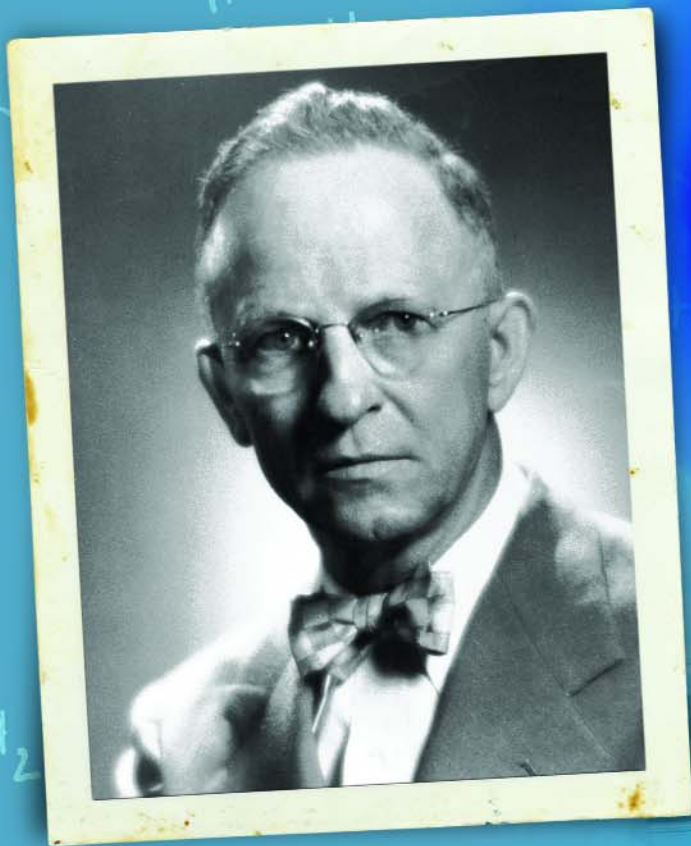


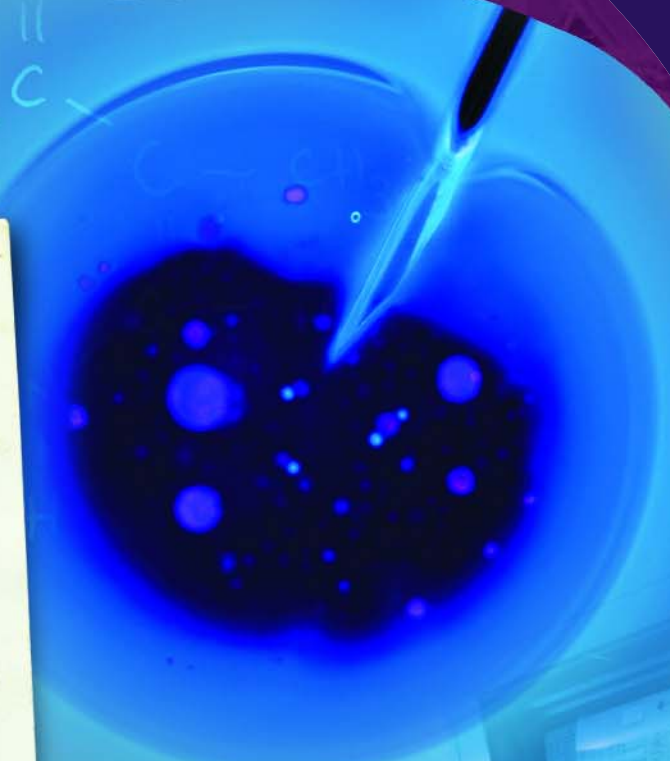
Chemical Abstracts Service (CAS)
June 14, 2007

Historic Chemical Landmark

A National



E. J. Crane



AMERICAN CHEMICAL SOCIETY
SCIENCE THAT MATTERS

“CAS celebrates one hundred years of service to world science as an integral part of the American Chemical Society. That is a century in pursuit of a single mission—to provide access to chemical and related information that speeds and enables scientific discovery to improve people’s lives.” Robert J. Massie, President, CAS

abstracts

Beginnings

The early history of chemical abstracting in the United States is intertwined with the Noyes family. In 1895 Arthur A. Noyes—hoping to enhance the credit American chemists received for their work—began the *Review of American Chemical Research*, part of the *Journal of the American Chemical Society (JACS)* after 1897. Five years later, William A. Noyes, Sr., a distant cousin of Arthur A. Noyes, became editor of *JACS* and the *Review of American Chemical Research*. He believed that the American Chemical Society should publish a comprehensive and inclusive separate journal of abstracts, and in 1906 the ACS Council approved publication of *Chemical Abstracts™ (CA)*. The first issue appeared in January 1907, with Noyes as editor.

William Noyes’ contribution to the success of *CA* cannot be exaggerated. Not only did he persuade the ACS to sponsor an abstract journal, he also organized, planned, and edited *CA* while serving as ACS secretary and working full time. Many of the policies he implemented served *CA* for decades. One of Noyes’ most important legacies was his insistence that *CA* cover applied as well as theoretical chemistry.

CA’s original offices were Noyes’ laboratory at the National Bureau of Standards in Washington, D.C., where he was chief chemist. The office moved to the University of Illinois when Noyes became chair of the chemistry department in September 1907. In 1909 Austin Patterson succeeded Noyes as editor, and the editorial offices moved to The Ohio State University (OSU) in Columbus at the invitation of Dr. William McPherson, head of the OSU Chemistry Department.

Chemical Abstracts™

Evan J. Crane, a youthful 26-year old, was named *CA*’s editor in 1915. During Crane’s stewardship, *CA* grew from a fledgling operation into the trendsetter for scientific abstracting and indexing journals. Crane ushered *CA* through some very difficult times; money was

often so scarce that he dipped into his own small salary for business travel. Crane’s perseverance in the face of financial and other difficulties insured the success of *CA*. In 1956 he was made the first director of the renamed Chemical Abstracts Service (CAS), a new division of the American Chemical Society.

Crane combined a lively sense of humor, a dedication to CAS, and a belief in the importance of science for human betterment. Three times a year Crane issued *The Little CA*, which went to all employees and the hundreds of volunteer abstractors located around the world. It contained exhortations and instructions, but always gently and with a deft touch:

Queer style may rile;
Clear style – worthwhile.
If you’re obscure,
Please find a cure.

And this on brevity:

Please
Be
Rigorous
In
Eliminating
superfluous
words

Under Crane’s tutelage *CA* grew rapidly as the service claimed complete coverage of the chemical literature. Of course, the definition of “completeness” is itself abstract. As Crane wrote “completeness in an abstract journal is a somewhat indefinite goal never quite attained, but the whole history of *CAS* has been one of striving for complete coverage so that the user of this journal can have confidence in the thoroughness of his survey without searching elsewhere.”

Crane recognized that comprehensive and accurate indexes were necessary. He undertook to release a thorough *CA* Decennial Index in 1916. Over the years indexing became more important because of the volume of material abstracted. In 1920 an annual formula index was added along with other indexes; for example, numerical patent indexes and a keyword subject index. By

1962 the amount of material abstracted became so large that *CA* began publishing Volume Indexes semiannually, rather than annually.

Crane retired in 1958. He was replaced by Dale Baker, who oversaw the transition of *CAS* from an ACS-supported service to a financially independent operation. In the beginning, ACS-member dues financed *CA* and ACS members received free copies—a print run of 17,000 copies of *CA* in 1933 prior to a subscription fee. Although a small subscription fee was instituted in 1933, it was not until 1955 that the ACS Board of Directors stepped in and raised subscription prices with the aim that *CA* should break even.



Early computer equipment, c. 1965

Baker faced another problem for *CAS*—housing for a rapidly expanding organization. Since 1909 *CAS* had been housed on the OSU campus, in the McPherson Chemistry Laboratory. In the 1950s, when *CAS* had a staff of 100, a building jointly financed by the ACS and OSU was erected on campus for the abstract service. In 1965, with a staff of 300, *CAS* moved into a four-story, multi-million dollar building of its own on a 50-acre site adjacent to OSU’s campus. Less than a decade later, *CAS* added a second building.

Until the 1960s *CAS* relied on volunteers for the bulk of its abstracting. Crane had referred to some of the volunteers as “the iron men of *CA*,” and many served for decades. In the mid-1960s *CAS* began to phase out its use of volunteers, and in 1994 it entirely ceased using volunteer abstractors.

Baker's greatest accomplishment was to lead CAS into the digital age. The introduction of computers meant considerable savings in staff time and costs. It also meant subscribers had quicker access to information and that the data was more precise. Staff no longer had to check for consistency in the use of chemical nomenclature and index term, which could now be done by the computer. This freed staff for the more intellectual tasks of analyzing the primary chemical literature.

The CAS RegistrySM

The mechanization of information yielded CAS' most significant and far-reaching innovation: The Chemical Registry System. G. Malcolm Dyson, hired by Dale Baker in 1959, first suggested the idea of a registry in the late 1950s. CAS needed an alternative to chemical nomenclature as a basis for this registry. With the increasing complexity and sheer numbers of substances appearing in the literature, the variability in nomenclature rules did not provide unique and unambiguous chemical names.

But chemists have an advantage over many other scientists in being able to communicate by referring to chemical compounds through unambiguous and universally understood structural

diagrams. These diagrams indicate a compound's chemical atoms, the bonds that connect them, and even the spatial arrangement of the atoms. But there was no good way to catalog these structures that enabled easy retrieval. At CAS, every time a chemical compound was

presumed discoverer. Was the compound *really* new? Had it been reported in the literature? Indexed by CA? The rapid increase in the number of named structures led to much confusion; some compounds were named over and over.

Clearly, CAS needed a system that recognized previously named structures and allowed for easy retrieval by CAS staff. In the early 1960s a solution was found when Harry Morgan of CAS developed a solution using an algorithm that generates a unique and unambiguous two-dimensional record of a substance's structure. The record could be read by a computer and was so simple that staff with little special training could employ it. The algorithm became the basis of the CAS Chemical Registry System.

The Chemical Registry System went into operation in early 1965. It eventually included all chemical substances indexed in CA, with their structures and names recorded in computer-readable files. Every substance was given a permanent, unambiguous, and unique identifying number, the CAS Registry Number[®]. For example, a certain statin drug has a systematic chemical name of about 70 characters and is associated with several different tradenames. But it is concisely identified by the CAS Registry Number 79902-63-9. Today scientists and researchers around the world rely upon the CAS Registry Number as the globally accepted standard for defining and describing a chemical substance.

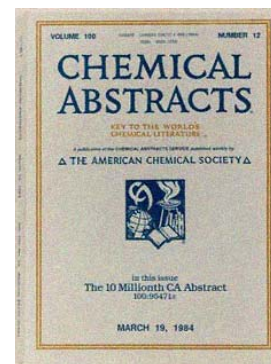
The Digital Age – STN[®], SciFinder[®], and More

When CAS ONLINE[®] made its debut in the early 1980s, it was a novelty among scientific search systems. It permitted online searchers and chemists to query the connection-tables of the CAS Registry using the language of chemistry—the structure diagram—as input. This was difficult, if not impossible, to do with printed materials. By the mid-1980s CAS began planning a network of databases to include scientific disciplines beyond chemistry and chemical engineering. The result was STN InternationalSM—the Scientific and Technical Information Network. CAS describes STN[®] as “an online database

service that provides global access to published research, journal literature, patents, structures, sequences, properties, and other data.”

The arrival of personal computers in the 1980s changed the speed with which CAS' clients received information. In the past, chemists needing information would submit their requests to the information professional at their organizations. But scientists wanted more control over the direction they sought to follow in their research, yet were hampered by the complex command language.

Realizing this, Robert J. Massie, who became Director of CAS in 1992, formed a New Product



Development team and challenged it to build a product that chemists could use without having to learn CAS systems: “If Turbo Tax[®] can reduce the tax code to a user friendly system, surely we can do the same for chemistry.” CAS began the development of a new desktop research tool that would inaugurate a new mode of data searching and retrieval.

The hard work paid off in 1995 with the product launch of SciFinder[®], which provided scientists with conversational and intuitive search interactions that were based on the action of complex retrieval algorithms in the background. SciFinder restored that direct connection to the nearly 100 years of CAS database content that chemists had been missing with the advent of electronic searching. While the Internet was still in its infancy, CAS' digital research environment was underway.

In 1998 CAS launched SciFinder ScholarTM, designed specifically for the academic community. SciFinder Scholar soon skyrocketed into being the campus-wide scientific research tool at schools around the world. Scientists everywhere are now only seconds away from the information they need. The growing families of SciFinder and STN products ensure CAS' continued leadership as a provider of scientific information.

CAS by the Numbers

Total abstracts by the end of

1907	11,847
1937	1,018,661
1955	2,037,767
1963	3,100,717
1971	5,021,101
1984	10,365,098
2005	23,974,214
2006	24,990,883

Substances in Registry (2007): 31,704,260 (as of 05.30.07)

Go to <http://www.cas.org/cgi-bin/cas/regreport.pl> for updated information on the Registry.

indexed, it was copied by hand and then given a name, which may or may not have agreed with the name given it by its

National Historic Chemical Landmark

The American Chemical Society designated CAS a National Historic Chemical Landmark in a ceremony at CAS headquarters in Columbus, Ohio, on June 14, 2007. The text of the commemorative plaque reads:

Founded in 1907 with the first publication of Chemical Abstracts™, CAS has provided generations of scientists with unparalleled access to the most comprehensive collection of chemical information. The CAS Chemical Registry™, established in 1965, is the recognized global standard for chemical substance identification and the largest database of chemical substances in the world. CAS continues to pursue its mission to provide access to chemical and related information that speeds and enables scientific discovery to improve people's lives.

Also on June 14, 2007, the American Chemical Society presented a plaque to The Ohio State University for its support of CAS, which was located on the OSU campus for many years. The text of the plaque presented to OSU reads:

From 1909 to 1965, The Ohio State University provided the American Chemical Society a range of support services and facilities that allowed the nascent Chemical Abstracts™ publication to grow into the world's most important resource for chemistry-related research. CAS moved to its own campus in 1965, adjacent to The Ohio State University, and cherishes the memory of that half century of generous and farsighted support.

About the National Historic Chemical Landmarks Program

The American Chemical Society, the world's largest scientific society with more than 160,000 members, has designated landmarks in the history of chemistry for more than a decade. The process begins at the local level. Members identify milestones in their cities or regions, document their importance, and nominate them for landmark designation. An international committee of chemists, chemical engineers, museum curators, and historians evaluates each nomination. For more information, please call the Office of Communications at 202-872-6274 or 800-227-5558, e-mail us at nhclp@acs.org, or visit our web site: www.chemistry.org/landmarks.

A nonprofit organization, the American Chemical Society publishes scientific journals and databases, convenes major research conferences, and provides educational, science policy, and career programs in chemistry. Its main offices are in Washington, DC, and Columbus, Ohio.

Acknowledgments:

Photos provided by CAS from the CAS Photo Archives

Written by Judah Ginsberg

The author thanks Janice Mears, Eric Shively, and Crystal Poole for assisting him with research materials. He also thanks Mary Ellen Bowden, Kathryn Steen, and Arthur Greenberg for reading a version of this material and making many valuable suggestions. Thanks also to Maria Rosenthal of CAS and the ACS Columbus Local Section for preparing the nomination documents. Needless to say, any remaining errors are the author's alone.

CAS salutes the work of its Anniversary Planning Committee, staff, and the many associates who contributed time and effort to make this commemoration a very special event.

Designed by MSK Partners, Hunt Valley, Maryland
© 2007 American Chemical Society

American Chemical Society

Catherine T. Hunt, President
Bruce E. Bursten, President-elect
E. Ann Nalley, Immediate Past President
Judith L. Benham, Chair, Board of Directors

Columbus Local Section, American Chemical Society

John Long, Chair
Ron Mitchum, Chair-elect
Marta Pazos, Secretary
Fred Costaschuk, Treasurer

American Chemical Society Committee on National Historic Chemical Landmarks

Paul S. Anderson, Chair, Bristol-Myers Squibb Pharma
Company, Retired
Mary Ellen Bowden, Chemical Heritage Foundation,
Retired
D. H. Michael Bowen, Consultant
Leon Gortler, Brooklyn College
Arthur Greenberg, University of New Hampshire
Janan Hayes, Merced College, Retired
Seymour Mauskopf, Duke University
Paul R. Jones, University of Michigan
Heinz Roth, Rutgers University
John B. Sharkey, Pace University
John K. Smith, Lehigh University
Kathryn Steen, Drexel University
Isiah Warner, Louisiana State University
Edel Wasserman, DuPont
Frankie Wood-Black, ConocoPhillips



American Chemical Society
Office of Communications
National Historic Chemical Landmarks Program
1155 Sixteenth Street, NW
Washington, DC 20036
202-872-6274
800-227-5558
www.chemistry.org/landmarks