arranged by melting point of the compound, in ascending order. Cards for compounds with melting point below zero were removed by inspection and placed in proper "reverse" order. This third arrangement was listed. The cards then were sorted back into alphabetical order by notation and refiled manually with the other cards in the V-non-carbon deck, to be ready for future searches. This last operation can be done more rapidly if a collating machine is available. Nevertheless the entire searching, sorting, listing, and refiling operation to produce these three printed lists of 199 acyl halides took only 1 hour. Obviously the 5 minutes spent in visual inspection to find -VG combinations is not a significantly large part of the total time required.

Similar lists were prepared from the 24,700 compounds for 350 semicarbazones, 600 oximes, 120 acid anhydrides, 525 amides, and smaller numbers of imides and acyl bromides, with very similar findings relative to the amount of visual inspection needed and the total preparation time required.

Searches on 50,000 Compounds

When the catalog had been expanded to 50,000 compounds, another series of searches was tried with the techniques described above and the 1000-card-per-minute sorter which had become available. A semicarbazone search, previously mentioned, produced the cards for 1097 semicarbazones in 8 minutes, with only two unwanted cards. A more complex search produced simultaneously the cards for 420 phenylhydrazones, 50 *p*-bromophenylhydrazones, 230 *p*-nitrophenylhydrazones, and 250 2,4-dinitrophenylhydrazones, each in separate alphabetized groups ready for listing, in 25 minutes of machine sorting and 55 minutes of visual inspection. As a by-product of this search, the machine-sorts to remove thiosemicarbazones (by sorting for S, column 5, punch position 3 and Z, column 3, punch position 9) and phenylsemicarbazones (by sorting for MV, column 4, punch position 9) gave "pure products" in each of these categories without "contamination" either from compounds in the four groups being sought or from other compounds.

Summary

A method has been developed for locating data about organic compounds with similar functional groups by means of punched-card techniques on a standard IBM sorting machine. By a judicious combination of machine sorting (made possible by the searching code described above) and visual inspection (made possible by the intelligible nature of the Wiswesser notation), the use of expensive and complicated machines has been avoided. The Wiswesser notation makes it possible to locate individual compounds at once in alphabetically arranged lists or files of cards. The searching system described above makes it possible to locate compounds with similar functional groups among the 50,000 organic compounds currently in the punched-card file described, and many of these searches can be completed in a matter of minutes.

Printed lists of the compounds, with the complete line-formula structure and other data, have been prepared quickly and effectively with an IBM tabulating machine from the cards located in the search. The conciseness of the Wiswesser notation makes the system efficient, since the notation and data for a given compound may be carried on a single card, which can be used in a tabulating machine to prepare lists of notations and data directly (*6*).

References and Notes

1. M. M. Berry, "Non-conventional Technical Information Systems in Current Use" (National Science Foundation, Washington, D.C., 1958).
2. W. J. Wiswesser, *A Line-Formula Chemical Notation* (Crowell, New York, 1954).
3. I. Heilbron and H. M. Bunbury, Eds., *Dictionary of Organic Compounds* (Eyre and Spottiswoode, London, ed. 2, 1943).
4. W. J. Wiswesser, *Advances in Chemistry Series No. 16* (1956), p. 76.
5. In a printed note dated 11 May 1957, Wiswesser acknowledged these shortcomings by revising his own searching code into one that more closely follows the code described here.
6. I am grateful to the University of Hawaii, Honolulu, where this study was carried out, for a reduction in teaching load which made part of this work possible; to the College of Business Administration of the university for access to IBM equipment; and to John Ferguson and Tad Nakano for their patient help with machine problems.

Science in the News

Royal Society Celebrates Tercentenary

In 1960 the Royal Society celebrates the tercentenary of its founding. It was on 28 November 1660 that the decision was taken to form a society for the promoting of experimental philosophy, by a group of 12 remarkable men, including Lord Brouncker, Robert Boyle, Sir William Petty, and John Wilkins, who met after a lecture by Christopher Wren at Gresham College in the city of London.

Two years later, Charles II granted them a royal charter which gave the society its constitution and its name, "The Royal Society of London for Improving Natural Knowledge." Some of those who were present on foundation day had been meeting with other enthusiasts to discuss the new philosophy during the previous 15 years, first in London, then in Oxford, and later in London again, after 1658.

Oldest Scientific Society

The Royal Society is the oldest scientific society in the world with a continuous record of activity, and today it fulfills the functions of a British academy of sciences, with members drawn from most of the countries of the British Commonwealth. All the great names in British science are to be found in the annals of the society, and many of the world's most famous men of science are in the roll of foreign members. A close and friendly relationship with the scientists of other countries has been one of the features of the society from its earliest days.

Its original constitution recognized

the Royal Society as a completely independent body governed by its president and council and, unlike the French Academy, without any subsidy from the government. The names of some of its 17th-century presidents—such as Pepys and John Evelyn—show that the fellowship then included amateurs. Their interest and financial support were of great help to the society in those difficult early days. The amateurs continued to have a considerable influence on the affairs of the society until 1847, but since that date election to membership has been dependent on scientific merit and is a much-sought privilege.

As today's president, Sir Cyril Hinshelwood, has said, "the choice of its Fellows is in many ways the most important of the activities of the Society, just as Nature places the perpetuation of the species as a first charge on most of her business." In 1900, 15 fellows were elected each year, but the number has now been raised to 25. In 1958 there were 655 fellows, including 61 foreign members.

Contributions to Progress in Science

In looking back over the history of science since 1660 the society has every reason to be proud of the contribution of its members, particularly of the part they have played in many of the major episodes of scientific progress when some new break-through has changed men's outlook.

The names of Newton, Dalton, Faraday, Darwin, J. J. Thomson, and Rutherford are all associated with milestones in the progress of ideas. Less spectacular but perhaps no less important has been the steady contribution of the society throughout its life to the growing stream of scientific knowledge. And here it has played a notable part with its publications. The *Philosophical Transactions*, which was started in 1665, is the oldest of the existing scientific journals, and since 1832 an even larger volume of papers has been published in the *Proceedings*, one section of which appears every two weeks. The meetings of the society are devoted mainly to discussions of the papers submitted for publication and to symposia on topics of current interest.

Thanks to the bequests it has received and to regular government grants which the society is entrusted to administer, it is able to support the scientific publications of numerous societies, to endow a number of research appointments, and to make grants to support the work of scientific investigators. The administration of its funds and of its other activities is in the hands of a number of expert committees of the fellows, who deal with problems arising in their particular spheres and give advice to the government, when, as often happens, such advice is requested.

In the reign of Queen Anne the society was made responsible for supervising the work of the Royal Greenwich Observatory, a duty which it now shares with the Royal Astronomical Society; it also appoints most of the members of the governing body of Britain's National Physical Laboratory and has representatives on about 100 other public bodies. Recently it administered a large government grant in support of the British activities during the International Geophysical Year, including an expedition to Antarctica.

In addition, it carries responsibility for British participation in the field of international relations in science through its membership in various international unions which are members of the International Council of Scientific Unions. It also provides advice to the government on the natural sciences program for the United Nations' Educational, Scientific, and Cultural Organization.

However, in the words of the president, "Whatever the importance of its corporate activities, the most significant contribution it makes is simply the sum total of innumerable individual contributions made in very varied ways by the Fellows in their own right. They are, of course, free and independent agents, but the Society provides them with the means of publication, on occasion with financial help, and with an elaborate and sensitive mechanism for consultation and exchange of views on every kind of scientific matter. It constitutes in a way a kind of central nervous system of science in Britain."

The society's tercentenary celebrations will occupy a two-week period, starting 18 July. The opening ceremony and the president's tercentenary address will be in the Royal Albert Hall, London. The days that follow will be devoted to scientific lectures by a number of fellows and to social gatherings and visits to Oxford and Cambridge and other centers of interest. The celebrations will be attended not only by the fellows and foreign members but by delegates from national academies of science and from universities throughout the world.

HAROLD HARTLEY
Royal Society of London,
London, England

Ford Foundation Aids New French Center for Human Sciences

The Ford Foundation has announced an appropriation of $1 million to strengthen the facilities and programs of a new Center for the Human Sciences being established in Paris. In addition to this appropriation in the social sciences, the foundation has awarded two grants to stimulate international cooperation in the natural sciences: $500,000 to the European Nuclear Research Center (CERN), Geneva, and $300,000 to Niels Bohr's Institute for Theoretical Physics, Copenhagen.

These actions were among several announced by the foundation to promote international understanding and to assist educational and research institutions in Europe, Asia, and the Near East. Others included: a $700,000 appropriation to expand facilities for receiving foreign visitors in Washington, D.C.; a grant of $750,000 to the Congress for Cultural Freedom, Paris, for international activities; and a $600,000 grant to the government of Pakistan for two pilot centers to develop rural industries.

French Center Described

Shepard Stone, director of the foundation's International Affairs Program, pointed out that the action of French authorities in establishing a new Center for Human Sciences in Paris reflects growing French interest in the social sciences. The center will group together institutes in international relations, anthropology, sociology, psychology, economics, geography, social mathematics, and statistics.

The French Government has budgeted $2 million to build the center and is providing additional funds for its operation and development. The Ford appropriation will make it possible for the center to draw on American and other foreign experts in developing its program, will help expand the center's library resources, and will finance fellowships for the exchange of research scholars with other countries.

The grant to CERN, the nuclear-research center supported by 12 European governments, will enable scientists, particularly from the United States and Asian countries, to participate in the high-energy experimental work at Geneva. The grant to the Institute for Theoretical Physics in Copenhagen will make possible an increase in the number of foreign scientists participating in its program. The foundation made