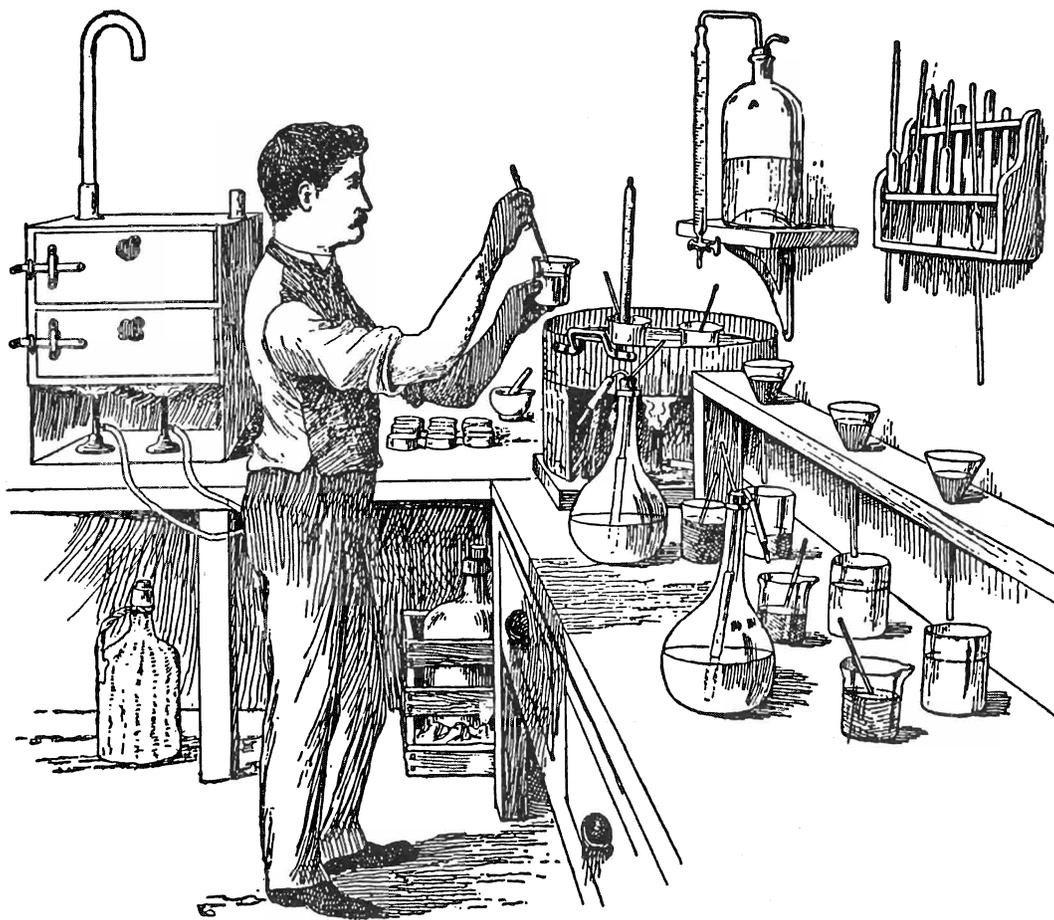


# BULLETIN FOR THE HISTORY OF CHEMISTRY

Division of the History of Chemistry of the American Chemical Society

NUMBER 1

SPRING 1988



The 19th Century American Industrial Chemist

**BULLETIN FOR THE HISTORY  
OF CHEMISTRY, NO. 1, 1988**

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The BULLETIN FOR THE HISTORY OF CHEMISTRY is published twice a year by the Division of the History of Chemistry of the American Chemical Society and incorporates the Division's Newsletter. All changes of address should be sent to the current Secretary-Treasurer.



***The Cover...***

This issue shows a woodcut of a typical late 19th century analytical chemist (with rather overly developed arms) working in a typical industrial laboratory of the period. For an interesting contemporary portrait of the prospects and challenges facing industrial chemists at that time, see this issue's DIVERSIONS AND DIGRESSIONS column.

**DEADLINES**

The deadline for the next issue (Fall 1988) is 30 July 1988. All materials should be sent to Dr. William B. Jensen, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221, Phone: (513) 475-4005.

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## FROM THE EDITOR'S DESK

The newsletter continues to rapidly evolve. Both because of the reduction in production costs obtained by use of desktop publishing techniques and the decreasing emphasis on history of chemistry in more traditional chemical journals, such as the *Journal of Chemical Education*, it was felt that the time had come for the Division to attempt something more ambitious in the way of a publication. From now on the newsletter will be incorporated within the larger *Bulletin for the History of Chemistry* as the DIVISIONAL NEWS section. To avoid confusion with the old newsletter, which went through 19 issues, the *Bulletin* will begin fresh with a new numbering sequence. Hopefully, with this issue, we have finally reached equilibrium and any future changes will involve only increases in length and frequency of appearance, rather than changes in format.

The *Bulletin* is not intended to compete, either in terms of size or content, with established historical journals like *Ambix* and *Isis*. The vast majority of the members of the Division of the History of Chemistry are practicing chemists and teachers of chemistry who enjoy reading general interest articles on the history of chemistry but are prevented by other duties from engaging in full-time historical research. Their interest in history is more that of chemists wishing to add a time dimension, as well as a depth-of-content dimension, to their appreciation and understanding of chemistry, than that of historians seeking to resolve social and philosophical questions through historical research. The intent of the *Bulletin* is to serve this audience by means of short entertaining articles and vignettes, usually in the form of a continuing column organized around a central theme.

In keeping with this goal, several new columns have been added to those already initiated in earlier issues of the newsletter. These include WHATEVER HAPPENED TO...?, which explores concepts, techniques, and examples which were once a standard part of the textbook literature but have since disappeared; CHEMICAL ARTIFACTS, which will catalog historically interesting equipment, photographs and other chemical memorabilia located in various chemistry departments throughout the country; a series on the history of the Dexter Award by Aaron Ihde of the University of Wisconsin; and, finally, TRANSLATIONS, which will challenge readers to exercise their ingenuity in unravelling "the chemistry behind the chemistry" of yesteryear.

In the future, we hope to add a FACES FROM THE PAST column, featuring concise biographical portraits of famous chemists; a BONES AND STONES column, featuring entertaining vignettes for members of the Archeological Subsection; and a series on the history of the Division itself by James Bohning of Wilkes College. Because of severe space restrictions, most contributions to

the *Bulletin* are currently by invitation. Nevertheless, readers are encouraged to bring materials which might be suitable for any of the current columns to the attention of the editor.

*William B. Jensen, University of Cincinnati*

## LETTERS

The DIVERSIONS AND DIGRESSIONS column in the History of Chemistry Newsletter has provided welcome additions to my collection of articles on elements. As a high school chemistry teacher, these articles spice up what could otherwise be a prosaic recitation of elements of representative families. Thank you for including tantalizing examples of what history of chemistry is all about. I have especially appreciated the inclusion of equations for relevant reactions and the substantial quotations from primary sources. Derek Davenport's article on fluorine and the article on phosphorus provide respectable benchmarks for future DIVERSIONS AND DIGRESSIONS...

In the Fall 1987 Newsletter you note that some of the essays are reprints of works initially published in *ChemMatters*; consequently they may lack some of the "meat" expected by a professional historian or chemist. Would it be too much to ask that all future essays note the approximate dates of key experiments, publications, etc ... A short bibliography would also be helpful. Thank you for including such useful, interesting articles in the newsletter.

*Judy Smith, Austin TX*

## TRANSLATIONS

*The following experiment is taken from Tiberius Cavello's "A Treatise on the Nature and Properties of Air", published by the author in London in 1781. Readers wishing to submit their interpretation of the chemistry involved, complete with balanced equations, should send their answers to the editor by the copy due date listed inside the front cover. Answers will appear in the next issue along with a fresh puzzle.*

*To inflame Regulus of Antimony by means of Aqua Regia: Let a common vial, such as apothecaries more commonly use, be about half filled with aqua-regia, made with four parts of nitrous and one part of marine acid. These acids should be very strong. Then take powdered regulus of antimony, and drop it gradually upon the aqua-regia; keep the hand that holds the powder a few inches above the vial. It will be found that the particles of regulus take fire, and sparkle like a flint and steel, before they touch the surface of the aqua-regia, viz. by only passing through its vapours.*

## THE 1987 DEXTER ADDRESS

### Quantification and Medical Motivation: Factors in the Interpretation of Early Modern Chemistry

When the historian of science seeks a conscious "revolution" in the science of the sixteenth century he normally turns to Copernicus and to the physical problems resulting from a sun-centered cosmology. In solving these the power of mathematics becomes evident in the progression from Copernicus to Galileo to Newton. But the historian of chemistry should be equally interested in Paracelsus, a younger contemporary of Copernicus. This Swiss-German firebrand called not only for new observations in nature, but also for chemistry to be the key to a new understanding of nature and man.

If mathematics played such a significant role in astronomy and physics, what was its place in Renaissance chemistry? To be sure, quantification had always been important to the chemist. Quantities had to be weighed in the alchemists' laboratories while assays of ores and practical pharmaceutical recipes all involved the use of the balance. These men - and the Paracelsians also - frequently cited Scriptural authority stating that God had created "all things in number, weight and measure." There seemed little doubt that nature should be investigated mathematically.

Here the real question involved the proper use of mathematics. Laboratory weights and measures were clearly appropriate for the chemist and they seemed to be upheld by Scriptural authority. But Renaissance savants thought also of a higher form of mathematics related to universal harmonies and natural magic. Paracelsus affirmed that true mathematics is magic which may, in turn, be equated with the study of nature. The godly magus is a mathematician who may concentrate in himself celestial virtues which are the hidden powers of nature. He may then use these powers to work wonders and learn of his Creator.

The chemists' call for quantification may best be seen in the work of Jean Baptiste van Helmont, a contemporary of Galileo. He is best known for his willow tree experiment in which he took a weighed sapling, planted it in a weighed amount of earth, watered it for five years and then reweighed it. There was an increased weight of 164 pounds which he attributed to water since the weight of earth remained the same. Here and elsewhere in his writings we find an author who regularly used quantification in his laboratory work.

But van Helmont considered this practical quantification simply to be normal observation rather than the use of mathematics in the interpretation of phenomena. The latter, he thought, was the ancient logical approach to nature which was akin to the deductive process of the geometrician. The Aristotelians and Galenists sought to apply such reasoning to medicine and they had failed in their attempt. For van



Paracelsus

Helmont, rational, mathematically-inspired investigations may aid us in the study of physics, but not in attaining the chief goal of natural philosophy - medicine - for to "understand and favour these things from the spring or first cause is granted to none without the special favour of Christ the Lord."

Rejecting the mathematical investigation of local motion, van Helmont specifically attacked the use of mathematical abstraction as a proper tool for the scholar. Motion is due to a divine *blas*, an internal force which causes the beating of the heart and other motion without contact or the need of an immoveable mover, a concept basic to the Thomist interpretation of Aristotelian physics. Because of this van Helmont concluded that the Aristotelian descriptive interpretation of nature "is a Paganish Doctrine drawn from Science Mathematical, which necessitates the first Mover to a perpetual unmoveableness of himself, that without ceasing he may move all things."

Paracelsus, van Helmont and other Chemical Philosophers of the period were all influenced by their alchemical heritage. True, they believed in the value of mathematics and quantification, but they did not agree on a single method. Paracelsus had emphasized the importance of a mathematical interpretation that would be judged mystical and valueless by modern standards. Van Helmont applied weights and measures to chemical investigation in a significant manner, but he firmly rejected the use of mathematical abstraction as a proper method for the understanding of natural phenomena. As historians of

chemistry we may conclude that the use of mathematics and the type of quantification practiced by pre-Boylean chemists was frequently mixed with mysticism and that it ignored the mathematical sophistication employed by contemporary physicists and astronomers.

And yet, the followers of Paracelsus were the most determined of those who sought to overturn the establishment science and medicine of the sixteenth and early seventeenth centuries. They - and thus chemistry - must therefore play a major role in any assessment of the Scientific Revolution. But if the growth of mathematical abstraction and quantification will not serve chemistry as it does physics, how should we best approach the chemistry of the early modern period? I think that the answer is to be found in its relation to medicine.

It is true that the accumulated metallurgical knowledge of past centuries was to play a role in the development of science, but for the Renaissance chemist, chemistry was primarily a medical subject. The Galenists who dominated the medical schools stubbornly tried to halt the growing interest first in chemically prepared medicines and then in chemical interpretations of physiological processes. Bitter debates occurred throughout Europe as Galenists attempted to maintain their ascendancy. And yet, the first appointment of a Professor of Chemical Medicine, Johann Hartmann at Marburg, was made as early as 1609. Throughout the seventeenth century more and more Chairs of Chemistry were established - almost always through medical faculties - so that by 1700 there were few medical schools in Europe lacking instruction in chemistry. To accompany these new courses the instructors prepared textbooks of chemistry that centered on medical preparations. These vary from works strongly tinged with Paracelsian mysticism to austere texts practically devoid of theory that confine themselves only to preparations and their use.

I would not argue that we should scrap our understanding of a Chemical Revolution associated with the work of Lavoisier and his colleagues. However, I do believe that if



Van Helmont and son

we are to assign chemistry to its proper place in the Scientific Revolution of the sixteenth and seventeenth centuries, we must begin to think of a two-phase chemical revolution over a much longer time period. The first part involves Paracelsus and his followers who made chemistry the key to medicine. Their work resulted in a major debate with the educational establishment - and eventually in the academic acceptance of chemistry in the course of the seventeenth century. It was this medical background that was to be the basis of Stahl's phlogiston theory and the new debates of the eighteenth century that were to culminate in the work of Lavoisier. The vitalist medicine of Montpellier that developed in the course of that century was also grounded in Paracelso-Helmontian thought and this is a connection that historians of chemistry will have to examine in greater detail in the future. Furthermore, we are confronted with the fact that the eighteenth century saw the publication of a vast number of alchemical and Paracelsian works which to date have not been studied in detail. They must be in the future if we are to understand the connection between these traditions and the work of Mesmer or the late eighteenth-century interest in Rosicrucian and Masonic thought.

In short, the Scientific Revolution has been interpreted primarily in terms of physics and astronomy - the road from Copernicus to Newton. The basis of this viewpoint has been the impact of quantification and mathematical abstraction on the sciences. This, however, is but one factor of many. It is certainly appropriate for physics, but it is inappropriate for other fields. It is certainly inappropriate for chemistry where the relationship to medicine is more significant and where a consistent appreciation of quantification became a major concern only in the course of the eighteenth century. We should then be concerned with two chemical strands, the first a medically oriented chemistry in combat early with Galenic medicine. Its practitioners became entrenched in the medical faculties of Europe in the course of the seventeenth century. The second strand is later and more familiar, the chain of discoveries that led to the abandonment of phlogiston chemistry in the late eighteenth century. Here indeed quantification played a major role. Both strands are essential for our understanding of the development not only of chemistry, but of the Scientific Revolution as a whole.

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## DIVERSIONS AND DIGRESSIONS

### A German Chemist's Experiences in Turn-of-the-Century America

*In 1907 a young German chemist by the name of Samter returned to Germany after a year in the United States and recorded his impressions of the opportunities and problems confronting American industrial chemists of the period. Samter's talk was summarized the same year by a reporter for Scientific American and provides us with a unique portrait of our profession at the turn-of-the-century:*

In a paper read before the Märkische Bezirksverein Herr v. Samter, a young German chemist, has given a remarkably fair and impartial account of his American experience, which contains information of interest to all chemists in search of employment.

An American electrician connected with a great Berlin establishment wrote to friends on this side, recommending Samter as a man "who impresses me favorably." This phrase is quoted as characteristic of America, where personal appearance, manner, and dress are often more important than testimonials to special ability. A position as analytical

chemist, at a small salary, in a factory near a large American city was offered to Samter, and he sailed for New York. He regrets that he did not come in the first cabin, where he might have made useful acquaintances, but he congratulates himself on evading the contract labor law, and warns others against betraying the fact that they have secured positions.

At the factory he finds three other chemists and a German foreman, who furnishes him with excellent board and lodging for \$4.50 a week. This experience suggests two interesting comments. One is that a great number of Germans in America, like this foreman who had lived here twenty years, have almost forgotten German without mastering English, so that they cannot express themselves decently in any language. The second comment relates to the cost of living in America, and the exaggerated conception of it formed by those Germans who assert that a

dollar will purchase no more here than can be bought in the old country for a mark (24 cents). Samter says this is sheer nonsense, as good board and lodging can be obtained in America for \$5 to \$8 a week in small towns and \$7 to \$10 in large cities, and there is no expense for "trinkgelder" or tips. The cost of living, however, is considerably higher in Western mining districts and some others and also in New York, "which genuine Americans have almost ceased to regard as an American city." The average German is too fond of his liberty to take kindly to a boarding house, but he can live cheaply in lodgings and restaurants unless he insists on unlimited beer and German dishes, which are to be had only at high-priced German restaurants. The comparison should be, not between German and American prices of German articles, but between the cost of living in German fashion at home and in American fashion here.

Samter was compelled to sign a contract for a year. This he did reluctantly, for he was eager to obtain higher and more remunerative work than analysis. He finds that employers prefer to make still longer contracts, at least with chemists who have proved their ability and learned the secrets of the establishment. He concedes that a contract for a year is, on the whole, advantageous for a young foreigner; for though it may delay a



A turn-of-the-century industrial laboratory

possible promotion, it removes the danger of being left stranded before becoming familiar with the language and customs of the country.

He quotes the average monthly pay of chemists in large American establishments at \$60 to \$75 for the first, \$85 for the second, and \$100 for the third year, with a gradual increase thereafter up to \$200. Even managers of the large factories demand only \$4,000 to \$7,000 per year. The payment of percentages on improvements is less common here than in Germany.

Nor is special knowledge so essential as it is in Germany. There are two reasons for this: the dearth of applicants possessing such knowledge, and the American habit of attaching paramount importance to general knowledge and intelligence. This trait is reflected in the remarkable breadth of the course of study in American

technical schools, where a little of everything is taught, specialization being left to practice. A good result of this system is that few American chemists betray the dense ignorance of matters not connected with chemistry that is so common in Germany. Every American chemist has some knowledge of machinery, mechanical drawing, and other things essential to the conduct of a factory. The German chemist is educated for a scientific career in a university or technical school or for the scientific solution of special problems in the laboratory of a great factory, while the American demand is for men qualified to act independently in positions of responsibility and to utilize the natural forces, circumstances, and men at their disposal.

Positions are most easily obtained through the scientific and technical schools, in which reigns a solidarity or *esprit de corps* that is absent from similar German institutions. The school, as well as the individual professors, looks out for the advancement of its graduates, and these, in turn, apply to their *alma mater* both for positions and for assistants. The Massachusetts Institute of Technology, the Armour Institute in Chicago, and many similar schools have standing lists of situations, and some of them have more positions than their own graduates can fill. Hence young German chemists are advised to seek assistantships in such schools, through recommendations from German professors, for most professors of chemistry in those schools have studied in Germany, and Boston is said to harbor more of Ostwald's pupils than any other city except Leipzig.

The pre-eminence of Germany in the manufacture of dyes, medicines, and pure chemicals has created the erroneous impression that she leads the world in all chemical industries. But the most important of those industries are concerned with the production of staple articles on a large scale, or with processes that have been developed empirically and are not yet amenable to rigorous scientific treatment. The importance of science to industry is overestimated. Often science merely approves methods discovered empirically. With the exception of the few branches in which strictly scientific methods are essential, applied chemistry is in a flourishing condition in America. The exception is due chiefly to the lack of thoroughly trained chemists, the high price of labor, and the more profitable employment of capital in the production of staples.

Paper, starch, sugar, glass, and the products of the distillation of wood are manufactured in large quantities. The production of cement increases fifty percent annually, but fails to supply the demand. America leads, or will lead, the world in petroleum products, glucose, iron, copper, silver, and lead. American shoes and overshoes are sold throughout the world, and America's supremacy in electrochemical industries is universally recognized. The meat industry, in which \$175,000,000 are invested, offers unlimited possibilities in the chemical treatment of waste

### Errand Boy to Chief Chemist

When I enrolled with the I. C. S. for a Complete Chemistry Course I was employed as errand boy, earning only \$19.50 a month. My Course with the Schools has benefited me very much from a practical point of view. Your Reference Library Volumes are so explicit that I find no difficulty in carrying out analyses and making the required solutions needed for the plant where I am at present employed. I had only a common-school education before my enrolment, therefore I give great credit to your Course, since I would be unable to carry out experiments and calculations without it. I am at present chief chemist of the Oakland plant for the DuPont Powder Company, earning a salary of \$125 a month.

BERNHART TROXLER,  
Oakland, N. J.

A testimonial for the International Correspondence School Course in Chemistry. Circa 1912. Some of the laboratory personnel encountered by Samter probably followed this route into chemistry.

products. An important industry, almost unknown in Germany, is the preparation of cereal "breakfast foods."

There are opportunities for employment outside of factories. Governmental and municipal bureaus for analysis and research are certain to be multiplied in response to the awakening of public opinion by recent disclosures. Agricultural stations and laboratories connected with boards of health, which do many things left to private initiative in Germany, are already numerous.

In discussing the social and business rank of the chemist, which he finds lower here than in Germany, Samter says that we have little respect for scientific attainments. "Success" and "results" are mottos of American life. "Successful businessman" is a title of honor which assures its bearer general admiration and makes him eligible for the highest offices. Some of these idols have recently been thrown from their pedestals, and the American people are probably acquiring a better notion of greatness.

Some German chemists have been convinced by experience that chemists are regarded as common workmen in America. One, who has engaged to devise improvements in silvering mirrors, was put under a foreman and received weekly pay and a time card. In many factories chemists and ordinary workmen have the same hours. Samter fared better because his employer was a graduate of a technical school, but he resigned his position on account of continual friction

with the manager, an energetic and intelligent but uneducated man, who, after working successively as shop boy, factory hand, and foreman, had been promoted to his responsible post over the heads of the chemists. Samter heard of many similar cases. He ascribes them to the very high value put upon administrative talents, especially the ability to increase the output, largely because of the high price of labor and its poor quality, most of the workers in Eastern factories being Italian and other immigrants.

He found the condition of the working classes not quite as favorable as he had expected. He quotes the following daily wages in Eastern manufacturing districts: laborers, \$1.25 to \$1.50; non-union mechanics, \$2.50 to \$3.33; union mechanics, \$4.00 and over. The workman is more independent and more prosperous here than in Europe, but he enjoys less protection against accident and less benefit from benevolence. If injured at work, he can obtain damages only by proving the negligence of his employer by means of a long and costly lawsuit. Hence he usually compromises for a small sum. Samter cannot understand why American workmen do not exert their great influence on law makers to improve these conditions.

He concludes with the diverting story of a sulphuric acid manufacturer who visited a tannery to investigate a complaint about the strength of the acid he had furnished, and asked the manager to produce the aerometer for comparison with his own. The tanner, who had never heard of an aerometer, bared his left arm and said: "See those blisters? They were raised by the old strong acid. Your acid is so weak that it only makes red marks like this." *Scientific American*, 1907, 97, 203.

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*Regrettably the anonymous reporter who summarized Samter's talk failed to give Samter's first name. Readers interested in learning more about the trials and tribulations of early industrial chemists should consult Edward H. Beardsley, "The Rise of the American Chemical Profession, 1850-1900", University of Florida, Gainesville, FL, 1964 and Otto Eisenschiml, "Without Fame: The Romance of a Profession", Alliance, New York, NY, 1942.*

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## CHEMICAL ARTIFACTS

### The University of New Hampshire

When Charles Lathrop Parsons resigned as Professor and Head of Chemistry at New Hampshire State College in 1911 to become chief mineral chemist at the U.S. Bureau of Mines in Washington, he was succeeded by his colleague Charles James. James, a student of William Ramsay at University College, London, continued to head the



Charles Lathrop Parsons

Chemistry Department at Durham from 1912 until his untimely death in 1928. During James' period at New Hampshire, research on the chemistry of rare earths was actively pursued. Under his tutelage, B.S. and M.S. students purified salts of many of the rare earths by laborious fractionation procedures, some of which had been worked out by James. The raw materials came from James' personal collection of rare earth ores and minerals, said to be the most extensive in existence at that time.



Charles James

Among artifacts from Charles James' research endeavors are dozens of large evaporating dishes, hand-numbered and imported from Germany. These were, after all, the major need, along with strong gas burners and mortars and pestles, for the fractionation procedure. Depending on emission spectra to identify and determine the purity of his rare earth samples, James typically kept his prized hand spectroscope (made by A. Hilger of London) nearby, which, through its donation by the widow of Heman C. Fogg, a student and colleague of James, is part of our collection. In the official photograph of James as Head of Chemistry, he can be seen with the spectroscope in his hand.

A limited number of small samples of purified rare earth compounds remained in the possession of the Department on James' death. The major collection of samples, many stored in large jars or bottles, was sold by his wife to the National Bureau of Standards, presumably

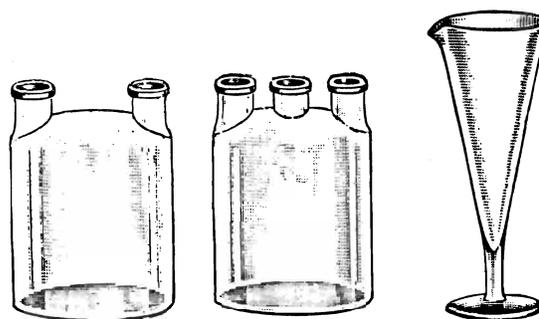


A pocket spectroscope. Circa 1925.

about 1930. In 1981 - 50 years later - an official at NBS, having read a biographical sketch of James in the January, 1981, issue of *Hexagon*, offered to return the samples to the University of New Hampshire Chemistry Department so that they could become a part of our permanent collection. Over 250 samples, packed in 18 cartons, were shipped back to Durham; they appear to have been untouched in the interim period. A large hand-crafted periodic table, about 6' x 10', constructed by New Hampshire chemistry students under the direction of Professor A. F. Daggett, hangs in the lobby of Iddles Auditorium. It includes many samples of elements or compounds, among which are oxides and chlorides of Pr, Nd, Sm, Eu, Gd, and Er - all prepared in Durham under James' supervision.

As a student in Ramsay's laboratory, James had been engaged in research in the inert gases discovered there. He had in his possession six Plücker tubes containing neon, argon, krypton, helium, and hydrogen, which had been filled by Ramsay, James, or N. Collis in London. These have remained as part of our permanent, prized possessions. James' Nichols medal, awarded to him in 1911, is among the collection of his daughter, Professor Marion E. James of Durham.

Based on the rare earth separation work, James, Cork and Fogg published a paper in the *Proceedings of the National Academy of Sciences* in 1926 in which they claimed to have isolated element 61. Also among the

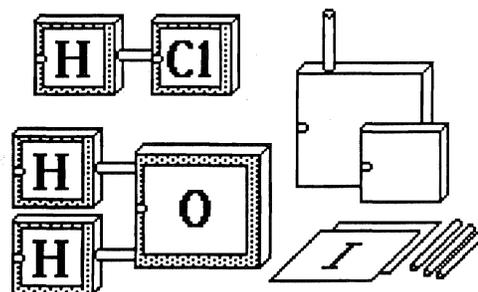


Woulff bottles and a conical test glass.

Department's possessions is the emission spectrum plate (1.5" x 1.5") which first led James to conclude that he had isolated the missing element.

Charles L. Parsons went on to become the first full-time executive secretary of the American Chemical Society, a position he held until 1946. He was the recipient of several medals, which were donated by his heirs to the Chemistry Department. These include the Nichols Medal (1905); SCI Medal (1931); Priestley Medal (1932); Charles Lathrop Parsons Medal (1952); and medals from the French Legion of Honor and the Order of the Crown of Italy. An oil painting, about 26" x 30", commissioned by his family on the occasion of the dedication of Parsons Hall in 1966, hangs in our Conference Room. Parsons' former private home, prominently located on Main Street in Durham, has been for many years the residence of Alpha Tau Omega fraternity.

Various glassware used over the years in lecture demonstrations has been preserved. Included are Woulff bottles (4" diam. x 7.5"; 5" diam. x 9.5"); and glass cylinders (3" diam. x 10"; 5.5" diam. x 12"). Test or "precipitation" glasses seem to be in abundance: about a dozen conical glasses of varying diameter (3.25" - 5.5") and



A valence block set.

height (4.5" - 8"); and one test glass in cylindrical form, (2.5" x 10"). A molecular model kit in a wooden box, with elemental balls of varying size and color and flexible metal connecting bonds, dates from about the period of World War I. Of particular interest is a box of "graphic symbols", consisting of wooden blocks with varying numbers of holes drilled in their edges. Metal clips on the faces of the blocks allow one to attach cardboard labels bearing the symbols of various elements. The blocks can then be connected together with short sections of dowel in order to illustrate the concept of valency (oxidation number). Regrettably both kits are missing the manufacturer's name and patent dates.

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*Dr. Paul R. Jones is Professor of Organic Chemistry at the University of New Hampshire, Durham, NH 03824 and is interested in the German influence on the development of the American chemical profession in the period between 1840 and 1914.*

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### WHATEVER HAPPENED TO THE GROTTA DEL CANE ?

In a recent study Furio Mas *et. al.* found that more than 50% of all 18 year old students think that gases naturally "rise" and that they lack weight or mass, opinions which the authors characterize as "Aristotelian" and as strikingly similar to those held by some chemists prior to the chemical revolution (1). Given this "common sense" view of the behavior of gases, the impact of classic lecture demonstrations in which carbon dioxide is poured "down hill" is understandable, as well as the desirability of continuing to do them in the modern classroom. However, older textbooks not only demonstrated these facts in the classroom and the laboratory, but provided practical everyday examples as well, usually involving the accumulation of carbon dioxide in poorly ventilated mines and caves and its subsequent suffocating action on unsuspecting animals and men.

Perhaps the favorite example of this was the famous *Grotta del Cane*, located at Pozzuoli, near Naples, Italy. Though mentioned in traveler's accounts of the Naples area for centuries, the cave did not find its way into the chemical literature until the end of the 18th century, when carbon dioxide (or fixed air, as it was then called) was finally recognized as a distinct chemical species, largely through the work of Cavendish, Black and Priestley (2). One of the earliest chemical writers to mention the cave was Tiberius Cavallo, who described it in some detail in the 1781 edition of his *Treatise on the Nature and Properties of Air* (3):

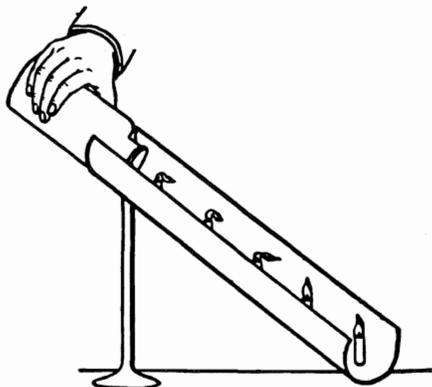
In the kingdom of Naples, and not more than six or seven miles from the capital of that kingdom, is a famous cave, near the foot of a hill, called in the Italian Language *grotta del cane*. This grotto is about fourteen feet long, and near seven feet high at the entrance. On the floor of it, there is always a stratum of that elastic fluid, which constitutes the choke damp. It is continually emitted from the earth, through fissures that may be seen on the ground. The experiments usually shown to the curious, who visit this grotto, are, first, that of bringing a lighted candle or piece of paper near the floor, which is put out as soon as it comes within about 14 inches of the ground, and, secondly, that of keeping a dog with its head near the ground, for about a minute, so as to oblige him to breathe the noxious fluid, which will soon affect his respiration, deprive him of his strength, and would soon kill him, if he was not immediately brought out into the open air, where, if he is not too far gone, he will gradually recover his strength and freedom of respiration. (From this experiment of the dog, the cave derives its name of *grotta del cane*; the Italian word for dog being *cane*.) There is a small lake near this grotto, the water of which is considered as a specific against the effects of the noxious fluid of the grotto, so that the animals apparently killed, or too much affected by that fluid, may be soon recovered by being bathed in that water; but if it is true that those waters at all contribute to restore the animals thus affected, it seems to be merely by the shock they give with the sensation of cold.

Apparently several generations of Italian guides and dogs earned their living by repeating this demonstration for visitors, as Worthington Hooker, writing almost 90 years



Illustrating the mass of carbon dioxide by pouring it downhill (11)

after Cavallo, again mentions the guide and his unhappy canine companion in terms which suggest he had visited the cave himself, the only alterations being the use of a pail of water rather than the nearby lake to revive the dog. Describing the scene in the 1870 edition of his *First Book*



Illustrating the suffocating action of carbon dioxide by pouring it downhill (11).

in *Chemistry for the Use of Schools and Families*, Hooker wrote (4):

A man lives nearby who shows the grotto to visitors, and, in doing this, he takes his dog in, who of course falls down senseless. He brings him out, however, quickly into the fresh air, which, with a dash of cold water, revives the dog, so that the same thing can be shown to the next visitors. But you can see by his leanness and the dullness of his eye [i.e. that of the dog, not the guide, Ed.] that he is dealt with harshly, for this gas, unlike nitrogen, is really poisonous. The dog falls senseless not merely for want of oxygen, but because the gas does him positive harm.

In his description of the toxicity of carbon dioxide, Hooker, in common with many other 19th century textbook writers, seems to have confused its properties with those of carbon monoxide, a confusion which, in conjunction with a knowledge of the grotto, once worked to the advantage of the famous British chemist, Lyon Playfair. In his memoirs, Playfair relates how, as a young chemist serving as "Honorary Professor of Chemistry" at the Manchester Royal Institution, he was given a poorly ventilated cellar for use as a teaching laboratory. One day he and his pupils were doing some routine combustion analyses using open charcoal furnaces, when Playfair became ill and had to go home. However, he was soon summoned back to the laboratory, where he found to his dismay (5):

... two of the pupils lying insensible in the area outside, and [I] at once saw they had been poisoned by the fumes of charcoal, as indeed I had been. Recalling that the guide at the *Grotta del Cane* uses his dog continuously by dragging the insensible body out of the cave, which contains carbonic acid in its lower layer, and immersing it in cold water, I instantly dashed a pail of water over each of my prostrate pupils, and

to my joy found that they revived. This was a practical lesson in ventilation which I never forgot.

In fact, Hooker was so taken with the grotto as a popular teaching device, that he actually designed a lecture demonstration using the grotto motif in which a pasteboard model of the cave was partially filled with carbon dioxide and a candle was lowered into the gas through a hole in the roof.

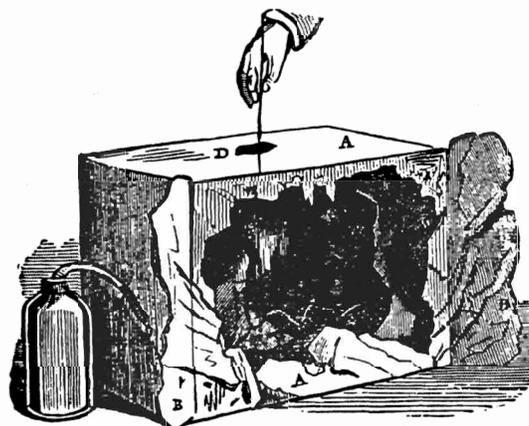
The grotto continued to be a favorite textbook example, not only throughout the 19th century, but well into the second and third decades of this century. It is mentioned in the popular texts of this period by Findlay (6), Partington (7), and Mellor (8). Indeed, the latter author provides additional details, stating that the carbon dioxide layer had a relatively constant depth of 18 inches and that analysis showed it to be 70.3%  $\text{CO}_2$ , 23.7%  $\text{N}_2$ , and 6.0%  $\text{O}_2$ . Only in the 1940's and 50's, with the increasing emphasis on theory, does the grotto finally disappear from the textbooks.

The *Grotta del Cane*, however, was not the only striking example available to the 19th century textbook writer. Later in the century it was joined by the even more exotic *Valley of Death*, located at Lake Laach in Java. This site was apparently much less well documented and the textbook descriptions were consequently more exaggerated. Thus, in his 1886 text, Paul Bert reported that (9):

In the island of Java there is said to be a valley in which the soil emits such quantities [of carbon dioxide] that nothing can live within its bounds, and the very birds that venture to fly through it fall down overpowered and die.

Mellor, likewise, states that (8):

... one traveler says the whole bottom is strewn with the



Hooker's pasteboard model of the grotto (4).



Paul Bert's (1886) version of the guide at the grotto and his recumbent dog (9).

skeletons of human beings, animals, and birds which have been asphyxiated in an atmosphere overloaded with carbon dioxide.

Like the *Grotta del Cane*, the *Valley of Death* seems to have disappeared from the textbook literature in the 1940's and 50's.

Should one wish to revive these interesting examples, the modern textbook writer would have yet a third to add to them - an example even more striking than the *Valley of Death* and certainly much better documented. This is, of course, the massive release of trapped carbon dioxide from the bottom of Lake Nios in Northwest Cameroon in late August of 1986 (10). The spreading blanket of dense carbon dioxide suffocated close to 2,000 people and as many animals, a set of statistics which leaves Hooker's generations of dull-eyed Italian canines far behind.

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#### QUESTIONS AND QUERIES

*The following item appeared in the 21 May 1881 issue of "The Chemical News". Since no one apparently answered Duckworth's original query, we thought we would resubmit it to our present day readers:*

Sirs - Without doubting for a moment that Priestley discovered oxygen on 1 August 1774, I should be glad if you or some other historical chemist would enlighten me as to the following statement which I have culled from an old work on Chemistry:

"Klaproth, 'On the Knowledge of the Chemistry of the Chinese in the Eighth Century', infers that the Chinese were then acquainted with oxygen and the composition of water. The following is interesting:

There are many circumstances that purify it (referring to the atmosphere), and which can rob it of part of its *yne*; the chief of these are those things which are modifications of the *yann*, such as the metals, sulphur (*lieou-hhouann*), and *tane*, or carbon. These ingredients, when burnt, amalgamate the *yann* of the air, and form with it new combinations of two fundamental bases. The *ky-yune*, or *yne* of the air, is always pure; but by the aid of fire it can be extracted from *tchine-che*, a black stone found in the marshes. It enters also into the composition of water, in which it is so closely united with the *yann* that its decomposition becomes extremely difficult. Gold never amalgamates with the *yne* of the air, and is always found native.' - *Memories de l'Academie*

*Imperiale des Sciences de St. Petersburg*, tome ii., p. 476."

Most modern textbooks on chemistry take us no further back than Priestley; so that if there be any truth in the above statement it is only fair that it should be noted. Possibly others beside myself may be interested in the matter.

*Charles W. Duckworth, Clayton, Manchester, 8 May 1886*

## THE HISTORY OF THE DEXTER AWARD

### Part I: Origins

At the beginning of the twentieth century numerous history of chemistry courses were taught in American colleges and universities. The course was considered a necessary part of the education of chemists and such courses remained popular until World War I. They were nearly always taught by professors whose major obligations lay in one of the other areas of chemistry. Following World War I, increased emphasis on education of chemists began to crowd history of chemistry courses out of the curriculum. Although a number of schools continued to offer the course, it was largely a labor of love on the part of an overworked professor and these courses were generally offered as electives rather than required courses.

There was, nevertheless, a certain amount of professional interest in history of chemistry. In 1922, Edgar Fahs Smith, Provost of the University of Pennsylvania and a longtime leader in chemical education, announced an unscheduled meeting at the ACS convention for any chemists interested in seeing a few historical selections from his library and in discussing history of chemistry. Charles Albert Browne of the U.S. Department of Agriculture and Tenny L. Davis of MIT were cosponsors of the informal meeting which revealed considerable interest in such a session. It was determined to continue such meetings of chemists interested in history at future meetings. The group was soon formalized as a probationary section which began holding regular meetings. In 1927, the section was voted divisional status and has functioned as a small division of the ACS since that time.

The division did not grow to large size but contained a nucleus of enthusiasts who read historical papers, exhibited favorite books and pieces of apparatus, and talked shop in the corridors. No one thought of history of chemistry as a formal profession but as an avocation pursued by enthusiasts.

Sidney M. Edelstein became associated with the group sometime during the 1940's and in 1948 volunteered to take over the secretary-treasurership from Ralph Oesper. He continued to serve as secretary-treasurer until late 1965,



Edgar Fahs Smith

when the position was passed on to Sister Saint John Nepumocene. In many respects, Edelstein was the officer who held the section together during a period after the original founders were no longer around and a new group of enthusiasts had not firmly congealed.

Edelstein was born on 22 January 1912 in Chattanooga, Tennessee. He was educated at Baylor School in Chattanooga until he entered MIT. He received a bachelor's degree in chemistry in 1932. Returning to Chattanooga, he took a position as textile microscopist and research chemist at Dixie Mercerizing Company. After three years he became Research Associate with the American Association of Textile Chemists and Colorists. In 1938, he became Vice President and director of Research with Lamede, Inc. in Rossville, Georgia, and in 1939 took a similar position at Hart Products Corporation in Woodbridge, New Jersey. He held this position until 1945, when he founded the Dexter Chemical Corporation and began his long service as its President. The corporation grew to worldwide status and the related Dexter International has headquarters in Israel.

After graduation from college, Edelstein began building up a splendid library dealing with the history of science. The library concentrated particularly in three areas - early chemistry, alchemy, and dyeing. Besides his many books, the library contains autographed letters, engravings, etchings, medals, and presentation copies of books. Several years ago this collection was transferred to the National Library at Hebrew University in recognition of the deep feelings held by Edelstein and his wife, Mildred, for the nation of Israel. Through the Israel Educational Fund, the Edelsteins also built "Beit Edelstein", the library and community center at Kiryat Shemona, and they have also built several day-care centers in the country. Dr. Edelstein is an honorary chairman of the United Jewish Appeal and a

member of the board of governors of Haifa University and of the American Friends of the Hebrew University.

In the field of textile chemistry and dyes he has carried on extensive work on the history of dyeing and finishing. In 1960, he studied the fabrics from the Bar Kochba caves in the Dead Sea area. With associates at Dexter, he developed new techniques for separation of individual dyes and the



Sidney Milton Edelstein

utilization of IR spectra for identification purposes. His research has included a reexamination of the chemistry of Tyrian Purple.

In the field of dye technology, Edelstein has been granted 12 American and 26 foreign patents on textile chemicals and textile finishing. He has contributed important tests and practical methods to the mercerizing industry. His Barium Number is now an official method of the A.A.T.C.C. He also pioneered the development and application of alkali soluble cellulose solutions. His research of cellulose zincate solutions (kopan, celfon) and their applications was a factor in expansion of production of military netting during World War II. His work on phosphate co-esters has placed versatile chemicals in the hands of the wet processing industries. His work on uron structure played an important role in the development of wash-and-wear and permanent press technology.

By the mid-fifties, Edelstein was convinced that history of chemistry lacked broad visibility at a time when important work was still being done by older enthusiasts while a new generation of enthusiasts was entering the field. It was his decision to give recognition to workers in the history of chemistry by creating an award in the field. The

result was the Dexter Award, to be administered by the History of Chemistry Division of the American Chemical Society. The award was to be given annually and carried an honorarium and plaque for the recipient. The machinery for issuance of the Dexter Award was set up in time for granting of the first award to Ralph Oesper in September 1956.

The award was to be given for recognition of longtime contributions to the field, publication of a significant book or paper, preparation of a bibliography, or of other services of significance to the development of the history of chemistry. The history division set up an awards committee consisting of three members with staggered three-year appointments. Members of the selection committee are appointed by the chairman of HIST and serve anonymously. The secretary of HIST announces a call for nominations for the next award and receives nominations until the deadline has been reached. The nominations are passed on to members of the awards committee and the selection is announced in the Spring - with the award being given at the Fall ACS meeting.

Part II of the series, dealing with the first decade of the Dexter Award, will appear in the next issue.

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*Dr. Aaron Ihde is Professor Emeritus in the Department of Chemistry of the University of Wisconsin, Madison, WI 53706. A Past-Chair of the Division (1962-1964) and a winner of the Dexter Award (1968) himself, Dr. Ihde is perhaps best known for his classic text "The Development of Modern Chemistry", which has recently been reissued as a Dover paperback.*

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## BOOK NOTES

*Essays on the History of Organic Chemistry*, James G. Traynham (Editor), Louisiana State University Press, Baton Rouge and London, 1987. ix + 145 pp. Cloth. \$25.00

At their worst the published proceedings for special symposia consist of camera-ready copy done in at least five type styles, cheaply bound and outrageously overpriced for the library market. Editing is minimal and about a fourth of the papers are usually unrelated, save in the most charitable sense of the word, to the central theme of the symposium. If this caricature represents one end of the spectrum, then the book under review represents the other extreme, as it is an example *par excellence* of what books of this type can and should be.

Based on the 1984 Mardi Gras Symposium in Organic

Chemistry at Louisiana State University - Baton Rouge, the book contains eight essays. The authors represent a good mix of practicing chemists and professional historians of science and the historical orientation of the essays themselves ranges from the conceptual (the origins of conformational analysis, optical activity and organic nomenclature) to the disciplinary (origins of the physical organic chemistry community) and the philosophical (convention versus ontology in 19th century organic chemistry). The book is typeset with excellent integration of the illustrations and figures and a uniform format for each essay. Evidence of careful editing is present on every page and, to top it off, the book is reasonably priced.

Indeed, it is difficult to find anything to criticize. As a half-hearted attempt, one might point out that two of the essays, that dealing with the sugar industry in Louisiana and that dealing with chemical trivia, do stretch the central theme a bit, being more properly examples of industrial-analytical chemistry and - well - chemical trivia! But both essays are so well done and entertaining that one would have to be a heartless curmudgeon to object to their inclusion. In short, this is an excellent, affordable volume which belongs on the shelves of all chemists with an interest in the development of their science.

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*A special discount coupon for members of the Division wishing to order this volume can be found on the back cover.*

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## MESSAGE FROM THE CHAIR

What do you think of when your thoughts turn to HIST? I invite you to look at our Division with me.

HIST is one of the smallest of the 32 divisions of the ACS (current membership 700), and, while there is strength in numbers, as the cliché says, various measures of division quality show HIST to have unusual strengths in spite of its size. Membership has been growing steadily, as a result of effective promotion by Al Kirsch, past membership chair and now Chair-Elect of the Division. Ray Seymour, newly-elected Alternate Councilor for HIST, has agreed to accept the additional responsibilities of membership chair. I expect our roll of members to continue to grow.

Budgeting is important to all divisions, and a major part of HIST's income is the annual allocation from the National Society. Divisional allocations are based on three variables: total membership; responses to the question on national meeting registration forms, "Which division's program influenced you most to attend?"; and reported attendance at national meeting sessions sponsored by the division. HIST



James G. Traynham  
1988 Chair

ranks sixth among the 32 divisions in the allocation per member. That ranking indicates to me that the imaginative programming by Mary Virginia Orna, our Program Chair, pays off, in every sense. The implication of that allocation seems even more applaudable when one reflects that most HIST members probably are members of other divisions, too, and divide their attendance time among them. The HIST programming for the meeting in Toronto in June, both symposia and general papers, is so appealing that our allocation rank may even go higher. Remember to record HIST on your meeting registration form: It pays.

The Dexter Chemical Company, through the commitment of Dr. Sidney Edelstein, Chairman of the Board, and Dr. David Abrahams, President, annually awards a plaque and \$2,000 to a Dexter Awardee selected by a committee of HIST. This award is not one of those administered by the National Society office, but it is the only one given through an ACS unit for outstanding accomplishments in the history of chemistry. I am glad that HIST has such a direct involvement in this significant award.

HIST also presents an annual award (plaque and \$100) to the author of the paper judged to be the outstanding paper presented at a national meeting in a general papers session sponsored by HIST. The HIST Program Committee members, assisted by a few other persons, take the responsibility of reading manuscripts of general papers before the meetings, of listening to the presentations, and of evaluating them and selecting the award winner. The restriction of the award to general session papers is a recent action by the Executive Committee and is intended to

encourage participation in those sessions. The titles of some general papers for the Toronto meeting assure rewards: surely for attendees, perhaps for authors.

This separate newsletter is a fresh venture for HIST and the product of the can-do spirit and dedication of our busy Secretary-Treasurer, Bill Jensen. Previously included in *CHOC News*, the newsletter can now be published on a regular schedule that directly serves HIST members and can be expanded to include additional features. It may become a favored publication possibility for papers identified with awards made through HIST. Bill's desk-top publishing capability makes it possible. We hope that you are pleased with it.

You will soon be asked to vote on some amendments to the Division's By-laws. The proposed amendments have been reviewed by the Society Committee on Constitution and By-laws, as required. Because of the superb work on them by Jane Miller, they passed review easily. Only a few minor wording changes were suggested for clarification and consistency. Further work on the Division's Constitution and By-laws to bring them and practice into better accord is being continued by Bob Goldsmith, immediate Past-Chairman, and Jane Miller.

Since the creation of the Center for the History of Chemistry (now the Beckman Center for the History of Chemistry, BCHOC), there has been close interaction between the Center and HIST. Jeff Sturchio, former Associate Director of BCHOC, was an effective liaison member of the HIST Executive Committee. He has now moved from BCHOC to AT&T Bell Labs, to head up its Archives and Records Management Services, and Arnold Thackray, Director of BCHOC, has agreed to serve on the HIST Executive Committee as liaison to BCHOC. I am pleased that we shall be able to continue the close ties that have been so fruitful for both HIST and BCHOC.

Each division of ACS is unique in its interests, but HIST's uniqueness is associated with its having a finger in every other division. The history of their chemistry is HIST's focus, as jointly sponsored symposia indicate. The history of HIST has been neglected, however, and this year we shall begin the office of Historian of the Division. We, more than any other division, have the responsibility to set the pattern of reclamation, development, and preservation of Division memorabilia. I am delighted to report that Jim Bohning, the 1986 Division Chair, will, in the language of the theater, create the role of historian of HIST.

A colleague of mine recently added to the clippings and cartoons on his office door a bumper-sticker-like item that said: Physics happens. I wanted to add: - but chemistry depends on chemists. HIST, in particular, is involved in unveiling and enlivening the archival records, both formal and informal, of that dependence. That's why I am a member.

At the New Orleans meeting of the ACS last year, the Council Committee on Divisional Activities adopted a new document about divisions. Included in that document is a "Statement of Purpose" which states that divisions are organized to:

1. Provide a forum for the presentation of original research results in the areas of their expertise.
2. Provide members of the division and the Society as a whole with the latest information on advances in these areas.
3. Provide a forum for the exchange of technical information and expertise.
4. Provide members with a sense of identity.
5. Promote the status of the area of expertise, and of persons interested in this area.
6. Build and increase the interest of members in special areas of chemistry and, thus, in the American Chemical Society as a whole.

I invite your suggestions for enhancing HIST's appeal and effectiveness.

*James G. Traynham, Louisiana State University*

## FAREWELL FROM THE PAST CHAIR

This is my final note as your chair for 1987. I wish to report to you that we did indeed have a very good year in nearly all areas. The programs under the direction of our Program Chair, M. V. Orna, included the symposium on carbocation chemistry, the history of chemical industry in Louisiana, the development of physical chemistry, the Kasmir Fajans session and our extended symposium on archeological chemistry, all of which were highly successful. The chemistry trivia session had a great location and was accessible to nearly everyone. Many thanks to all the organizers, symposium coordinators, presenters of papers, the program committee and all others who were involved in this effort.

Our membership increased about 8% under the leadership of our Membership Chair, Al Kirsch. Administratively, much has been done this past year that should help in the efficient operation of the division. Under the leadership of Jane Miller, our by-law changes were approved by the board, submitted to the ACS and returned with virtually no changes. A committee on by-laws, consisting of Dr. Miller and myself, was set up. The Dexter Award procedures were spelled out. The newsletter is being shifted to separate production. The cachet committee's terms were normalized and the division made a long-term commitment to the program and the presidential papers series. Arrangements with CHOC regarding booth operation were worked out, thanks to Jim Bohning, who also deserves credit for his work on the cachet program with his fellow committee

members and for numerous other things he has done for the division. Program committee guidelines were approved by the board. Division members helped the field of the history of chemistry in many ways, including publications, oral history projects, advice on archives, and national exhibits. Besides the persons mentioned previously, I wish to thank Jim Traynham for his help in numerous ways, Bill Jensen for his diligent work as Secretary-Treasurer, Bert Ramsay for his work as our Councilor, Ralph Allen for his leadership of the Subdivision of Archeological Chemistry, Jeff Sturchio for providing the important link with CHOC and other services, the Dexter Chemical Company for its support, and all our committee members who gave consistent service to the division. Thanks to all who made this a successful year. The division is in good hands for next year and should continue to prosper and grow.

*Bob Goldsmith, St. Mary's College of Maryland*

## REPORT OF THE PROGRAM CHAIR

The New Orleans HIST program was a full one in every sense of the word. The days were packed with symposia, poster sessions and general papers, and the sessions themselves were generally well attended. The Symposium on the History of the Chemical Industry in Louisiana, organized by Jim Traynham, led off the HIST offerings, with brief histories of several important chemical companies headquartered in Louisiana and topical papers on industries which formed Louisiana's chemical economic base: sugar, sulfur, petrochemicals, rubber and polymers.

The Chemistry Trivia Poster Session, organized most ably by Jack Stocker, attracted about 800 viewers during its two-day exhibition in the Convention Center Lobby. Papers on a variety of subjects from alchemical music to chemical Rorschach tests, complete with audiotape recorders for the more adventuresome, were featured in this potpourri. The session met with such enthusiasm that it should certainly be featured again, possibly at the Dallas meeting, and renamed "Chemical Potpourri," since many of the subjects dealt with were by no means trivial pursuits.

The General Papers session on Tuesday morning highlighted the Divisional Cachet Paper on the 1882 ACS President, John William Mallet, and the *piece de resistance* was Allen Debus' Dexter Award Address, "Quantification and Medical Motivation: Factors in the Interpretation of Early Modern Chemistry". This session was climaxed by the Dexter Award luncheon at which Dr. Debus was presented with the 1987 award by Dr. Sidney Edelstein, President of the Dexter Chemical Corporation.

Tuesday afternoon's featured symposium was a commemoration of the Centennial of Kasimir Fajans' birth, organized by Seymour Lewin and Ray Holmen. Fajans'

multifaceted contributions to such diverse areas as radioactivity, polarization, solid-state chemistry, colligative properties and adsorption phenomena were reviewed by speakers who had worked directly with Professor Fajans in these areas. We were also particularly honored to have one of Professor Fajans' two sons present for the symposium.

The Frank C. Whitmore Centennial Symposium was held all day on Wednesday of the meeting week, with a technical session on carbocation chemistry in the morning, co-sponsored by the Division of Organic Chemistry, and a review of Whitmore's work and influence in the afternoon. Many members of Professor Whitmore's family were present for the symposium and for the luncheon between the sessions.

I would like to thank Jim Traynham, Leon Gortler and Martin Saltzman, not only for their efforts in organizing their respective symposia, but for their excellent summary reports, and I hope to see all of you in Toronto where, among other things, HIST will be celebrating its 50th birthday with a special luncheon. Mark your calendars now for this event, and for the major symposium on the History of Electrochemistry, organized by John Stock.

*Mary Virginia Orna, College of New Rochelle*

## REPORT OF THE ARCHEOLOGICAL SUBSECTION

Why is Archeological Chemistry a subdivision of HIST? What do those who enhance the study of history (and prehistory) by using chemistry have in common with those who enrich the subject of chemistry by studying history? It is perhaps the common interest in the past that has made this unusual partnership work to the advantage of both groups.

A very successful aspect of the unification of chemical historians and archeological chemists has been a series of books within the ACS Advances in Chemistry Series. The fourth in the series, *Archeological Chemistry IV*, is in its final stages of preparation and should be published sometime this summer. This volume includes many of the papers presented at the three-day symposium held at the Denver ACS meeting. These papers demonstrate the many diverse archeological problems that chemists have helped address using some of the most sophisticated methods of material characterization available. One paper addresses the possibility of using the innovative developments in biotechnology to study the residual DNA in dried blood samples. Other papers focus on natural fibers and ancient fabrics. It is clear that these chemical studies not only increase our knowledge of the past, but will also help museums preserve the many delicate historical artifacts made of silk and other natural fibers. A controversial linen

artifact, the Shroud of Turin, is the subject of two papers. In one, the newer methods for carbon dating are described. These advances, which have improved sensitivity, have made it possible to propose the definitive experiments for determining the age of the Shroud of Turin. In another paper, the prospects for determining the age of very old bones is discussed. This important new technique could revolutionize anthropology. All the papers demonstrate the level of scientific maturity that this field of study has reached. The continuation of the *Archeological Chemistry* series is a testament to this growth.

Beginning with the next issue, we also plan to introduce a regular column on archeological chemistry, called BONES AND STONES, which will hopefully encourage both groups of chemists to learn more about what others with historical interests are doing. Anyone interested in the fascinating applications of chemical techniques to archeological and historical studies or for the preservation of ancient materials can contact Ralph Allen, Department of Chemistry, University of Virginia, Charlottesville, VA 22901, for further information.

*Ralph O. Allen, University of Virginia*

## ELECTION RESULTS

Dr. Albert S. Kirsch has been elected as Chair of the Division of the History of Chemistry for 1989; Dr. William B. Jensen of the Department of Chemistry, University of Cincinnati, has been reelected for a third term as Secretary-Treasurer; Dr. O. Bertrand Ramsay of the Department of Chemistry, Eastern Michigan University, has been reelected as Councilor, and Dr. Raymond B. Seymour of the Department of Polymer Science, University of Southern Mississippi, has been elected as Alternate Councilor and Membership Chair.

*Jane A. Miller, University of Missouri-St. Louis*

## AWARDS

The Outstanding Paper Award for 1987 has been awarded to Dr. Grant Urry of the Department of Chemistry of Tufts University for his paper "Herman Irving Schlesinger: The Man, His Chemistry and His Impact Upon the Department of Chemistry at Chicago", delivered at the 1985 Fall National Meeting in Chicago, Illinois.

## NOTES FROM MEMBERS

John Wotiz (University of Southern Illinois-Carbondale) reports that he will become Professor Emeritus in the Fall

of 1989 and that he hopes to keep busy by making his extensive teaching experience available to other colleges and universities as a Visiting Professor in the History of Chemistry and/or Undergraduate Organic Chemistry. Given Dr. Wotiz's usual busy schedule, the editor would suggest that parties interested in availing themselves of Dr. Wotiz's services should contact him as soon as possible.

Jeffrey L. Sturchio (CHOC) has recently resigned as Associate Director of the Center for the History of Chemistry in order to accept the position of Historian at Bell Laboratories. Dr. Sturchio's new address will be Dr. Jeffrey L. Sturchio, Archives and Records Management Services, AT&T Bell Labs/WVA201, 5 Reinman Road, Warren, NJ 07060.

Bert Ramsay (Eastern Michigan University), who has just been reelected as Divisional Councilor, reports that he has been appointed as a Committee Associate for the National Committee on Meetings and Expositions for 1988 and invites input from the membership.

The Division of the History of Chemistry notes with sadness the passing of M. Christine King, who was a victim of an automobile accident in November of 1987 in London. Dr. King was the first recipient of the Division's Outstanding Paper Award in 1984 and made significant contributions to the history of chemical kinetics.

## WHILE IN TORONTO

\* The Croft Chapter House, which housed the original University of Toronto Chemical Laboratory (1859), will be open for viewing by interested persons on Tuesday, 7 June, from 6:00-7:00 p.m. A display of early artifacts will be featured, as well as a brochure on the early history of chemistry at the University, and the college archivist will be on hand to answer questions. Croft Chapter House is located at the southwest corner of University College on the main campus of the University of Toronto next to the Hart House (where the Chemical Education Dinner will be held).

\* The Division of Nuclear Chemistry and Technology will be conducting a one-day symposium (Tuesday, 7 June) at Toronto to celebrate the 50th Anniversary of the Discovery of Fission. Interested persons should consult the meeting abstracts for further information.

\* Due to the international nature of the Toronto meeting, the divisional cachet will depart, for this meeting only, from its ongoing ACS Presidential Series. This series will continue at the Los Angeles meeting, where a cover will be issued honoring James C. Booth, ACS President from 1883

to 1885. Instead, both a special cachet and cancellation are being prepared to commemorate the meeting, incorporating the logos of the participating organizations and that of the Congress itself. This will be on sale, as usual, at the HIST-BCHOC booth on 6-8 June from 9:00 am - 5:00 pm. A Canadian postal substation will be located next to the booth to issue the cancellations. Members unable to attend the meeting or exposition may order the cover by mail. To obtain an order form, send a self-stamped envelope to Dr. John Sharkey, Department of Chemistry, Pace University, Pace Plaza, New York, NY, 10038.

## FUTURE MEETINGS

**Los Angeles .... 25-30 September 1988**

Five copies of 150-word abstract (original on ACS Abstract Form) by 15 May 1988. Title of paper by 30 April 1988.

\* *General Papers*. Contact Dr. M. V. Orna, HIST Program Chair, Department of Chemistry, College of New Rochelle, New Rochelle, NY 10801, Phone (914) 654-5302.

\* *Chemistry and the Discovery of Nuclear Fission*. Organized by L. W. Fine, Department of Chemistry, Columbia University, New York, NY 10027, Phone (212) 280-2017.

\* *Information Sources in the History of Chemistry: California and the West Coast*. Organized by H. Goldwhite, Department of Chemistry, California State University, 5151 State University Drive, Los Angeles, CA 90032, Phone (213) 224-3263.

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

**Dallas .... 9-14 April 1989**

Five copies of 150-word abstract (original on ACS Abstract Form) by 1 December 1988. Title of paper by 20 November 1988.

\* *General Papers*. Contact M. V. Orna (see address above).

\* *The Bicentennial of the Revolution of Modern Chemistry*. Organized by J. A. Miller, Department of Chemistry, University of Missouri-St. Louis, MO 63121, Phone (314) 553-5311.

\* *The Role of Chemistry in Petroleum Discovery and Production - Historical Perspectives*. Organized by J. K. Borchardt, Shell Development Co., P.O. Box 1380, Houston, TX 77251-1380, Phone (713) 493-8237.

\* *Chemical Trivia III*. Organized by James J. Bohning,

Department of Chemistry, Wilkes College, Wilkes-Barre, PA 18766, Phone (717) 824-4651.

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

**Miami Beach .... 10-15 September 1989**

Five copies of 150-word abstract (original on ACS Abstract Form) by 1 May 1989. Title of paper by 15 April 1989.

\* *General Papers*. Contact M. V. Orna (see address above).

\* *History of Biotechnology*. Organized by J. L. Sturchio, Archives and Records Management Services, AT&T Bell Labs/WVA201, 5 Reiman Road, Warren, NJ 07060, Phone (201) 756-1591.

\* *Impact of Radiopharmaceuticals on the Frontiers of Chemistry and Medicine*. Organized by R. M. Lambrecht, Radionuclide and Cyclotron Operations, King Faisal Specialist Hospital and Research Centre, P.O. Box 3354, Riyadh 11211, Kingdom of Saudi Arabia.

\* *History of Fertilizers* (Cosponsored by FERT).

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

**Boston .... 22-27 April 1990**

Five copies of 150-word abstract (original on ACS Abstract Form) by 15 December 1989. Title of paper by 20 November 1989.

\* *General Papers*. Contact M. V. Orna (see address above).

\* *The 1890 Benzol Fest 100 Years Later*. Organized by J. H. Wotiz, Department of Chemistry, Southern Illinois University at Carbondale, Carbondale, IL 62901, Phone (618) 453-5721.

\* *Chemistry in Science Fiction*. Organized by J. J. Bohning, Department of Chemistry, Wilkes College, Wilkes-Barre, PA 18766, Phone (717) 824-4651.

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

**Washington .... 26-31 August 1990**

\* *General Papers*. Contact M. V. Orna (see address above).

\* *History of the Development, Use and Testing of Food Additives*. Organized by H. T. McKone, Department of Chemistry, St. Joseph College, W. Hartford, CT 06117, Phone (203) 232-4571.

\* *Chemistry and Crime II*. Organized by R. O. Allen, Department of Chemistry, University of Virginia, Charlottesville, VA 22901, Phone (804) 924-3622.

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

Minneapolis .... 21-26 April 1991

\* *General Papers*. Contact M. V. Orna (see address above).

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

New York .... 25-30 August 1991

\* *General Papers*. Contact M. V. Orna (see address above).

\* *Chemistry and Crime III - Forensic Methods: Past, Present and Future*. Organized by S. M. Gerber, Color Consultants, 70 Hillcrest Road, Martinsville, NJ 08836, Phone (201) 356-4721; Richard Saferstein, New Jersey Forensic Laboratory, P.O. Box 7068, West Trenton, NJ 08825, Phone (609) 882-2000, Ext. 2692.

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

San Francisco .... 5-10 April 1992

\* *General Papers*. Contact M. V. Orna (see address above).

\* *True Stories of Small Chemical Businesses* (Cosponsored by SChB).

Geneva .... (Date to be Announced)

\* *100th Anniversary of the Geneva Conference*. Organized by J. G. Traynham, Department of Chemistry, Louisiana State University, Baton Rouge, LA 70803-1804, Phone (504) 388-3459.

#### Tentative Future Symposia

(Please contact M. V. Orna if you are interested in organizing or participating in the following.)

- \* *Development Side of Inventions and Discoveries*.
- \* *Impact Issue: Biotechnology in Our Lives*.
- \* *History of Environmental Pollution and Federal Regulations*.
- \* *Emil Fischer and a Century of Carbohydrate Chemistry*.
- \* *History of Pyrotechnics*.
- \* *History of Food Chemistry*.
- \* *History of RDS Research*.
- \* *Chemistry Potpourri*.

Note: The cosponsored symposia indicated with parentheses

will have their primary sponsorships by the divisions so named and the programs will appear under their respective divisional headings.

#### 1988 OFFICERS DIRECTORY

\* *Chairman*: James G. Traynham, Department of Chemistry, Louisiana State University, Baton Rouge, LA 70803-1804, Phone: (504) 388-3459.

\* *Chairman-Elect*: Albert S. Kirsh, 94-1 Marion Street, Brookline, MA 02146, Phone: (617) 232-4797.

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\* *Program Chair*: Mary Virginia Orna, 5000-303 Beaverbrook Road, Raleigh, NC 27612, Phone: (919) 541-3259 or (919) 782-1932; (After June): Department of Chemistry, College of New Rochelle, New Rochelle, NY 10801, Phone: (914) 632-5300, Ext. 302.

\* *Councilor*: O. Bertrand Ramsay, Department of Chemistry, Eastern Michigan University, Ypsilanti, MI 48197, Phone: (313) 487-0304.

\* *Alternate Councilor and Membership Chair*: Raymond B. Seymour, Department of Polymer Science, University of Southern Mississippi, Hattiesburg, MS 39406-0076, Phone: (601) 266-4868.

\* *Chair, Archeology Subdivision*: Ralph O. Allen Jr., Department of Chemistry, University of Virginia, Charlottesville, VA 22901, Phone: (804) 924-3577.

\* *Historian*: James J. Bohning, Department of Chemistry, Wilkes College, Wilkes Barre, PA 18766, Phone: (717) 824-4651.

\* *Member-at-Large*: Jeffrey L. Sturchio, Archives & Records Management Services, AT&T Bell Labs/WVA201, 5 Reinman Road, Warren, NJ 07060, Phone: (201) 756-1591.

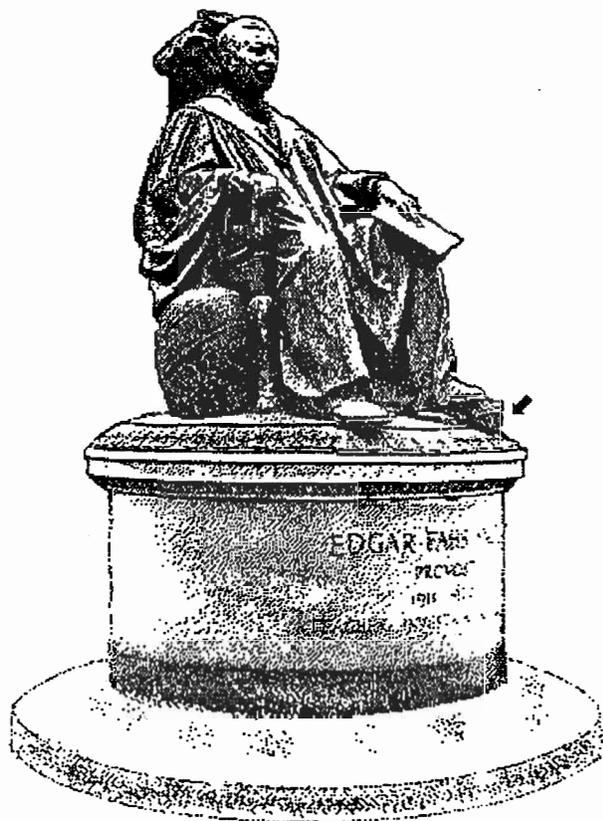
\* *Member-at-Large*: Arnold Thackray, BCHOC, 215 South 34th Street, Philadelphia, PA 19104, Phone: (215) 898-4896.

#### PARTING SHOTS

##### The Monster Under Edgar's Foot

Edgar Fahs Smith, President of the American Chemical Society in 1895 and again in 1921-1922, and co-founder of the Division of the History of Chemistry, is immortalized in a statue on the campus of the University of Pennsylvania,

located on 34th Street between Walnut and Spruce Streets. Not surprisingly, it is adjacent to Smith Hall and marks one terminus of Smith Walk.



Edgar F. Smith statue with monster under foot (arrow)

In September of 1984, HIST's Dexter Award Luncheon was held just a few blocks away at the La Terrasse Restaurant on Sansom Street. After that affair a group of HIST "luminaries" stopped in front of the statue to pay homage to their Division's creator. Replete with appropriate chemical symbols, this rendition of Smith includes a feature that was inexplicable to the visiting chemical historians - a gargoyle was peering out at them from under Smith's left foot!

The solution to this riddle was subsequently solved with a visit to the University of Pennsylvania Archives, located in an abandoned rifle range under the stands of Franklin Field, where the following information was uncovered with the assistance of Associate University Archivist, Hamilton Elliott.

Smith's national chemical reputation was relatively well-

known, through his research, his active association with the ACS, and his collection of historical books and artifacts of chemical interest. But at the University he was also revered as a teacher and highly skilled administrator, serving as vice provost and provost for a total of 22 years.

Several years after Smith's retirement in 1920, University Trustee John C. Bell commissioned Dr. R. Tait McKenzie, noted sculptor and Director of Penn's Department of Physical Education, to execute an eight-foot bronze effigy of Smith that would repose on a stone pedestal designed by Master Architect, Horace Trumbauer. The unveiling exercises took place on Alumni Day, 12 June 1926, immediately after the Penn-Princeton baseball game (Penn won, 9 to 3). Many classes "went in a body to pay their tribute" while "scores of individual alumni came singly and in groups."

In presenting the statue to the University, Mr. Bell expounded at great length on the meaning of the simple inscription carved below the name - "TEACHER. INVESTIGATOR. FRIEND." Citing Smith's "personification of unselfishness" and his service to "numbers of struggling students", Bell's relentless hyperbole culminated in an oratorical crescendo, terminating with testimony that bordered on beatification: "Incapable of an unkind act - yes, I believe, of even an unkind thought, I personally never have known a more nearly Christ-like man than Edgar Fahs Smith."

In accepting the monument for the University, Provost Penniman predicted that it would "continue among us after he and we shall have passed into the great beyond. He sits there," declared the Provost, "in characteristic pose, looking out upon scenes in the midst of which most of his life was spent." Rising to similar heights of grandiloquence achieved earlier by Bell, the Provost proclaimed that "along this street



A close-up of Edgar's monster

will walk in years to come those who never had that privilege [to know him] ... but to them as to us this statue will bring thoughts of the greatness to which a man's life may attain if it is devoted unselfishly to the discovery of laws ... of matter and force" and "the laws that govern human happiness and are founded upon the eternal verities of spiritual truth."

More than sixty years later, Smith still casts his gaze out on the Penn campus, seated on an 18th century Master's chair presented to him by former students. Dalton's chemical symbols are etched in the glass carboy standing on his right side. A stack of books inscribed with the titles of his principal contributions to science and the history of chemistry is placed at his left side. And, *his left foot continues to crush a monster signifying Error!*

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*James J. Bohning is Professor of Chemistry at Wilkes College, Wilkes-Barre, PA 18766. A Past-Chair of the Division and its current Historian, he is particularly interested in the history of the American Chemical Society and in the work of John Draper.*

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## PUBLICATION OPPORTUNITIES

### Nouveau Journal de Chimie

History of science, and especially that of chemistry, remains underdeveloped in most textbooks. This is unfortunate, since a knowledge of the historical development of chemistry can play a role in educating public opinion concerning the positive impact of chemistry on our daily lives. It is also useful in attracting bright young people into chemistry and in justifying the funding of fundamental research. Teaching chemistry at various levels also requires a sound knowledge of the development of chemistry in the past, as well as in the present.

The *Nouveau Journal de Chimie* is attempting to address these needs to some extent in its "Chemical PastTimes / Petite Chronique Archeologique" series. However, since the *Nouveau Journal de Chimie* is neither a history of science nor a philosophy of science journal, it does not intend to compete with the historical articles published from time to time in the *Journal of Chemical Education*, nor does it wish to absorb the overflow of historical and philosophical contributions from other existing journals, such as *Ambix* or *Isis*. Its basic intent is rather to present case histories illustrating interdisciplinary transfers from one sphere of knowledge to another, whether these be between different branches of science or between science and the humanities and arts, and whether the transfers

involve subject matter, methodology, or both.

A second goal is to place on record materials of interest to future historians. Consequently, we are extremely interested in publishing first-person accounts of such transfers. However, in so doing, we want to steer clear of both internalist and externalist illusions. Contributions should refrain from projecting a Romantic heroic image of major scientists, as well as from the opposite caricature of scientific advances being entirely socially-determined. Authors should also avoid falling victim to the "Whig" conception of scientific history as being unidirectionally progressive, since it is felt that our readership are prepared for more sophisticated viewpoints.

Though the basic intent is to "squeeze" from the history of our discipline a sense of continuity with other fields, other types of contributions are also welcome. For example, textual analysis of the scientific discourse is an extremely powerful tool, and we would love to publish case studies displaying its full register.

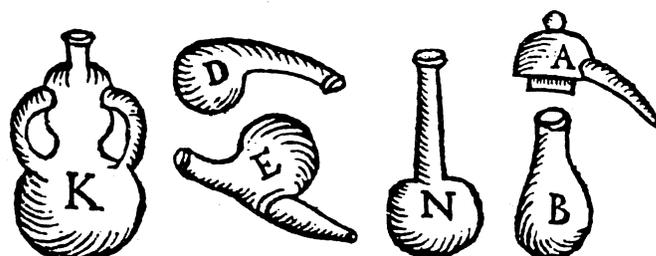
The style of the contributions should be unhesitatingly entertaining. We want these short articles to be highly readable and therefore to combine clear and logical argument, impeccable scholarship, and levity of writing. This is not to say that "Chemical PastTimes" papers should be lightweight. On the contrary, their logic, their intellectual rigor, and their scholarship should be of the highest standard. Authors should avoid hearsay and the use of anecdotal or merely picturesque stories.

Manuscripts, typically eight to 15 double-spaced typewritten pages, should be submitted in triplicate to Professor Henri Kagan, Editor, *Nouveau Journal de Chimie*, Laboratoire de Synthese Asymetrique, Batiment 420, Universite de Paris-Sud 91045, Orsay, France.

*Henri Kagan, Universite de Paris-Sud*

## ACKNOWLEDGMENTS

All illustrations, unless otherwise indicated, are from the Oesper Collection in the History of Chemistry at the University of Cincinnati. Thanks are also due the Department of Chemistry of the University of Cincinnati for providing secretarial assistance.



## **PLEASE JOIN US IN TORONTO 7 - 10 JUNE 1988 FOR A SPECIAL SYMPOSIUM ON THE HISTORY OF ELECTROCHEMISTRY**

This event, which will form part of the Third Chemical Congress of North America and the 195th National Meeting of the American Chemical Society, will be truly international. Speakers from the supporting countries of Canada, Mexico, and the United States will be joined by those from Czechoslovakia, England, Malaysia, Scotland, and Wales. A total of 41 papers will be presented in seven sessions running from Tuesday, June 7, through Friday, June 10. Individual session topics will include classical electrochemistry, electrosynthesis and general electrochemistry, electroanalytical chemistry, fundamental electrochemistry, industrial electrochemistry, and electrode systems and pH measurement. Financial support for the symposium has been generously supplied by the following individuals and organizations and is gratefully acknowledged by the Division of the History of Chemistry:

Dr. A. O Beckmann

The Canadian Section of the Electrochemical Society

Chemical Institute of Canada

The Division of Analytical Chemistry, ACS

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