An Off-the-Campus View of the Chemical Literature Course

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An ideal course in chemical literature should basically include a study of chemical publications, chemical information centers, and methods of using mechanical aids in chemical documentation. Instruction should be geared toward finding data and references relevant to problems that the prospective chemist can expect to encounter when employed by government and industry. Although literature chemists may be most qualified to teach the chemical literature course, a correspondence course may be a satisfactory alternative.

The presentation of a formal course in chemical literature at United States colleges and universities has never been a popular practice. Three surveys have shown that a course in chemical literature is taught at approximately 40% of all schools offering a major in chemistry.[2, 3, 4] A major reason for not teaching a formal chemical literature course is a preference among instructors to integrate topics in chemical literature with topics taught in other courses. The absence of a formal course in chemical literature is often due to the belief that it is less important than other courses required to train the professional chemist.[2] Why is the chemical literature course regarded by many to be of secondary importance? It is believed that both students and educators do not fully appreciate or understand the benefits derived from having been exposed to a chemical literature course.

Although papers have been published and presented at American Chemical Society meetings by a number of individuals on various aspects of the chemical literature course, the ACS as an organization has not espoused or emphasized the value of a literature course. Since neither guide lines nor standards have been proposed, the quality and subjects covered by a literature course often reflect upon the experience of the instructor. Frequently, a course will consist of searching the literature for preparations of organic compounds and in writing state-of-the-art reports.[1]

What should be taught in a chemical literature course? This question is as difficult to answer as the question: Who should teach a course in chemical literature? Some people will answer: a professor of chemistry. Others will respond: a librarian. Another group will say: a literature chemist. An ideal course for a student who plans a career as a chemist should include a study of chemical publications, chemical information centers, and methods of using mechanical aids in chemical documentation.

CHEMICAL PUBLICATIONS

In regard to chemical publications, emphasis should be placed on the effective use of books, journals, patents, and reports for obtaining information relevant to questions and problems of the kind students can expect to experience as chemists. A list, memorized by the student, of publications and the subject matter covered by the publications is not adequate. Students should be aware of the best sources of information for finding data and references to problems that they may expect to encounter when employed in government and industry. Just as medical students study case histories and law students review court decisions, students in chemical literature courses can profit by discussing methods and strategies used to find information. For example, there are many strategies and sources of information that can be used to find literature relevant to catalysts and reaction conditions for the hydroformylation of alpha-olefins. What strategy is best? Which indexes and publications yield the most relevant information?

CHEMICAL INFORMATION CENTERS

Since a great proportion of students who major in chemistry will at some future time be employed by government and industrial laboratories, it seems logical that a course in chemical literature should cover the organization, functions, and activities of libraries and information centers that serve government and industry. Students should be aware that many libraries are not merely reservoirs of books, journals, and indexes. Students would be surprised to learn that libraries of most large companies have technically trained personnel who prepare current awareness bulletins, selectively disseminate information, index reports, perform retrospective searches of the literature, and translate technical articles and patents. The activities of government-supported information centers such as the National Library of Medicine and the Defense Metals Information Center would also be of interest to most prospective chemists.

MECHANICAL AIDS, CODES, AND NOTATIONS

Chemistry students enrolled in a chemical literature course should be aware that computer-based methods of storing and retrieving data and information are becoming more widespread. The fact that tab card machines have been successfully used to handle generic chemical structure retrieval either after structural formulas have been fragmented into bits and pieces, which have been assigned code numbers, or after structural formulas have been converted to chemical notations would be novel to a great number of chemistry students.

WHO SHOULD TEACH THE CHEMICAL LITERATURE COURSE?

It is doubtful that there are many university personnel who are knowledgeable in all of the above mentioned topics. The people most aware of these subjects are away from the college campus and employed by government and industry as literature chemists, chemical information specialists, and chemical librarians. These people should be invited to colleges for the purpose of giving courses in chemical literature.

Another idea is the establishment of a correspondence course in chemical literature by a special committee of the Division of Chemical Literature of the American Chemical Society. The course could consist of a study guide, exercises, and questions. Tuition, credits, and administrative details could be resolved through cooperative efforts of the committee and the departments of chemistry of participating colleges and universities.

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Steroids: From Chemistry to Law

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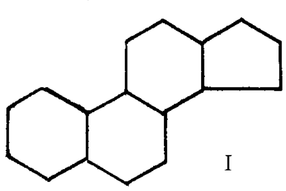
The growth and evolution of the literature of steroid chemistry are surveyed and the unique character of steroid patents is illustrated.

Steroids are compounds containing the perhydrocyclopentanophenanthrene nucleus (I). They include sterols, bile acids, sex hormones, adrenocortical hormones, cardiac



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glycosides, sapogenins, and some alkaloids. The development of steriod chemistry can be divided into the following periods: prehistory, to 1900; classical, 1900–32, the period in which the structure of the nucleus was almost completely elucidated; early modern, 1932–47, which started with the "new" formulas and covers the years when the basic chemistry of nearly all the known naturally-occurring groups of steroids were settled in detail; and late modern, 1947 to date, largely dominated by the search for methods of synthesizing cortisone and related compounds.[1]

I would like to add another period, beginning with the easy handling of optical rotatory dispersion and circular dichroism that enabled chemists to have a basis for studying the stereochemistry of steroids on a scientific basis. Actually, Arago[2] discovered the phenomenon of optical activity in 1811; Biot[3] laid the foundation for spectropolarimetry in 1817, when he reported the angle of rotation becomes greater if the measurement is carried out at shorter wavelengths.

Stagnation characterized the period until 1953. Then Djerassi and coworkers brought spectropolarimetery back to life; the substances they measured are more than what had been investigated the preceding 140 years.[4]

Lowry[5] attributes the long period of stagnation to the invention of the Bunsen burner (1866), which made it extremely easy to produce monochromatic light instead of using a monochromator, which had been particularly troublesome in the previous century. One had only to hold a piece of rock salt in the flame to measure the optical rotation of a substance. Owing to the simplicity of this method, nearly all the earlier workers did not pay attention to the valuable information of a complete rotatory dispersion curve.

The period 1953 to 1960 was the octant rule period and the year 1961 was the beginning of a new period in steroid chemistry. This period began with the work of Moffitt, Woodward, Moscowitz, Klyne, and Djerassi.[6]

The evolution of the steroid literature is shown by the following statistics of publications per year:[7]

1910–25	~10
1926–32	10–40
1933–39	40–100
1940–45	80–50
1946–48	90–120
1949–53	150–130, 210, 290, 320

The number of known steroid compounds until 1953 was 8000;[8] by 1961 it was 21,000. This number is now (1970)