best qualified to judge of the difficulties they have to encounter, and of the manner in which their studies may be most effectually facilitated.

Should, then, no Lectures on Chemistry at all be given? Far from it. They afford a cheap and easy method of presenting much interesting instruction to the student, and they may be attended with advantage either before or after, or at the same time with the Practical Course. But the professional student should not be bound to attend them as well as the extended Practical Course, unless at a reduced fee, and more

for the sake of recapitulation, and refreshing his memory with the experimental illustrations, &c., the Practical Course being considered the only proper business course for a student.

I must here take notice of some statements which Dr Andrewson has made in reference to Practical Chemistry, which I am at a loss to understand. He says, "From the meaning which is thus attached to these terms, it is imagined by many, that the object of classes for 'Practical Chemistry,' is to fit persons who have acquired the Theory of the science from lectures, to engage in some of its applications. This, however, as I shall afterwards more particularly notice, is a great mistake. No greater delusion can exist than to suppose that such practical instruction is to be obtained in the laboratory, any more than it can be obtained in the lecture-room," &c. &c. Pages 3 and 4.

Dr Anderson adds also, that representations on a small scale of the great manufacturing processes, carried on in our manufactures, are *useless* and *absurd* when applied to the actual business of life, though they may be very well adapted to convey popular instruction and entertainment. And again, "It is not in the Universities that practical knowledge can be acquired; and to set up Chairs for any such purpose, is only to hold out a delusion destined to end in disappointment."

In the preceding sentences, Dr Anderson has certainly made a very sweeping generalization, and adds, that he has been engaged himself, for ten years, as a manufacturer, with the view of strengthening his opinion.

I also have been engaged in manufactories. I commenced the study of Chemistry in an extensive manufacturing establishment in the neighbourhood, and at that time every hour, every few minutes indeed, made me feel the want of a course of Practical Chemistry, such as I have been in the habit of giving. Nothing is to me more unaccountable than that Dr Anderson should speak as he has done of Practical Chemistry. If, in a Practical Chemistry class, the Student acquires no power of action, no resources, no more fitness for entering professionally upon the applications of Chemistry to the real business of life, than he acquires in a course of lectures, then Dr Anderson cannot be too quick or too earnest in exposing a delusion

by which so many have been, and are still deceived. Let him come boldly forward and prove the deception.

Every practical Chemist will agree most cordially with Dr Anderson, that the proper field of study for the manufacturer is in the manufacturing establishment similar to that in which he is to be engaged; but who will join with him and say that the practice of operations on a small scale in the laboratory is absurd and useless for the Student, before commencing them on the large scale in the manufactory? There are numerous manufactories where professional chemists are engaged solely for the sake of making trials on the small scale to regulate the processes; and there are numerous operations connected with the different branches of medicine, and even among the varied operations of art, in the application of Chemistry to domestic economy, &c. which are taught in a practical class, so as to enable the Student to acquire much important information and to conduct all these himself; and that laboratory must be equally incomplete and ill adapted for every thing that is useful in a practical class, from which the attentive Student departs without carrying with him a fund of knowledge which will render him much better fitted for carrying on professionally any process of Chemistry, than if he had merely attended lectures, though the peculiarities necessarily connected with many of the chemical operations carried on in the larger scale can be studied with full advantage only in the manufactory.

In short, Dr Anderson has, while depreciating the value of the Practical Class, unfortunately for his argument, gone a great deal too far; for, if it be true, as he says, that representations, on a small scale, of the great manufacturing processes, are absurd and useless, then the Practical Class can teach nothing practical in reference to the real business of life, and ought to be abolished altogether. I beg to send you copies of some letters by manufacturing chemists on the importance of a Practical Course, in reference to the real business of life, which were printed with some testimonials which I published last year. But, while I differ so widely from Dr Anderson, in reference to what a Practical Class may be made to effect, by proper management, I am glad to have this opportunity of bearing testimony to his great exertions in the classes of Prac-

tical Chemistry which he was the first to give in the College, and the handsome testimonial of their esteem which was presented to him by his pupils, as a small mark of the benefit they derived from his class, and of the success which attended his labours.

I trust, my Lord and Gentlemen, after the facts I have laid before you, it will not be deemed presumptuous in me, if I venture to suggest the propriety of appointing a Committee to examine the present state of Practical Chemistry, the manner in which the theory has now begun to be fixed down upon the teaching of the practice, and the plans I have proposed for improving the present system of chemical education. I shall be happy to lay before that Committee a precise and working plan of the proposed Class, to make arrangements for shewing it in operation, and also to furnish them with evidence as to the practicability and the advantages which it holds out, in every point of view, and of the progress of the Students who have followed this course.

I have been led more especially to recommend this mode of proceeding, as the most contradictory evidence has been given by different individuals as to the nature of Practical Chemistry, arising, I have every reason to believe, from the great changes which have been annually taking place within these few years in the teaching of Chemistry. An inquiry is also so much the more necessary, as the Report of the Parliamentary Commission on Medical Education, will no doubt affect most materially the interests of any new appointment.

Many of the statements which have been lately circulated with respect to the pecuniary emoluments from a common practical course, the fitness of class-rooms, the expense that would be necessary to put a practical class establishment on a proper footing, and numerous other circumstances, are exceedingly incorrect, and would require investigation. It would also become evident to the Committee, on prosecuting their inquiries, that, from the change at present going on in the teaching of Practical Chemistry, this will soon become the most efficient method of teaching the theory.

I must confess, that when I left the College, a year ago, the arrangement of an extensive laboratory, fitted up in a proper

manner, appeared to me to be what the Practical Class stood most in need of; but, after a year's trial, with almost every advantage in this respect which I could wish, I have been led to see that even this is not sufficient, and that the theory and practice must be taught at the same moment, to do justice to the Student.

It must be obvious to the Patrons, that the juster views which are daily gaining ground regarding education, as well as the extraordinary changes which Chemistry has of late years undergone, are the real cause of the conflicting opinions which different individuals entertain, as to the course that ought to be adopted on the present occasion. And whatever may be the result of the inquiry, it can afterwards only prove a source of satisfaction, if they take the present opportunity of inquiring what changes ought to be looked forward to in imparting instruction in a branch of science, which is extending its dominion every day over every improvement that is contributing to the wants of man. They have now an opportunity, if I am not greatly mistaken, of forwarding the interests of the students and of education, by placing before the public in a proper point of view, a system of teaching adapted to the wants of the country, in a science whose practical applications are unbounded, and the study of which is as important to our colonies abroad, as it is to medicine, manufactures, and the progress of society at home.

I have the honour to be,

MY LORD AND GENTLEMEN,

With every respect,

Your very obedient servant,

D. B. REID.

TUESDAY, July 22. 1834.