

CHEMISTS BY PROFESSION

The origins and rise of
The Royal Institute of Chemistry



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with
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**CHEMISTS
BY PROFESSION**



Figure 1. The Institute building, c. 1914

Architect: Sir John J. Burnet, LL.D.

BIBLIOGRAPHICAL NOTE

In notes and references after each chapter names of publishers are given only for books published after 1900. The following abbreviations are used for standard biographical sources:

- Boase:* Frederic Boase, *Modern English Biography*, Cass, London, 1965.
DNB: *Dictionary of National Biography*, Oxford, 1917 onwards.
DSB: *Dictionary of Scientific Biography*, ed. C. C. Gillispie, Scribners, New York, 1970 onwards.
WWW: *Who Was Who*, A. and C. Black, London, year varies.
WW: *Who's Who*, A. and C. Black, London, year varies.

Titles for periodical publications are given in abbreviated form. The Journal of the (Royal) Institute of Chemistry appeared with various titles as indicated below:

- up to 1943: *Proc. Inst. Chem.*
1944 to 1949: *Proc. R.I.C.*
1950 to 1964: *J.R.I.C.*

From 1965 the *Journal* was absorbed in *Chemistry in Britain*.

FOREWORD

It is possible that lack of historical sense is responsible for most of the mistakes we make; in other words, an historical sense is a first-class destroyer of idols.

F. A. Freeth, in a lecture to the Manchester District Section of the Institute of Chemistry, 11 January 1934 (*Proc. Inst. Chem.*, 1934, 58, 53).

In 1977 the Royal Institute of Chemistry celebrates its centenary. To mark the event it has commissioned the present book, which traces the development of the chemical profession in Britain up to 1976. The story which unfolds is largely the history of the Institute, although suitable attention is paid to the events and trends leading up to its foundation in 1877.

I wish to record my sincere gratitude to the Institute for inviting me to be responsible for this volume, and my pleasure at the help given by two of my colleagues at the Open University, Dr G. K. Roberts and Dr N. G. Coley. Both have shared in planning and production as well as writing some of the chapters. The authorship of these is indicated by the initials of one of us at the end of the main text of each.

It is no mere formality to express our indebtedness to the administrative officers and Council of the Institute for their unfailing courtesy and goodwill throughout our investigations. Not only have they insisted upon our complete freedom to write what we wanted and to say anything we wished, they have gone out of their way to make available all the Council's minutes and documents relating to the formation of the Institute, the membership records, correspondence, and the now rare back numbers of the Institute's *Journal*. We are especially grateful to Mr D. A. Arnold, Deputy Secretary to the Institute until October 1975, for his kind encouragement and help in a multitude of ways.

For permission to examine and cite early minute books and other unpublished material, we extend our warm thanks to the Councils of the Chemical Society, the Society of Chemical Industry, the Pharmaceutical Society of Great Britain, the Managers of the Royal Institution, the General Secretary of the Association of Professional Scientists and Technologists, the Librarian of University College, London, and the County Archivists of Durham and Northumberland. We are also grateful to Mr M. T. Hall, Scientific Services Manager, British Rail, Derby, for access to his collection of early material relating to chemistry in the railway industry and to Mr George Rolleston for permission to quote from the Davy letters in his possession. Similarly, we thank Mr G. A. Bloxam for access to his private collection of papers relating to his grandfather, the chemist C. L. Bloxam. In addition we have consulted manuscript material in the British Library, the Public Record Office, King's College, London, the University of

London (Senate House), and Imperial College, London. We are very grateful to the librarians and staff of all these institutions and also to those of the Institute of Historical Research, the Wellcome Institute of the History of Medicine, the City Library of Newcastle-upon-Tyne, and public libraries in Sunderland and Bedford.

We are especially grateful to the staff of the Open University library for their cheerful acceptance of many outrageous demands upon their time and for their willingness to locate source material of all kinds, often with only the minimum of notice.

We are grateful for much additional material supplied to us by interview and would wish to express our special thanks to the following gentlemen who kindly went to much trouble to answer our questions: Sir Harry Melville, Sir James Taylor, Sir Ewart Jones, Dr G. H. Beeby, Col F. J. Griffin, Dr D. H. Sharp, Sir George Porter, Dr L. H. Williams, Dr R. E. Parker, and Mr D. A. Arnold.

The production of this book with its various drafts has been the major preoccupation for over a year of each of us and of several secretaries in the Faculty of Arts, amongst whom we would especially mention those who have served in the History of Science: Mrs S. Batten, Mrs E. A. Dickey and Miss P. E. White. It is more than formal thanks that we would offer to these ladies, who have had to cope with complex and sometimes scarcely legible manuscripts. We must also thank Mr A. W. R. Seward of the Open University Press for both encouraging and restraining where necessary, Mrs Caroline Land for preparing the manuscript for publication, and Mr A. J. Coulson for picture research. I am grateful to my wife Shirley for preparing the Indexes.

Any historical study which attempts to deal with comparatively recent times is attended with rather special difficulties. It is never easy to know how much or how little to say of those who are still alive when the book is published. For this reason we have adopted the definite policy of making very little reference by name to living persons, the only exceptions being where it would be impossible to produce a coherent and fair account without doing so. This avoided the necessity of making value judgements on the work of living individuals and at the same time of coming to premature conclusions about certain events in the recent past. In writing our book we have been very conscious of the critical times through which the Institute is passing, even as the book goes to press. In following the fortunes of the Institute since 1877 we have tried to paint a fair picture, 'warts and all', rather than to give the uncritical hagiography that was once the custom. But, having said that, we recognize the great service which it has given to British chemistry and cordially wish it well in its next hundred years, under whatever title it may continue to exist.

Colin A. Russell

The Open University, January 1977.

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CHAPTER 1

THE IDEA OF A PROFESSION

The notion that chemistry was not only a science but could also be a profession is more recent than even the chemical atomic theory. So far as Britain is concerned it is undoubtedly a Victorian invention, though few people would share the opinion of Alexander Findlay that 'it is doubtful whether one could speak of the existence of a *profession* of chemistry before the founding of the Institute of Chemistry in 1877'.¹ Clearly, much depends upon one's precise conception of what a profession might be, and, as this book will show, it is a complex notion whose several constituents did not develop at the same time, in the same place, or at the same rate.

The starting-point for most discussions on the rise of the chemical profession has usually been two books by R. B. Pilcher, who served the Institute for half a century as Assistant Secretary (1894), Secretary (1895) and Registrar and Secretary (1900-45). His *Profession of Chemistry* first appeared in 1919 and came out as a 4th edition in 1938; it was in its time a valuable guide to prospective candidates for a career in chemistry, the changes in content over the various editions signifying several important developments in the profession.² However it must be stated that the book was primarily recruiting propaganda for the Institute, and in no sense did it lay claims to being a scholarly study of the evolution of the profession of chemistry. Much the same can also be said of Pilcher's *History of the Institute: 1877-1914* which was published at a time when, as will be seen, the Institute was being hard-pressed on several sides and a morale-raising history was deemed appropriate. The book tends to be rather a 'blow-by-blow' account of what happened than an analytical enquiry as to the causes behind events or a critical history.³ Today both of these books should still be treated with respect and seriousness, but as historical raw material in their own right instead of 'official history' to be accepted without cavil or criticism. Although in the process Pilcher's value to us as an historian may be slightly diminished, there will emerge with greater clarity and force the administrative skill, dogged persistence, unflagging energies, clarity of vision and consummate devotion of this man who, more than anyone else, helped to create the history of the Institute of Chemistry.⁴

In the pages that follow an attempt is made to explore the development of the chemical profession in that spirit of enquiry. Especially in the early years of the Institute there is no need to chronicle detailed activities under each successive President, for Pilcher has already done this for us. Where such details are germane to the argument they will, of course, be supplied,

together with some that Pilcher omits. At the same time this account will deny itself an indulgence of the opposite kind and frequently encountered today, namely the setting up of a sociological model and the incorporation of only such data as are seen to fit and 'confirm' such a model. Inevitably in an account about 'institutions' sociological categories of description will be needed, for the Institute of Chemistry, the Chemical Society and all the others in this narrative are (in a loose sense) sociological units. Primarily, however, the skills and sympathies of the historian have seemed more relevant to the present task, always taking for granted the sympathies (if not all the skills) of the chemist.

The rise of the profession of chemistry must be seen as part of a larger movement in which *science* in general acquired a professional status.⁵ It occurred when, as the Victorians liked to put it, people no longer lived *for* science so much as *by* it. This professionalization of all the major sciences was in its turn related to both a growing awareness of the value of science to technology,⁶ and the rise of the professions in general.⁷ Consequently it makes no sense at all to begin the present account with 1877 for, by that time, the foundations of the Institute had been well and truly laid; this can be seen in the increasing applications of chemistry to both productive industry and analytical work that had marked the first forty years of Victoria's reign, and, on the other hand, the development of chemical institutions. The multifarious happenings in the latter area may seem merely amusing to a modern chemist, with tales of feuds, squabbles, animosities, alliances and regroupings, but they have much to tell us of the *modus vivendi* of a Victorian chemist and the social pressures he experienced. Certainly the Institute's foundation cannot be understood properly if they are to be ignored, nor can its later development.

The concentration of this book upon the British experience needs little comment. A treatment of (say) European developments would have dictated a much larger volume but the chief reason against it was the simple fact of the British priority in most of the developments of the chemical profession. As Chapter XV indicates it is no mere jingoism to assert this with confidence. Furthermore when other countries are concerned the very definition of professionalism raises acutely difficult questions, since it means manifestly different things in different places.⁸ Certainly there have been attempts to discuss the development of professional careers in science elsewhere than in Britain but their categories have been different from those employed here.⁹ In Britain, for example, the distinction between academic and professional qualifications has led to a rather specific use of the term 'profession' for those employed in the application of chemistry. Most university teachers would (rightly) regard themselves as fully professional though perhaps more as members of the university teaching profession than of the profession of chemistry.

It remains therefore to indicate the complex of ideas that are generally

conveyed today by the term 'professional' and which underlie the discussion in the present book in the case of the chemists in Britain. The term 'profession' referring to a particular group of people carries certain definite connotations, though not always with equal force. As will be seen they emerged gradually and at different rates for the chemical community. They are as follows:

Intellectual qualifications The adherence by members to a certain body of 'received knowledge', imparted by a teaching process that is subject to careful monitoring, and guaranteed by recognition from the professional organization (often by examination).

Social responsibility The acceptance of obligations to the general public in respect of the maintenance of standards of technical service, as well as by personal integrity; the guarantees may vary from a Hippocratic oath, through carefully written codes of conduct, to a general consensus of corporate opinion – often with sanctions for non-compliance.

Remuneration The expectation, in return, of certain monetary rewards which would not be allowed to fall below certain minima, and which would be related to those enjoyed by other similar groupings or 'professions'; this expectation carried with it the perpetual danger that such minima, once agreed, would then be regarded by authority as maxima, and reactions to this hazard varied widely between the professions.

Community relationships The existence of a feeling of corporate identity, which largely manifests itself in a complex of social and cultural relationships appropriate to the time.

Authority The recognition by other professional groups, and, more important, by Government, of the authoritative nature of the pronouncements by accredited representatives of the group on matters relating to their special area of expertise.

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NOTES AND REFERENCES

- 1 A. Findlay, 'The Royal Institute and the Profession of Chemistry', *Proc. Inst. Chem.*, 1944, 68, 211–16 (211). On Findlay see ch. XIII, note 56.
- 2 R. B. Pilcher, *The Profession of Chemistry*, Constable, London, 1919, (2nd. edn. 1927, 3rd. edn. 1935, 4th edn. 1938 pub. by the Institute of Chemistry 'having been prepared by the Registrar under the supervision of the Publications Committee').
- 3 *Idem*, *History of the Institute: 1877–1914*, Institute of Chemistry, London, 1914.
- 4 On Pilcher himself see ch. XII (note 19).
- 5 Among recent writings see E. Shils 'The Profession of Science', *Adv. Science*, 1968, 24, 469–80; J. Ben-David, 'The Profession of Science and its Powers', *Minerva*, 1972, 10, 362–83; E. Mendelsohn, 'The Emergence of Science as a Profession in Nineteenth Century Europe', in K. Hill (ed.), *The Management of Scientists*, Beacon Press, Boston U.S.A., 1964, pp. 3–48; D. M. Knight, 'Science and Professionalism in England, 1770–1830', *Proc. XIVth Int. Congress Hist. Sci.*, Tokyo, 1974, 1, 53–67.

6 The interface between science and technology in the period from 1800 is the subject of an Open University half-credit course, AST 281 *Science and the Rise of Technology since 1800*. Extensive bibliographies are available in connection with that course.

7 The classic work is A. M. Carr-Saunders and P. A. Wilson, *The Professions*, Clarendon Press, Oxford, 1933. It was issued as a Cass Reprint in 1964, pp. 165–75 dealing with ‘Chemists’. See also W. J. Reader, *Professional Men: The Rise of the Professional Classes in Nineteenth-Century England*, OUP, New York, 1966.

8 Thus D. M. Knight commenting on a ‘Professionalization of Science’ symposium in 1974 concluded ‘it is still difficult to know what we mean by the terms “professionalization” and “science”. . . . So “professionalization” is a vague term, which must be applied differently in different countries; but perhaps we can use it to mean the emergence of a scientific community’. As will be seen from this chapter the modern concept of professionalization is considerably broader and more complex than that. It is, of course, possible to object to the application of modern concepts in an anachronistic way to past situations, and such objections are perfectly proper. But if one seeks to understand how a *modern* multi-strand idea has arisen it is surely necessary to trace the development of *all* of its components, not just one or two. And it is not then desirable to apply a modern omnibus term to some components in isolation from the rest (unless the term has since changed its meaning and contemporaries used it differently). In that case the onus is on the historian to prove it to be so. Knight (note 5), 4, 159.

9 A recent example is M. P. Crosland, ‘The Development of a Professional Career in Science in France’, in *The Emergence of Science in Western Europe*, ed. Crosland, Macmillan, London, 1975, pp. 139–59; also in *Minerva*, 1975, 13, 39–57.

CHAPTER II

ALCHEMISTS, ASSAYERS AND APOTHECARIES

1 The Alchemical Tradition

One of the oddest but most persistent features of chemical thinking over the last 150 years is the air of embarrassment with which chemists generally contemplate their intellectual origins in alchemy. This was not the only—or even the most important—movement in the prehistory of modern chemistry. But the popular opinion of the alchemist at work is in the strongest contrast to the image a modern professional chemist seeks for himself. The conception that chemistry can be a profession as well as a subject goes no farther back than the Victorian era, and it is arguably the case that this awareness has still not developed to its maximum extent. The Institute of Chemistry, founded in 1877, was the incarnation of this new professional spirit, and its first seal depicted not an alchemist but Priestley, a proposed new design incorporating suggestions of alchemical symbolism being rejected in 1944.¹

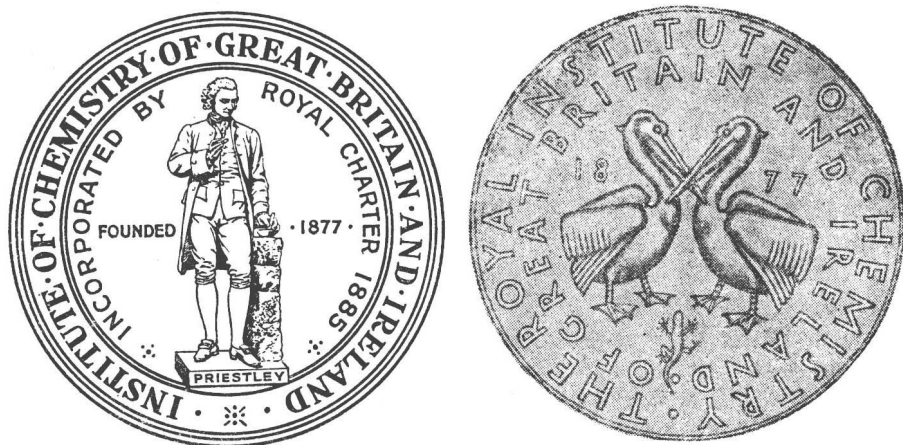


Figure 2(a) *The first seal of the Institute of Chemistry.*
(b) *The rejected design, 1944.*

It is not hard to see how inappropriate the adjective of 'professional' must be for the alchemist² of popular convention, proceeding on the basis of inspired hunches or half-baked empirical knowledge, having regard to the welfare of no one but himself, with no assured prospects of having success, operating completely on his own and regarded by society, save his own, as a

quack and charlatan. How far this popular understanding of the archetypal alchemist is correct and how far he lacked *any* kind of professional status we shall now proceed to examine.

So much scholarly study has now been made of alchemical ideas that their appalling complexity and diversity are a permanent warning to avoid generalization and over-simplification. Its diverse origins, the deliberate obscurity of much of its language, its strange blend of empiricism and mysticism all go to make alchemy one of the most formidable subjects for any historian to tackle.³ Thus a belief in the efficacy of gold in prolonging life is very characteristic of Chinese alchemy but almost totally absent in the Greek variety. This in its turn varied from century to century and generally became less obscure as time went on.

At the basis of most alchemy lay the belief that matter, or at least its outward forms, can be changed. This, after all, is what nature is doing all the time, particularly in the processes of biological generation and decay. The mutation of nature became an obvious goal, whether by 'seeding' solutions with small amounts of the desired product or by applying external heat to hasten the processes of ripening or growth, or even by observing the heavens for propitious signs as in sowing and reaping. Indeed, there was frequently an association between the seven 'planets' and the seven metals then known (gold, silver, mercury, copper, lead, iron, tin).⁴

It is all too easy for modern science to write this off as mystical nonsense, yet the fact remains that chemistry did have such origins and that, in the context of the time, such ideas were nothing like as silly as they may seem to us. It would be going too far to claim that alchemy had an empirical basis (implying a similarity to, say, nuclear magnetic resonance spectroscopy) but it is true that a considerable mass of experimental data gave at least the appearance of credibility to some of the alchemists' most cherished beliefs. And some of the experiments performed by the Arab alchemists led to many important technical advances.

The practice of alchemy in the West cannot be dated much before the twelfth century. By the year 1200 there were available about six alchemical texts in Latin, derived from Arab sources through translations made at Toledo or some other centre of Moorish culture in Spain. From now on the alchemist enters on his long career in Europe and becomes an increasingly familiar part of the scene. Although certain central aspects of alchemy do not change noticeably during about six centuries the term alchemist has to cover at least three different classes of person. Firstly it was applicable somewhat loosely to those whose work was largely with metals and who can be regarded as the predecessors of the metallurgical developments of the sixteenth century (pp. 11-14). These men were the practitioners of alchemy, more concerned with its empirical basis than its metaphysical projection, and for this reason, almost always involved with operations at hearth or furnace. Here was the legendary 'puffer', earnest, credulous, motivated by a