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# The Charles Babbage Institute Newsletter

Volume 2, Number 2

June 30, 1980



Roger H. Stuewer, CBI's Acting Director

## CBI SELECTS PERMANENT HOME

After a long and thorough search, the University of Minnesota has been chosen by CBI's Board of Trustees as the Charles Babbage Institute's permanent home. A formal contract must still be developed and approved by the Board of Regents of the University of Minnesota and by the Board of Trustees of the Charles Babbage Institute.

In making their selection, the Board of Trustees noted that the University of Minnesota offers to CBI the facilities to implement a vigorous program in the history of information processing. The university has strong programs in the history of science and technology, in management information systems, and in computer science and engineering. The university's library ranks among the top dozen academic libraries in the U.S.; it also administers a major program in archives and manuscripts. In addition, a new Midwest Regional Institute for Computer Science and Technology is being launched in cooperation with local industry. The strength of the computer industry in Minnesota was one of the factors which led to the selection of the University of Minnesota as CBI's host institution.

The university will provide CBI with centrally-located space on the first floor of the Walter Library and archival space in one of the university's archives collection areas. Ready access to the university for the many scholars and others who will use CBI's resources

is provided by the Minneapolis/St. Paul airport, which is thirty minutes away.

As a part of the arrangement with the university, Roger H. Stuewer, Professor of History of Science and Technology at the University of Minnesota, will serve as Acting Director until a permanent director is appointed (see story on page 3 for more information about Roger Stuewer).

A University of Minnesota/CBI consultative committee will be established to maintain close liaison between CBI and the university's departmental and collegiate units. A permanent director will be sought through a search conducted by a committee jointly appointed by the CBI Board of Trustees and an administrative committee of the University of Minnesota, chaired by the Dean of the Institute of Technology. The Director will report jointly to the CBI Board and to this administrative committee.

CBI's Site Selection process began in the spring of 1979 with the appointment of a Site Selection Committee under the chairmanship of Walter F. Bauer, President, Informatics, Inc. The Committee sent letters to the presidents of forty-one major universities having programs in computer science and technology across the country asking for indications of interest. About half of these responded positively, and several other academic institutions, having read about CBI's site search in the *CBI Newsletter* and other publications, asked to be considered as well. The Committee developed a twenty-six page "Proposal Invitation" which was sent to all interested organizations. Thirteen universities submitted proposals and, of these, the University of Michigan and the University of Minnesota were chosen as "finalists." A team of members of the Site Selection Committee visited these universities in mid-April and the Site Selection Committee chose Minnesota by written ballot soon thereafter. The Board of Trustees endorsed the selection and final approval was granted in May.

CBI was most gratified by the high level of interest in the Institute indicated by the many fine proposals that were received. Selection of the finalists and the final selection itself was most difficult. CBI thanks both the University of Minnesota and the University of

*Continued on page 2*

## CBI SELECTS PERMANENT HOME

*Continued from page 1*

Michigan for their outstanding proposals and for their hospitality during the on-site visits.

Members of CBI's final Site Selection Committee were: Walter F. Bauer, (Chairman), Informatics, Inc.; Paul W. Berthiaume, New York Times Information Bank; James W. Birkenstock, IBM (retired); Walter Carlson, IBM; Albert S. Hoagland, AFIPS; Robert P. Multhauf, Smithsonian Institution; E. R. Piore, IBM (retired); Joan N. Warnow, Center for History of Physics; and Spencer Weart, Center for History of Physics.

## FROM THE EDITOR

In any new field, scholars often find themselves working in isolation. Increasingly, the Charles Babbage Institute is finding that we are able to help researchers in our developing field find each other to discuss mutual interests. Our new *Newsletter* department, "Invisible College," is geared toward continuing this effort of introducing those interested in different aspects of the history of computing to each other.

Pamela Gullard  
Editor

## STROMBACK BECOMES TRUSTEE

DuRay E. Stromback, President of Burroughs Corporation, has been elected to the Board of Trustees of CBI. Stromback joined Burroughs in 1949 in Philadelphia as a design engineer. He subsequently held a progression of engineering, plant management, and executive positions, becoming President, chief operating officer, and a member of the Board of Directors in October 1979. He joins twenty-one other CBI Board members, listed on the last page of the *Newsletter*.

The next meeting of the Board of Trustees is scheduled for October 31, 1980 at the University of Minnesota in Minneapolis.

## MICROFILM PROJECT BEGINS

Brian Randell, Professor of Computing Science at the University of Newcastle Upon Tyne, has agreed to chair a small committee for a CBI project in which classic and out-of-print books and other materials relating to the history of information processing will be made available on microfilm. Brian Randell is editor of *The Origins of Digital Computers: Selected Papers* (Springer Verlag, 1973) and of the extensive bibliography on the history of computing which appeared in the *Annals of the History of Computing* (Vol. 1, No. 2, October 1979). The committee is still in formation. Other members will include Paul Armer; Henry S. Tropp, Professor of Mathematics at Humbolt State University; and one or two other experts, such as a European scholar and a specialist in library/microfilm sciences. This committee will decide on the selection criteria for the collection and make the actual selection. It has been proposed that the project's first release should be a basic and fundamental historical

library, with subsequent releases of collections of more limited interest. It is expected that the collection will prove of value to most major universities, government and private research libraries, and other research and scholarly institutions of all kinds.

Randell has stated that CBI's Microfilm Committee is most interested in obtaining comments and advice on this project from anyone interested in it. We would like to hear suggestions about both the technology and management of the collection, and about the contents of the collection itself. Please write to: Professor Brian Randell, Computing Laboratory, The University of Newcastle Upon Tyne, Claremont Tower, Claremont Road, Newcastle Upon Tyne, ENGLAND NE1 7RU. It will speed communications among the committee if a copy of your letter is also sent to our Palo Alto address.

## PUBLIC INTEREST

As part of CBI's awareness building effort, feature articles on the Institute have appeared, or will appear, in the *Annals of the History of Computing*, the *Newsletter* of the American Institute of Physics' Center for History of Physics, *ISIS* (the journal of the History of Science Society), *Datamation*, *Data Communications*, and the *Peninsula Times Tribune* (which is published in Palo Alto, California). Brief items have appeared in a number of newsletters and in the trade press.

## ANNALS OF THE HISTORY OF COMPUTING

The Table of Contents for the April 1980 issue of the *Annals of the History of Computing* is:

John Mauchly, 1907-1980—Nancy Stern  
John Curtiss, 1909-1977—John Todd  
National Bureau of Standards SWAC—Harry D. Huskey  
SHARE—A Eulogy to Cooperative Effort—Paul Armer  
Programming the Manchester Mark I—Martin Campbell-Kelly  
Printed Papers of Charles Babbage—Alfred W. Van Sinderen

Included with this *Newsletter* is a copy of a brochure describing the *Annals* and giving information on subscribing. Readers are reminded that Associates of the Charles Babbage Institute receive at no charge a subscription to the *Annals*. If you would like to join our Associates, the schedule for contributions is as follows:

Associate Member Category	Minimum Annual Tax-Deductible Contribution	Cost of Lifetime Membership at the Category Level (one time payment)
Regular	\$ 40	\$ 650
Participating	\$ 100	\$1,000
Sustaining	\$ 500	\$3,000
Patron	\$1,000	\$5,000

Please make your check payable to the Charles Babbage Institute and mail to: CBI, 701 Welch Road, Suite 224, Palo Alto, CA 94304.

## **ROGER H. STUEWER, CBI'S ACTING DIRECTOR**

Roger H. Stuewer, CBI's newly appointed Acting Director, is Professor of the History of Science and Technology at the University of Minnesota, where he holds a joint appointment in the School of Physics and Astronomy and the Minnesota Center for Philosophy of Science and teaches courses in the history of nineteenth and twentieth century physics. He is also on the graduate faculty of the American Studies Program. Professor Stuewer received his Ph.D. degree in 1968 from the University of Wisconsin with a major in physics and the history of science. Since 1967 he has been on the Minnesota faculty, except for 1971-72 when he was Associate Professor of the History of Science at Boston University. During 1974-75, as a Fellow of the American Council on Learned Societies, Dr. Stuewer was on leave at Harvard University as Honorary Research Associate in the Department of the History of Science. He was Secretary of the History of Science Society (1972-77) and is currently editor of the American Association of Physics Teachers Resource Letters and Reprint Books and chairman of the A.I.P. Committee on the History of Physics. He is the author of *The Compton Effect: Turning Point in Physics* (Science History Publications, 1975) and editor of two other books, *Historical and Philosophical Perspectives of Science* (University of Minnesota Press, 1970) and *Nuclear Physics in Retrospect* (University of Minnesota Press, 1979).

## **ORAL HISTORIES**

From 1967-73, the American Federation of Information Processing Societies (AFIPS) and the Smithsonian Institution conducted a joint project in the history of computing wherein more than 200 oral interviews with various key individuals in the field were generated. (The Smithsonian has since interviewed a number of other individuals.) CBI's oral history project is now providing a substantial supplement to that initial historical base.

As mentioned in previous *Newsletters*, CBI has interviewed Gerhard Dirks, who holds a number of early computer patents, and six individuals involved with the late George Forsythe in establishing the Computer Science Department at Stanford. CBI has also interviewed Antonin Svoboda, a Czechoslovakian who built what was probably the first "fault tolerant" digital computer. (See *Obituary*, page 6).

Bobbi Mapstone, who did many of the oral history interviews carried out under the AFIPS/Smithsonian project, interviewed R. Blair Smith this May. Smith was the founder of the Digital Computer Association, which begat SHARE, the first computer user group. He was also responsible for SABRE, the pioneering airline reservation system developed jointly by IBM and American Airlines. SABRE was the first large commer-

cial on-line system. This summer, Nancy Stern, Associate Professor of Administrative Computer Systems at Hofstra University in Hempstead, New York, will interview Arthur Burks, Professor of Computer and Communication Sciences at the University of Michigan. Burks is best known for having been one of three authors of the classic 1946 paper, "Preliminary Discussion of the Logical Design of an Electronic Computing Instrument," along with Herman H. Goldstine and John von Neumann. Despite the importance of the role he has played in the history of our field, Burks has not previously been interviewed. This summer Stern will also interview James W. Birkenstock, retired Vice President of IBM. Birkenstock was intimately associated with IBM's entry into the electronic data processing business.

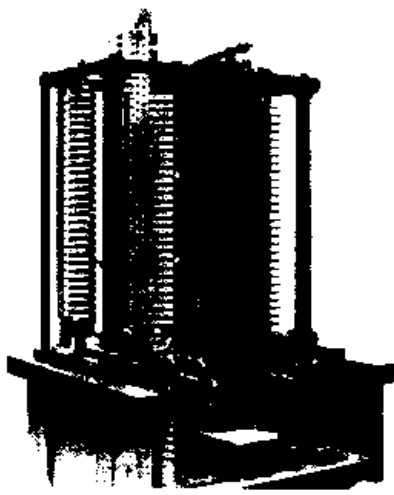
Shortly after the recent death of John Mauchly, Nancy Stern interviewed his colleague, J. Presper Eckert; Kay Mauchly, his widow, who was a programmer in the days of ENIAC; William Cleaver, a patent attorney for Sperry Univac; and James McNulty, son-in-law of Mauchly and employee of Sperry Univac. Subsequently, Stern interviewed George Eltgroth, who was the patent attorney for Eckert and Mauchly.

Nancy Stern's Ph.D. thesis, "From ENIAC to UNIVAC: A Case Study in the History of Technology" will be published next year by Digital Press. She has offered to turn over to CBI, subject to the concurrence of the individuals, tapes of the interviews she made while doing research for her dissertation. These tapes cover about 40 hours and include discussions with John Mauchly, J. Presper Eckert, Herman Goldstine, John G. Brainerd, Isaac Auerbach, Edmund C. Berkeley, S. Reid Warren, Irven Travis, Carl C. Chambers, Phillip Vincent, Mina Rees, and Morris Hanson.

## **EXECUTIVE CHANGES**

Two of CBI's Board of Trustees members have made major career changes in their management positions. Effective April 16, 1980, Erwin Tomash, CBI's founder and Chairman of its Board of Trustees, retired from active day-to-day participation in the affairs of Dataproducts, the company which he founded in 1962 and which has become the world's largest independent manufacturer of printers. Tomash was Chairman of Dataproducts' Board of Directors. He will remain a director, continue as chairman of the executive committee, and will serve as a consultant to the company. His retirement will permit him to devote more time to his personal affairs and, in particular, to the Charles Babbage Institute.

This spring, Clarence W. Spangle became Chairman of the Board and Chief Executive of Memorex, the California-based 12,000 employee manufacturer of magnetic tape, computer storage devices, and other computer-related equipment. Spangle was president of Honeywell Information Systems.



Charles Babbage's  
Analytical Engine

## CHARLES BABBAGE

The Charles Babbage Institute for the History of Information Processing was named for an Englishman whom many have called the "father" of the computer. Although Babbage died without ever successfully building either the "difference machine" or the "analytical engine" he had designed, his far-reaching efforts have been recognized as presaging the modern computer.

Charles Babbage is often portrayed as an irascible eccentric, but many believe that further research will reveal a deeper, more complex and likable individual. Anthony Hyman, who is working on a biography of Babbage (to be published by Oxford University Press) says, "At an early date it became clear to me that the common pictures both of the man and his work were hopelessly inadequate and seriously misleading." Until such time as a comprehensive, scholarly biography appears, Babbage's personality will probably be described in terms such as those used below in an article reprinted with permission from *The Illustrated Science and Invention Encyclopedia*, (London: Marshall Cavendish, 1976).

*Babbage, Charles (1791-1871). Charles Babbage was born at Totnes, Devon,\* the son of a wealthy banker. After a succession of private tutors, he entered Trinity College, Cambridge, in 1810. At this time, mathematical instruction consisted mainly of the study of Newton's works, neglecting the more recent investigations of Euler, Lacroix, and other European mathematicians. To encourage reform, Babbage and his contemporaries founded an Analytical Society.*

*In 1816, Babbage, John Herschel, and others translated Lacroix's treatise on the calculus (an important way of solving many mathematical problems), followed in 1820 by a joint work, Examples in the Differential and Integral Calculus. It was while working on these projects that Babbage wondered if machinery could be used to do some of the calculation.*

*Babbage married in 1814, and thereafter lived in London, but his married life was tragic. He was too engrossed in his work to be a good father, and of his eight children only three survived. Furthermore, his wife died in childbirth in 1827.*

*In 1822, Babbage made a model of a Calculating Machine that could add six-figure numbers. Encouraged by this success, he designed a far more elaborate*

*machine or "difference machine" for the calculation of tables, which would automatically set printing type to eliminate the chance of human error, and in 1823 the Government advanced £1500 towards the cost of making the engine. He hoped that such a machine would prevent errors occurring in mathematical and astronomical tables.*

*The work, however, went very slowly. By 1827, when it should have been finished, there was little to show, and rumours that he had put the money to his own use caused a nervous breakdown. More money was advanced, but in 1834 his skilled foreman resigned, and the machine was left unfinished.*

*Between 1835 and 1848 he worked on a new calculator, the "analytical engine," paying for it entirely from his own fortune. This too, remained unfinished at his death. In all, he had spent £20,000, a considerable amount in those days, on these projects.*

*Among his more lasting inventions were the heliograph, a signalling device using mirrors in sunlight, and the ophthalmoscope,\*\* a device for examining the interior of the eye. He was also an expert in ciphers. In 1832 he published *Economy of Manufacturers*, a widely circulated book dealing with the organization of labour. In 1827 he was appointed Lucasian Professor of Mathematics at Cambridge, but did not give a single lecture during his ten-year term.*

*An over-sensitive and tactless person, Babbage was unpopular with many of his contemporaries; the Astronomer Royal, Sir George Airy, called his first machine a "humbug." Babbage replied by writing a book attacking prominent Fellows of the Royal Society. He was born far ahead of his time, and only in an age of digital computers can his understanding of the problems of automatic calculation be appreciated.*

## WHERE WAS CHARLES BABBAGE BORN? —A FOOTNOTE

Perhaps the point is not very earthshaking, but as we were selecting the article for the Newsletter to describe Charles Babbage's life, we noticed that although *The Illustrated Science and Invention Encyclopedia* (see story above) states that Charles Babbage was born in 1791 in Totnes, Devon, Anthony Hyman, a well-known Babbage scholar, says that "Charles Babbage was born on 26 December 1791 in his father's house in Crosby Row on the Walworth Road, about 500 yards from the Elephant and Castle, now in the Borough of Southward in London."<sup>1</sup> Checking further, we found that the city of Totnes in Devonshire does indeed claim to be the birthplace of Charles Babbage, and Herman Goldstine confirms the view that Babbage was born in Devonshire.<sup>2</sup> Showing how the confusion started, Goldstine directs his readers to the biography by Mabeth Moseley<sup>3</sup> wherein she points out that Babbage himself claimed that his birth was in London, in 1792. Moseley says that Babbage was wrong—that he was

\*See story on this page about Charles Babbage's birth.

\*\*Although Babbage did build an ophthalmoscope, Herman Von Helmholtz actually invented it.

born in Totnes, Devonshire, in 1791.

Where was Babbage born? When? Whoever has any opinions, or proof, please come forward so that in the future we of the *CBI Newsletter* will not feel compelled to write such long footnotes on the matter.

<sup>1</sup>Anthony Hyman, *Computing, A Dictionary of Terms, Concepts and Ideas* (Arrow Books: London, 1976).

<sup>2</sup>Herman H. Goldstine, *The Computer from Pascal to von Neumann* (Princeton: Princeton University Press, 1972).

<sup>3</sup>Maboth Moseley, *Irascible Genius, A Life of Charles Babbage, Inventor* (London: Hutchinson & Co., 1964).

## CBI'S ARCHIVAL COLLECTION

When CBI becomes established in its permanent home at the University of Minnesota, about fifty boxes of historical material will be transferred from the office in Palo Alto to become the nucleus of the Institute's archival collection. As mentioned in earlier *Newsletters*, a low-key archival program has been in operation since the Institute was founded. Until the permanent home was known, CBI was not ready to pursue an aggressive policy of acquisition, but rather accepted only contributions which might otherwise have been lost through delay. Some of these contributions were noted in the January issue of the *Newsletter*. Since then CBI has received a great many more items, including a valuable gift from Oliver Whitby of SRI International of draft documents and working notes on the development of ERMA, which was the first automated check-processing system, and incidentally, as Dr. Whitby points out, the first timesharing system. Other unique or scarce documents have been contributed by libraries in the area and by scientists at SRI, including Ralph Keirstead, Carrol Kerns, Leonard Leving, Robert Hopkin, and Cecilia Smith.

When the historical research center is established at Minnesota, a comprehensive database for the use of scholars working in the field will be established. The main intent is not to attempt to centralize the physical location of all important documents, but rather to centralize (and then distribute) information about where things are. However, CBI will continue to collect those materials for which no other home can be found. CBI is well aware that even materials that are now plentiful should be preserved. It is very clear already that certain landmark documents once common are now scarce because their preservation was not provided for in the past.

A system for recording and making the current collection useful has been under active development and implementation. The archival consultant, Reddy Dively, has set up procedures for these functions, and processed the items received. Records of the contents will be included with the collection when it moves to Minnesota. The records include: lists of each donor's gifts, the periodicals holdings file, and a catalog of cards describing each item. From the card file it is possible to learn not only whether the Institute

possesses a particular document, but also the name of the donor, the size, color, and type of binding, and whether the item is a personal memo, technical report, product brochure, manual, or other class of information. These descriptive elements, as well as dates and report numbers, have been coded for future computer processing.

In addition, Nancy Stern, Associate Professor, Department of Administrative Computer Systems, Hofstra University, New York, and Paul Berthiaume, a CBI Trustee and President of the New York Times Information Bank, are working on an historical database prototype for CBI. This prototype will be constructed from a sample base of 200 documents. The documents selected will be abstracted and the abstracts retrievable on a free text basis. One of CBI's goals is the application of the tools of information processing to historical materials. This project brings state of the art technology to creating a resource that will help encourage history of computing scholarship.

## DIGITAL PRESS ANNOUNCES NEW SERIES

Digital Press has announced a new series of publications, the History of Computing Series, which will focus on pioneering developments in computing. These publications will present a global overview of the evolution of the computer industry, carefully examining historic American as well as landmark international efforts. Written by distinguished historians and computer professionals, the publications will examine the political, economic, and technological aspects of those vital contributions which make up the history of computing. The first two publications, *Early British Computers* and *Project Whirlwind* are described in the "Publications" Department of this *Newsletter*.

## SPEAKER'S BUREAU

In the September, 1979 *CBI Newsletter*, we included an article requesting readers to send in descriptions of talks they would be willing to give on subjects concerning the history of computing. We received a number of interesting replies, such as one from Professor Dr. B. Baron V. Freytag-Loringhoff of Tübingen, Germany, concerning his lecture on "the calculating machine of Wilhelm Schickard—Tübingen 1623." We do not have room here to include the name of everyone who wrote in, but we would like to thank you all. The speaker's bureau is going to be a valuable resource.

This project is being developed in conjunction with Joe Ann Clifton of the American Federation of Information Processing Societies (AFIPS). If you would like to receive more information about the speaker's bureau, or add your lecture to the list, you may write to her directly: Joe Ann Clifton, Litton Industries, Inc., Technical Libraries, 5500 Canoga Avenue, Woodland Hills, CA 91365, (213) 887-2678. We would appreciate it if you would also send a copy of your letter to CBI's Palo Alto address.





Antonin Svoboda

## ANTONIN SVOBODA DIES

We sadly announce that Antonin Svoboda, computer pioneer, died of a massive heart attack in Milwaukie, Oregon. He was 72. In late November, 1979, CBI conducted a six-hour oral history interview with Svoboda and that interview should prove invaluable to scholars studying the life and work of this brilliant engineer.

Born and raised in Czechoslovakia, in 1937 Svoboda and a colleague designed an anti-aircraft gun control system. Hitler crossed the border of Czechoslovakia on 15 March 1939 and the Czech Ministry of National Defense sent Svoboda abroad, anywhere, to work the anti-aircraft system against Hitler. Svoboda and his family narrowly escaped, finally making their way to France. Soon, as Hitler advanced on that country also, Svoboda fled again, this time to the United States where he became a staff member of the Radiation Laboratory at the Massachusetts Institute of Technology. There, his work included co-invention of the residue number system for computers.

In 1946, Svoboda returned to Czechoslovakia on an intended visit and was forced by the Communist regime to stay. He subsequently joined the Academy of Science and invented the computer SAPO (Samocinny Pocitac-automatic computer). The materials which Svoboda was able to obtain in Czechoslovakia for his work, such as vacuum tubes, were so unreliable that he was compelled to build into his system a high degree of redundancy and many correcting features, thereby producing the world's first fault-tolerant computer.

In 1964, Svoboda and his family again managed to escape from Czechoslovakia. He returned to the United States and spent most of the balance of his career at UCLA.

## BABBAGE LETTER PURCHASED

Alfred W. Van Sinderen, President of The Southern New England Telephone Company and a prime collector of Charles Babbage materials (See September issue of the *CBI Newsletter*, page 6), has purchased a twenty-three page letter sent by Babbage on August 8, 1854 to Alexander Dallas Bache, Superintendent of the U.S. Coast Survey.

Reached by telephone, Van Sinderen explained the significance of the letter and the circumstances of its

writing. Alexander Dallas Bache was a great-grandson of Benjamin Franklin. His grandfathers were Richard Bache, the second Postmaster General of the U.S. (succeeding Franklin) and Alexander Dallas, Secretary of the Treasury under James Madison. Bache himself was a man of many talents. One-time President of Girard College, he founded and was first President of the National Academy of Sciences. Part of his responsibility in 1854 was to administer the Lighthouse Board, of which he was a member. One of Charles Babbage's many inventions (besides the Analytical Engine, sometimes called the "first" computer) was a system for occulting lighthouses, that is, identifying lighthouses by characteristic flashes. In 1852, Babbage wrote to the U.S. Lighthouse Board describing this system and that body recommended the idea to the U.S. Senate. In 1853, the Senate passed a bill granting \$5,000 to implement Babbage's lighthouse system in the United States. Bache subsequently wrote to Babbage asking him to come to the U.S.A. and take charge of the project. In declining this offer, Babbage wrote at considerable length, telling the story of his life, and describing his extensive work on Calculating Engines.

This letter provides insight into Babbage's view of himself and his work and is an important document to students of this computing pioneer. Van Sinderen is planning to write a paper about the letter and its historical significance.

## CBI FELLOWSHIP

Only three proposals were received for CBI's 1980-81 Fellowship. These are now being evaluated by the Fellowship Selection Committee, headed by Melvin Kranzberg of the Georgia Institute of Technology, a member of CBI's Board of Trustees. The fellowship is being offered on a continuing basis. We would appreciate it if our readers would call the program to the attention of promising students and encourage them to apply.

## RESEARCH PRIORITIES

As reported in the last *Newsletter*, Nancy Stern, Associate Professor, Department of Administrative Computer Systems, Hofstra University, New York, began conducting for CBI a program under which she would identify those historical areas most in need of study and in particular, would develop priorities for selecting those pioneers who should be interviewed for the oral history program. She has concentrated on the latter half of this assignment, developing lists of individuals who worked with John W. Mauchly and J. Presper Eckert, Jr. and those involved in the early activities at Harvard University, the Moore School of Electrical Engineering at the University of Pennsylvania, the Institute for Advanced Study at Princeton, the Massachusetts Institute of Technology, Engineering Research Associates, the Bureau of the Census, the National Bureau of Standards, the Office of Naval Research, the Naval Ordnance Labs, IBM, and Bell Labs.

## PUBLICATIONS

Here is a list of interesting relevant publications that have come to our attention.

By the way, if, after reading in this *Newsletter* of Herman Lukoff's book, *From Dits to Bits*, you tried to order a copy from Robotics Press in Portland, Oregon, you were probably frustrated by the fact that neither the post office nor the telephone company seemed to know about the Press. Copies of the book can be obtained from Robotics Press, P.O. Box 92, Forest Grove, OR 97116. The price of Lukoff's book is \$12.95 plus \$1.00 for shipping and mailing.

- Selim G. Akl, "Professor Jevons and His Logical Machine" (Queen's University, Department of Computing and Information Science, Kingston, Ontario, Canada, 1980). This paper accords W.S. Jevons his proper place in the history of the evolution of computing science.
- J. Baxandall (1926), revised and updated by Jane Pugh, *Calculating Machines and Instruments* (Science Museum, London SW7 2DD, England). This contains a catalogue of the collections in the Science Museum.
- Martin Campbell-Kelly, *The Computer Age* (Wayland Publishers Limited, 49 Lansdowne Place, East Sussex BN3 1HF, England, 1978). The author surveys the development of calculating devices from the abacus to the modern computer and discusses prospects for the future. 120 pages, many pictures, £4.50
- Philip Charles Enros, "The Analytical Society: Mathematics at Cambridge University in the Early Nineteenth Century" (University of Toronto, Ph.D. Dissertation, 1979). This dissertation is an exploration, based largely on manuscript sources, into the cultural context of developments in mathematics in early nineteenth century England.
- A. P. Ershov, *The British Lectures* (Heyden and Son, Inc., 247 South 41st Street, Philadelphia, PA 19104, 1980). In the western world, Ershov is the best known of Russian software experts. A frequent visitor to the west, in October 1976 he lectured in the U.K. The texts of his lectures appear in this volume in slightly expanded form. One lecture was devoted to "An Outline of the History of Computing in the USSR" and another to "The First Soviet Compilers." 80 pages, soft cover, \$14.00.
- Douglas R. Hofstadter, *Gödel, Escher, Bach* (Basic Books, 10 E. 53rd Street, New York, NY, 1978). This unique book involves, among other things, an imaginative and playful discussion of the work of Gödel and Turing. There have been good reviews in *Scientific American* and *New York Review of Books* and the book has been awarded the Pulitzer Prize.
- Doris Langley Moore, *Ada, Countess of Lovelace* (John Murray, 50 Albemarle Street, London W1X 4BD, England, 1977). This excellent biography of "the first programmer" is based on a vast mass of documents, few of which have been published previously.
- S. H. Lavington, *Early British Computers* (Digital Press, DEC Educational Services, Crosby Drive, Bedford, MA 01730, 1980). This book centers on the pioneering work on modern computers that took place in the United Kingdom between 1935 and 1955. It closely examines the economic, political, as well as technological aspects of landmark projects of the time. Concurrent American developments are compared, highlighting the worldwide interplay of ideas. 140 pages and over 60 photographs, \$8.00.
- Kent C. Redmond and Thomas M. Smith, *Project Whirlwind, A Case History in Contemporary Technology* (Digital Press, DEC Educational Services, Crosby Drive, Bedford, MA 01730, 1980). Whirlwind—the first high speed electronic digital computer able to operate in "real time"—contributed much to today's computer technology. This book sheds new light on this critical juncture in the development of digital computers. 300 pages, 60 photographs and diagrams, \$18.00.
- Thomas M. Thompson, "From Error Correcting Codes Through Sphere Packings to Simple Groups" (Department of Mathematics, University of California, Davis—this Ph.D. thesis is available from University Microfilms, 300 N. Zeeb Road, Ann Arbor, MI 48106, tele. 800-521-0600, 1979). This dissertation follows "... the devious trail that winds its way through a quarter century of mathematics" into today's computing environment. This thesis is an excellent example of effective use of oral history. The *Annals of the History of Computing* is looking for a reviewer of the manuscript.
- *An Age of Innovation: The World of Electronics 1930-2000*. (This is a clothbound edition of the 50th Anniversary edition of *Electronics*, which was the April 17, 1980 issue. Order from *Electronics Reprints*, P.O. Box 669, Hightstown, NJ 08520, tele. 609-448-1700x5494). Written by the staff of *Electronics*, this contains ten chapters on the history of the past fifty years and five chapters looking ahead to the year 2000. Computers are given a great deal of attention. ISBN 0-07-606688-b., 288 pages, \$18.50. Discounts are given for 11 copies or more. A limited number of issues of the magazine are also available for \$9.00.
- *IEEE Transactions on Education*—The Editorial Advisory Board of the *IEEE Transactions on Education* has planned a special issue for August 1980 on the subject of the history of electrical engineering. For orders, write to *IEEE Transactions on Education*, 445 Hoes Lane, Piscataway, NJ 08854. Papers will deal with topics such as biographies of engineers, history of organizations, impact of household appliances, and electrical manufacturing.

# INVISIBLE COLLEGE DEPARTMENT

*In an influential footnote in Science Since Babylon (Yale University Press, 1975) Derek de Solla Price referred to the "new invisible college"—a set of individuals working in a specialized field of knowledge who, despite varied geographical locations, slowly get to know one another, communicating with one another where previously there had been little or no communication, interchanging ideas and information about their field, and sometimes beginning cooperative efforts. As a clearinghouse, in the past two years the Charles Babbage Institute has catalyzed the growth of the invisible college of individuals interested in the history of computing.*

*To continue the task of helping individuals find others with common interests, the CBI Newsletter is introducing the following "Invisible College" Department. In this section, we will describe the work of individuals working in the field, of relevant organizations, meetings, fellowships, or any other activities in the field that we think our readers might be interested in. Whenever possible, we will include addresses and telephone numbers so that you can directly contact any of the sources.*

In the history of science and technology, support is available from the National Science Foundation for research into the growth of the engineering and mathematical sciences; the development of scientific organizations, social institutions, and intellectual and other movements significant for understanding the growth of science and technology; various factors responsible for the development of science and technology; relationships between scientific and technological developments, particularly in the recent era; and other subjects associated with the growth of science and technology. If interested in applying for a grant, you should prepare a proposal according to instructions in NSF's *Grants for Scientific Research* booklet and submit it to: Dr. Ronald J. Overmann, Associate Program Director, History and Philosophy of Science, Division of Social Sciences, National Science Foundation, Washington, D.C. 20550.

Harvey L. Garner, Professor of Computing and Information Science at the University of Pennsylvania, has recently resigned as AFIPS's History of Computing Committee chairman. Daniel McCracken, President of the Association for Computing (ACM), a major constituent society of AFIPS, has been appointed to take his place.

In Great Britain, The Contemporary Scientific Archives Centre in Oxford collects, sorts, and catalogues scientific collections and then places these collections at an appropriate university or museum. Of the 60 catalogues published so far, four of these have been major figures in computing: Alan Turing, Stanley Gill, Christopher Strachey, and Douglas R. Hartree. The Centre was established under the joint aegis of the Royal Commission on Historical Manuscripts and the Council of the Royal Society. Its director is Margaret Gowing and its address is: Contemporary Scientific Archives Centre, 10 Keble Road, Oxford OX1 3QG, England.

The Board of Directors of the Institute of Electrical and Electronics Engineers (IEEE) approved the establishment of a new Center for the History of Electrical Engineering (CHEE) at its meeting in August 1979. Dr. Robert Friedel, formerly a professor of History of Technology at Clarkson College in New York, has been selected as the Director. He will assume his duties next August. The Center will be located in the Engineering Societies Building in New York City and the Director will be a member of the IEEE headquarters staff. The IEEE headquarters is located at 345 East 47 Street, N.Y., N.Y. 10017.

The Center activities are expected to include gathering information and compiling inventories of documents, photographs, and artifacts in the possession of individuals, companies, and educational and governmental institutions. The Center also will maintain and catalog IEEE archival records and conduct or direct oral interviews. A newsletter is planned to disseminate information on Center activities. Support for specific research projects in electrical history will be sought once needed projects have been identified. It is anticipated that the Director will play a prominent role in the planning of symposia and other activities related to the celebration of the Centennial of the IEEE (AIEE) during 1984. A major goal of CHEE will be to provide informed interpretations of electrical engineering history to an international constituency of IEEE members and to the public.

Cassette tapes (both video and audio) of a conference devoted to the History of Programming Languages (HOPL) are now available from ACM. This conference was sponsored by the Association for Computing Machinery's Special Interest Group on Programming Languages (ACM/SIGPLAN) and was held June 1-3, 1978. A brochure about the tapes is enclosed with this issue of the Newsletter.



Two studies involving the military and computers have come to our attention. The first of these is being conducted by James Hewes Jr. of the Department of the Army, The Center of Military History, Washington, D.C. 20314. His research involves an analysis of the history of the Army Ordnance Department's management of the development and construction of ENIAC at the Moore School of Electrical Engineering at the University of Pennsylvania. It is based largely on the Moore School's ENIAC archives and interviews with John G. Brainerd, who was the ENIAC Project Director; Herman H. Goldstine, who acted as liaison between the Moore School and the Ordnance Department, and Colonel Paul N. Gillon (U.S.A. ret.) who was responsible for the overall supervision of the project and for its funding.

The other study is being undertaken by Fred Shaw at the Strategic Air Command's Office of History, Offut Air Force Base, NB 68113. This study concerns SAC computers and contains chapters describing the application of data processing to management support, intelligence, and operations.

The U.S. military played a critical role in the development of computers. If any *Newsletter* readers know of any other studies concerning this role, please let us know and we will describe the projects in future issues.

Monte D. Wright, Director, History Office, NASA, Washington D.C. 20546, is interested in knowing of anyone interested in the interaction of computer technology and the space program. He would also like to know of anyone studying the development of computers built as recently as in the late 1960s—computers in general, not just space-related ones. NASA funds a major book or two on the history of space activities each year, contracting with individuals and universities or other nonprofit, educational organizations. Inquiries are invited by Dr. Wright.

Augusta Ada Byron, Countess of Lovelace (1815-1852) is known as the first computer programmer for her pioneering work on how Charles Babbage's machine might be used (see story on Charles Babbage, page 4). She described procedures necessary to solve problems using the mechanical forerunner of today's computers. Now, a new computer language has been named in her honor.

The new language, ADA, was developed through cooperation between Honeywell's Systems and Research Center in Minneapolis and Cii Honeywell Bull in Paris. It will be used by the U.S. Department of Defense as a common standard for future applications of computers embedded in United States military systems.

For more information on Lady Lovelace herself, see Doris Langley Moore's full-length biography, *Ada, Countess of Lovelace* (New York: Harper, 1977).

More and more data processing corporations are becoming aware of the value of preserving their own histories and of chronicling the development of their field. Many of these companies are instituting in-house historical programs. The historical activities of International Computers Limited (ICL) in Britain provide a good example of what a company can do to retain documentation and artifacts of its past and thereby contribute to an understanding of the growth of the data processing industry as a whole.

ICL has appointed a consultant to consider what archives material should be retained, to establish where such material is located at present and to recommend methods for chronicling it, and to consider what oral and written records should be obtained from former directors and senior executives of ICL and its predecessor companies. In addition, the corporation has already carefully preserved the statutory books of the predecessor companies, including records that date back to 1907.

Through the years, ICL has also donated specimen products to various public museums and maintained a record of what is on display. It is currently considering a museum of its own. In 1979, ICL began publishing a technical journal which should prove to be of archival interest in years to come.

The Center for History of Physics is a division of the American Institute of Physics, the membership corporation of leading American societies in the fields of physics and astronomy. The AIP Center aids the preservation and use of original source material so that future generations—and our own as well—can better understand the growth and impact of physics and astronomy in our time. The Center maintains the Niels Bohr Library, which contains an extensive collection of published works and other materials relating to the history of modern physics and astronomy. The Center also aids scientists, their families, and institutions in arranging for preserving historical source materials and carries out historical studies, notably an extensive oral history program to tape record the recollections of eminent physicists and astronomers. The Center publishes the results of its preservation and research activities, and communicates information to the public by providing resources and services to writers, educators, film makers, and others.

CBI has been in contact with the AIP Center since the Institute's inception and has used the Center as a role model in developing its own programs. Spencer Weart, Director, and Joan N. Warnow, Associate Director, have been of tremendous help to CBI, giving freely their advice and assistance, including being members of our Site Selection Committee.

The AIP Center publishes a *Newsletter* free of charge. Their address is 335 East 45th Street, New York, NY 10017.

William Aspray, Jr., CBI Fellow, gave a paper at the Annual Meeting of the History of Science Society held in New York in December, 1979. This paper, "The Growth of a Mathematical Theory of Thinking Machines," discusses the early developments of those subdisciplines of computer science known as automata theory and artificial intelligence. Aspray's thesis is that these fields developed not so much from examining the possibilities suggested by existing physical machines, but from attempts to consider how a machine could "think"—"that is, the idea of a thinking machine preceded the construction of actual machines, including electronic digital computers."

Aspray has also drafted a paper on Turing and the beginnings of computer science and has given a talk to the Wisconsin History of Science Departmental Colloquium on "Mechanism and Automata: Man's Attempt at Self-Simulation Since Descartes." He expects to have a draft of his thesis, "Logical Origins of Computer Science: The Search for Mathematical Constructibility," completed late this spring.

Aspray has accepted a position in the mathematics department at Williams College in Williamstown, Massachusetts.

Aspray, and Paul Ceruzzi, our second CBI Fellow, were both on the program of the annual meeting of the Midwest Junto of the History of Science Society at the University of Wisconsin in Madison in April. Aspray spoke on "The Conceptual Revolution in Information Processing" and Ceruzzi lectured on "The Study of the Early History of the Computer and Computation."

The Research Collections Program of the National Endowment for the Humanities has assumed responsibility for all finding aids (bibliographies, indexes, guides, etc.) projects and has a new name. The program, administered by Margaret Child, is now called the Research Resources Program and revised guidelines reflecting its new responsibilities are available. For more information, write Research Resources Program, National Endowment for the Humanities, NFAH Mail Stop 350, Washington, DC 10506.

Allan G. Bromley, of the Computer Science Department at the University of Sydney in New South Wales, Australia, has written a 25,000 word "paper" on a group of Charles Babbage's notations written during early 1838 and dealing with the design of the analytical engine. Bromley conducted his research at the Science Museum in London, studying the notations in association with Babbage's drawings and notebooks. Bromley says that he soon "formed the impression that the notations were key to understanding the designs of the analytical engine..." The paper will be ready for publication soon.

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