The Key Reporter

Books on Alexander Pope, Comets, and Ancient China Win 1986 ΦBK Book Prizes

The 1986 Phi Beta Kappa book prizes of $2,500 each were awarded to Maynard Mack, Fred L. Whipple, and Benjamin I. Schwartz at a Senate banquet in Washington, D.C., on December 5, 1986.

Mack, Sterling Professor of English Emeritus at Yale University, won the Christian Gauss Award for *Alexander Pope: A Life,* published by W. W. Norton. In awarding the prize, Gauss Committee Chairman David H. Hirsch said that the author has "made Alexander Pope come alive by bringing the age itself to life. Without being any the less an absorbing biography of a major poet, the book is a compendium of the manners and mores, the virtues and foibles, of an age. Professor Mack's analysis of Pope's poetry in the context of its classical sources enables even the casual reader to understand exactly what it means to call the first half of the 18th century the Neoclassical Age."

Whipple, who is retired from his professorship in astronomy at Harvard University and from the directorship of the Smithsonian Astrophysical Observatory, won the Science Award for *The Mystery of Comets,* published by the Smithsonian
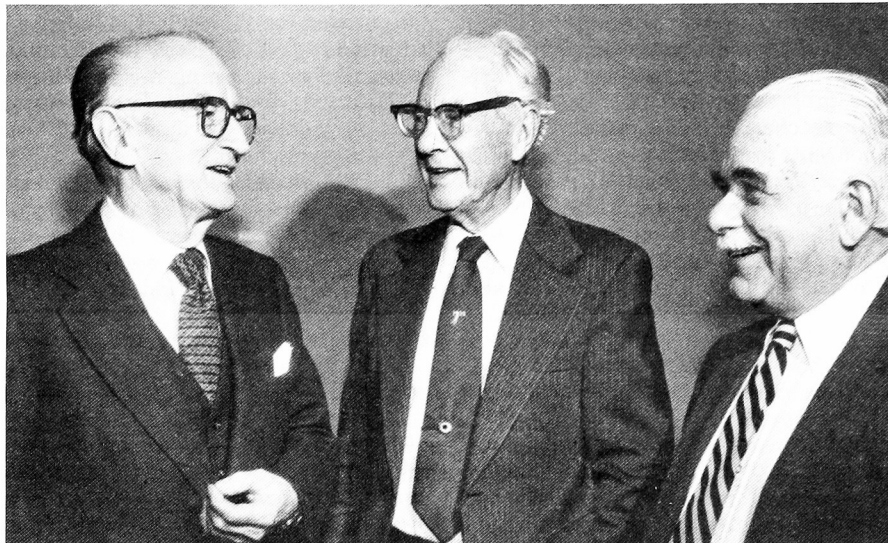

Maynard Mack, left, poses with Fred L. Whipple, center, and Benjamin I. Schwartz before the three authors received their awards at the Senate banquet in December.

Institution Press. Science Committee Chairman Niles Eldredge described this book as "a simple, clear, yet totally captivating and intriguing account of the growth of human experience and knowledge of comets. Presented as a linear mystery story, Dr. Whipple's book proceeds from the awe and fear engendered by comets as recorded in early texts, on to the early theories on the nature of comets, and moves into modern times, revealing how he and his colleagues in contemporary astronomy grapple with the mysteries of comets."

Schwartz, who is Leroy B. Williams Professor of History and Political Science at Harvard, won the Ralph Waldo Emerson Award for *The World of Thought in Ancient China,* published by the Belknap-Harvard University Press. Emerson Committee Chairman William H. McNeill commented, "Anyone who has tried to learn anything about China will be aware of the difficulty of translating Chinese texts into English or any other Western language.... Benjamin Schwartz has spent a lifetime ... seeking first to understand the Chinese classics in their own terms and then to find adequate ways of expressing their meaning in English. The Committee knows nothing of Chinese, but we do attest that the English dress Professor Schwartz has found for his account of Chinese ideas is elegant, clear, and altogether convincing."

The 1987 Phi Beta Kappa book awards are open to qualified books published between June 1, 1986, and May 31, 1987. Entries must be submitted, preferably by the publishers, by May 31, 1987. Inquiries and entries should be addressed to the appropriate award committee at 1811 Q Street, N.W., Washington, DC 20009.
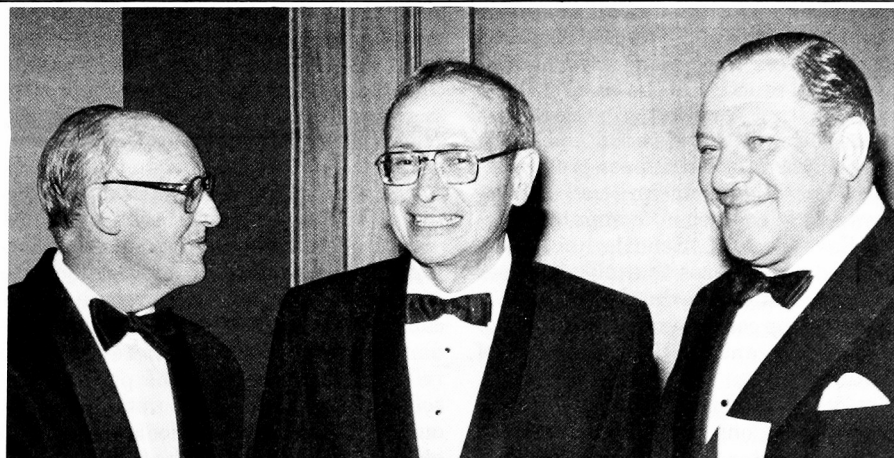
National Academy of Sciences President Frank Press, center, was the featured speaker at the Phi Beta Kappa Associates' dinner on October 25, which was a highlight of the Associates' 46th annual meeting in Washington, D.C. Stanley Frankel, left, is president of the Associates; Howard Suslak, right, served as chairman of the annual meeting. The weekend's events also included a National Symphony Orchestra concert at the Kennedy Center and a luncheon hosted by Associate Lillian Berkman at Decatur House. The next annual meeting is set for October 24–25, 1987, in New York City.

From Drill Sergeant to Intellectual Assistant

COMPUTERS IN THE SCHOOLS

By Pamela McCorduck and Avery Russell

SINCE THE INTRODUCTION of microcomputers into elementary and secondary schools in the early 1980s, stories have blossomed of children who hate school discovering the joy of learning through computing or who perform precocious intellectual feats at the keyboard. Newspaper articles herald a computer program called "Rocky's Boots," which teaches college-level mathematical concepts to children as young as seven years of age. More than 90 percent of children in the computer-based Writing to Read program sponsored by International Business Machines Corporation (IBM) in six different states can read and write above grade level after the first grade. High school students in rural Minnesota use financial spreadsheet programs to help make their family farms more efficient.

The fuss over the "computer revolution in the schools," and the high expectations it has engendered among parents and educators, recalls the excitement that swept through the education system in the 1960s and 1970s, when computer-assisted instruction, language labs, tape recorders, filmstrip projectors, and television were supposed to change the process of teaching and learning forever.

That earlier expectation was not fulfilled for a variety of complex reasons. Introduction of the machines was accompanied by mistaken notions that they would lighten the teaching load and in some cases supplant the teachers; teachers themselves were not adequately trained to use the technologies; the machines turned out to be more trouble and expense than they were worth. Many of the machines wound up in a locked closet, where they languished.

In 1980, the potential of microcomputers to improve instruction and access to education seemed enormous, yet the record of American education in using new technologies effectively gave cause for skepticism. What would happen this time? Would the microcomputer revolutionize education or become a disappointing and expensive electronic textbook?

Investigating How Computers Help Shape Learning, Teaching

To learn more about the issue, Carnegie Corporation, which has long had an interest in the educational possibilities of information technologies, commissioned Marc Tucker to look at ways in which computers, either alone or linked to video, teletext, or cable, could help shape the learning and teaching process. Tucker, former associate director of the National Institute of Education's Program on Educational Policy and Organization, was interested in the policy implications of these new developments, particularly concerning the need to prepare future workers for an economy increasingly driven by rapid scientific and technological change.

In 1981, he set out on a cross-country tour of schools, software publishers, and computer manufacturers. He also read deeply into the literature on computers in education and consulted experts in the field. Tucker's initial findings were troubling. "I discovered that conditions both within schools and in the wider society did not always favor widespread development or effective use of these technologies by the people who were expected to bring the new revolution about—the teachers and students in American schools, the software designers working for publishers or on their own, and the computer companies supplying the machines." Teachers objected to the poor quality of the programs they were supplied: the programs did not operate technically as well as they should, or the material was not clearly and logically presented. A handful of teachers and staff members were enthusiastic about using computers in the classroom, but the vast majority were legitimately concerned that the machines would turn out to be just another fad, with no real utility for teaching.

More unsettling, Tucker discovered that computers were being used mainly for drill and practice in the basic skills—something that could often be done just as well with paper and pencil and much more effectively with peer-group tutoring. The other principal use of computers was in courses in "computer literacy." Says Tucker, "Schools have been conceived of as places that offer courses in subject areas. Accordingly, schools began to develop courses in the workings of the computer and in the rudiments of programming."

Yet, as Tucker points out, neither of these applications permits students to use the computer the way a manager, a writer, a physician, or a composer would. Such professionals generally have little or no interest in how the machine works, and they do not get involved in the design of programming. Their goals are to achieve professional results—a quarterly projection, a novel, a diagnosis, a sonata—as quickly and effectively as possible. For them, the computer is a means, not an end. It is a powerful intellectual assistant that can do the dogwork, suggest alternatives, attend to possibilities that might be overlooked, remember and rearrange ideas, replace guesswork with precision, and finally, free the intellect to make new leaps to unknown places.

Problems in the Software

Educators define good software as programs that are not only free of operational bugs but are also pedagogically sound. Like good curricula and good teaching, good software enables students to accomplish an important instructional purpose and to do so in a way that engages their intellect and imagination. The best software helps students acquire a conceptual grasp of the material and, with it, an ability to pose and solve problems on their own in a particular domain. Moreover, it does these things in ways that cannot be done as well by other means.

By these definitions, good educational software does exist, although not in great supply. One kind is pedagogical—intended to teach concepts or subject matter. Another is productivity, or tool, software—such as word processing, database management systems, computer graphics, spreadsheets, and models and simulations—aimed at enhancing intellectual and problem-solving capability.

It is Tucker's belief that some of the best pedagogical software has not found a strong market in the schools because it involves group activities that sometimes have a high noise level, combines subjects in ways that violate the normal scope and sequence of the curriculum, seeks to convey concepts that the teacher may not have mastered, or is designed to raise questions in the minds of students that the teacher may not be prepared to answer. The software, in other words, does not fit the established *routines of* schools.

The market for tool software is also weak, Tucker believes, because schools and teachers have not considered adapting software originally developed for use in business to the school curriculum; because texts and teachers' guides for standard courses have not been rewritten to reflect the availability of productivity software; and because, until recently, only a handful of schools have had enough computers to make the computer-as-tool approach practical.

Who Wants Computers in the Schools?

Tucker began to wonder how and why computers got into the schools in the first

place. "I thought that if I could get a better grasp of the incentives driving educators, parents, and others, I would then have a reasonably accurate map leading to the right questions. I might be able to see how the incentives could be changed to encourage more appropriate use of the new technologies."

It turned out that computers were initially introduced in American schools not by teachers, not by administrators, not even by computer manufacturers, but by white, middle-class, mainly suburban, parents. "These were the parents," says Tucker, "who were going into the newly opened computer stores and buying one device after another to take home and find out what it could do. Parents would literally deliver a computer to the school and say to the school people, 'Do something with it.'

"Actually, the parents had no clear idea of what it might mean for kids to be competent users of the machines. What did seem clear to them, true or not, was that kids who learned computing would have a real advantage in life over kids who did not."

Inside the schools, administrators were faced with a dilemma. On the one hand, parents were demanding that schools respond to the "revolution" in computer technologies; on the other, the majority of the teachers were skeptical, even hostile, about the idea.

According to Tucker's research, school administrators chose the middle path through the dilemma. They found a way to make the computer available to the enthusiasts, while making the smallest possible demands on those teachers and students whose enthusiasm was limited.

In the early 1980s, the schools were at the tail end of a long decline in classroom population. Spare classrooms were commandeered as "computer laboratories" and outfitted with a few microcomputers loaded with drill-and-practice software. It was nearly self-explanatory and very close to workbooks for paper-and-pencil drills, making it possible for the classroom teacher to disengage altogether and leave the students in the charge of the laboratory teacher, who also did not need a great deal of training.

From the point of view of costs—capital and organizational—the use of the machines for drill and practice made sense. But for the purpose of introducing a new technology with far-reaching intellectual ramifications, it left everything to be desired. And it helped to confirm numerous doubts about the utility of the media in the schools.

The notion of "computer literacy" began to take hold in the schools with the widespread introduction of microcomputers in the 1970s, when a knowledge of programming was essential if an operator was to make the machine do anything

at all. "Productivity programs—word processing, spreadsheets, personal financial managers, data-base management—all these forms of tool software simply did not exist for microcomputers when they first appeared," says Tucker. Even so, when such programs began to emerge, they were perceived as tools of commerce—business software—having little relevance to education.

It was reasonable to assume, therefore, that the way to computer literacy and thus to computer mastery was to learn to program; and when the education world began to wake up to the possibilities of computers for instruction, this was the notion of computer literacy that was embraced. Says Tucker, "A reasonably willing teacher could pick up the rudiments of BASIC or Logo computer languages in a three-day workshop, be pronounced computer literate, and return to his or her school to lead the way. That most of these workshops taught only a beginning command of the syntax and vocabulary of a programming language was obscured."

Equating computer literacy with learning to program met other needs. Students could write their programs on paper and use the machine only to test for bugs, making the scarce and costly machines available to many.

In establishing superficial computer literacy courses, the schools were able to respond to pressures to do something about computing; and, says Tucker, it turned out to be the only viable organizational response schools could make at the time, given the fact that there were not many computers around and that few people were interested in, or trained to teach, computing. But an early pattern was established of isolating the computer from the main instructional purpose of the schools, and that pattern has since proved difficult to break.

Computer Literacy for What?

When Tucker asked school superintendents, principals, and other educators why computer literacy, as they conceived it, was taught to children, their answer often was that the children were being prepared to take their places in a high-technology society—one in which skills in computer programming would be essential for career advancement.

Tucker called on professional organizations such as the Association for Computing Machinery, the world's largest professional computing society, and other electronics industry associations, and he asked them whether teaching students beginning BASIC would indeed prepare them for a high-technology future. The answer was a resounding no. "About 300,000 people were making their living as programmers in 1983," he notes. "Experts in the business were convinced

that, although there was a temporary shortage of programmers, in time the number needed would become smaller, not larger. Although many more people would be using computers in the future, most would be using applications programs (another term for tool or productivity software) written by others. In fact, this is already happening in the work place."

Yet the assumptions that computer mastery means programming skills and that everyone should have them have been so deeply ingrained in the minds of educators that they have only recently been questioned.

In Tucker's view, real computer literacy should signify mastery over a powerful tool of intellectual and creative endeavor. A pencil is such a tool. But computer literacy courses have become tantamount to "courses in the pencil": the structure of the pencil, how to sharpen pencil points, the history and social impact of the pencil. "While this might be interesting, what children need is pencils to help them achieve something else.

"Courses in pencil use, in any event, are unavailing if students do not have the pencils in their hands," Tucker adds. "Suppose they had access to pencils for only 20 minutes a month or even 20 minutes a week. This is the situation that has faced most students with computers." When Tucker began his explorations, there were only 35,000 computers in the schools. By autumn of 1985, the number had multiplied to 1 million—still only about one computer to every 45 students in the nation.

The Computer as Intellectual Assistant

When civilizations had only shovels to dig with, most of the holes they dug were small, although certain monumental projects engaged entire societies from time to time. Once steam shovels could do that kind of work, the projects undertaken not only grew larger and more numerous, they were qualitatively different. This is known to scientists as the "order-of-magnitude effect"—when a change of ten or a hundred or a thousand times in quantity brings about a change in quality or type. The history of all successful technologies, including technologies of the intellect, whether the written language, mathematics, or computing, shows such effects taking place.

The computer, similarly, can be used in education not only to do better what used to be done passably well, but to make new things possible, believes Tucker. "Five very different examples come to mind, although the number of applications are many.

"One area is writing. As it is now, few elementary school children are taught to

organize their thoughts, to make a persuasive argument, or to express themselves clearly, and far too few high school graduates succeed in doing so. Computers make it much easier for students to write and to edit what they have written and for teachers to read and comment on students' writing—the essential conditions for learning how to write well.

"Another example is in science and technology. Computers can make it possible for students to grasp the power of scientific theory by applying it to real life. There are school labs where fourth graders learn some fundamental principles of engineering by designing, programming, and building computer-controlled devices that make use of light sensors to guide motor-driven model vehicles. There are school districts in California where high school students have built computer-controlled automatic data-gathering systems used to predict local weather in remote mountain valleys.

"A third example is in drafting. We know that computer-aided design and computer-aided manufacturing are already changing the whole notion of what it means to design and produce something, whether it is a machine part or an industrial process. Students should be learning those techniques, not the manipulation of a T-square and pencil, which cannot begin to give them the design power of computer graphics.

"A fourth example is in training for jobs in the building trades. Vocational students could be learning and using sophisticated computer-based job-costing, project planning, and management techniques, rather than the rule-of-thumb approaches commonly used in small contracting firms.

"The fifth example is in the social sciences and other areas where the tools now available for microcomputers enable students to manipulate large volumes of data and increase their capacity to analyze them. Data sets stored on disk and text files accessible by telecommunications make it possible, for example, for history or economics students to do research using the same data and texts that experts use. High school students could learn how to apply techniques of statistical analysis to many subjects in the curriculum, gaining a skill increasingly in demand in the work place."

Across the curriculum, maintains Tucker, the computer could make intellectual and creative efforts possible in art, music, mathematics, and science that are not even contemplated in schools right now.

Are children ready for it? Tucker believes they are not only ready but gloriously eager. No longer bound by the limitations of motor ability or the tedious mechanics of copying and erasing, they burst with the stories they want to tell,

with the music they hear in their heads, with the pictures they carry in their mind's eye. Elementary school children make the conceptual leaps past arithmetical equations to do college-level mathematics. Laboratory science students record a graphic display of the data from their experiments for later analysis. Music students create, edit, and play compositions for many instruments without touching a score or hiring a musician.

Fully implementing these changes would, Tucker emphasizes, require major changes in curriculums. New subject areas as well as new ways of teaching traditional subjects would have to be developed.

Teachers would have to learn computer-aided design techniques and the use of computer-aided project management systems in various fields. At all levels, teachers would quickly find out that they do not know nearly all they need to about the subject areas they thought they had mastered. "Were all these things to happen," Tucker warns, "the whole approach to teacher education would have to be reevaluated and revamped."

Computers in Higher Education

The history of computer use in higher education has been very different from that in the lower schools. Certain colleges and universities very early perceived the computer as the intellectual assistant it could be and dedicated their energies to realizing this concept. Carnegie-Mellon University has had a long commitment to computing, boasting one of the world's leading computer science departments. Its cognitive science department is relying on the computer for the investigation of human thinking processes. Its computer facilities for undergraduate use are among the most advanced in the nation. Intensive research efforts are under way there to enhance computer capabilities by adding more power and more "intelligence" to the machines.

Several years ago, the university embarked on a plan to design and develop the next generation of personal computers—a plan that will eventually cost more than $60 million and is being largely financed by IBM. These powerful personal computers will be located at work stations linked to one another and to the campus mainframe computers. Students, faculty, and staff will have easy access to the system for all purposes. Students will be able to exchange messages, homework assignments, and entire papers with other students and faculty members at any time convenient to them. Each student will have access to the library catalogue and be able to

search it in sophisticated ways. Most writing and text editing will be done on the system, with a set of specialized tools to improve organization, grammar, and spelling. The system will also handle numerical computation easily. Students can use computer simulations to test concepts and observe events that might range from the behavior of cells to the factors contributing to World War I, depending on the application software developed. In 1983, Carnegie Corporation gave the Carnegie-Mellon University a three-year grant of $1,060,000 toward the development and dissemination of educational applications for this new networked computer system.

Comparable projects are under way at Brown University, the Massachusetts Institute of Technology, and other institutions. "In the language of economists," Tucker contends, "these universities are 'capitalizing' higher education. They are doing in their industry what countless firms in other industries are doing—investing in information technology to improve productivity."

Lessons for the Schools

Tucker believes the lower schools could and should adopt approaches to computer use similar to those employed in higher education. "Technology right now is forcing fundamental changes in the world economy that inevitably will reshape the goals, financing, and structure of all of American education. We already know that the United States is having difficulty competing with countries where costs of labor, energy, and raw materials are low. To retain and bolster our share of the world market—and to maintain our standard of living—schools will have to produce a nation of workers who can take maximum advantage of information technologies in every facet of the labor market, to enhance productivity, flexibility, and creativity."

In other words, if Americans are to be genuinely prepared for a high-technology society, they must develop a broad range of sophisticated skills in technology and its applications—particularly in microchip-based technology, says Tucker. And the place where the great masses of American children can begin to be comfortable with this technology is in the schools.

Fully exploiting the potential of the computer as an intellectual assistant in the classroom will make it possible for all students to learn more, and to learn it more quickly, as the foregoing examples show. Moreover, by using computers as an aid to their studies, students stand to acquire the essential skills in computer use they will need in the work place.

But achieving these gains in student learning will, in Tucker's view, require a substantial increase in the number of

computer work stations in the schools. "Billions of additional dollars will be needed to provide just one work station for every three or four children." Improvement in student learning will also require both the creation of laboratory schools, where teachers and university researchers can work together in arriving at the most effective uses of the computer in the curriculum, and new opportunities for all teachers to develop their skills in the appropriate use of computers in their courses.

"Fortunately, although there are still formidable obstacles to overcome, the probability of meeting these requirements is substantially greater than it was just a few years ago. The states and school districts with the largest number of computers and the greatest experience in using them have been turning away from policies emphasizing computer literacy or the computer as a delivery system for instruction toward increased emphasis on policies that support the use of computers as intellectual assistants across the curriculum."

The number of computers in the schools continues to rise. When the general market for personal computers slumped in 1985, only the education segment of the market was strong. That year, 18 states provided funds to districts expressly for the purchase of computers.

Some states, notably Minnesota, have fostered school settings where teachers and researchers can work together to shape technology-based "schools of the future" focusing on the use of computers as tools or intellectual assistants. Minnesota is also among those states that have provided staff development grants to districts willing to engage teachers in planning for the use of computers in their schools.

But the proportion of computers in the schools is still far short of the desired ratio. Bills filed in the Congress to provide greater access to computers for all children, but especially to children from poor families, have languished. Many states have spent very little money for this purpose, and schools serving low-income children have fewer computers than do schools serving the well-to-do. There are not enough staff development programs to prepare teachers for appropriate computer use in the classroom. Only a small proportion of American teachers have had the opportunity for sustained work with computers.

"Both the federal government and the states have a largely unmet obligation to organize a sustained effort to support classroom teachers as they seek to make the best use of the computers coming into their schools," says Tucker. In the absence of such an effort he predicts that "it is virtually certain that the machines will be badly used in most classrooms, if they are used at all, and computers will

reading *recommended by the book committee*

RONALD GEBALLE

Quantum Physics: Illusion or Reality? Alastair I. M. Rae. Cambridge Univ., 1986. $29.95; paper, $9.95.

Quantum physics is unchallenged as the basic principle describing the structure of matter and the interactions among the fundamental particles of matter. Ever since its beginning in the mid-1920s, however, it has posed perplexing conceptual challenges to those who seek more than a machinery for calculation. One such problem is "nonlocality," the apparent influence of one part of a system on another even when there is no known interaction between them. The other is the "measurement problem," the notion that systems possess properties only when these are measured—a notion that seems to defy all capability for measurement because in principle the measuring instrument is itself a part of the quantum system. Rae offers for the lay reader a nontechnical account of the essential nature of quantum physics that causes these problems, and he describes the various solutions that have been advanced to solve them. He rejects the "outrageous leap" into mysticism taken by some writers. While stating his preferred explanation, he is far from dogmatic and regards the matter as still open.

The Fundamental Constants and the Frontier of Measurement. B. W. Petley. Adam Hilger, 1985. $49.

Near the end of the 19th century it was contended that physics had left to it only the boring task of measuring to more decimal places. Many times since, it has been forcefully brought home that precision measurement, on the contrary, opens new vistas and provokes controversy that deepens our understanding. Indeed, our best theories cannot predict numerical values of such basic quantities as the charge of the electron, Planck's constant, and the speed of light; our knowledge of the universe remains limited by our ability to measure with precision. Experimental ingenuity of the highest order, combined with deep understanding, continually leads to improved values. This book describes recent precision measurements of many kinds and in so doing cuts across the modern subdivisions of physics. Theoretical physics has been accorded much glamour; here are the guts of the subject.

Measures and Men. Witold Kula. Trans. by Richard Szreter. Princeton, 1986. $39.50.

Weights and measures are a ground on which science and technology intersect with custom, economics, sociology and law, religion, history and government. The story told by this distinguished Polish economic historian goes back to Flavius Josephus, who blamed Cain for the invention that symbolizes the loss of primeval happiness and inaugurated a history replete with struggle and injustice. The first and last of the four parts of the book treat metrology on the general, international scene. The second part deals with Poland, and the third traces developments in France that culminated with the establishment of the metric system. The progression from the 175 different land measures used in Oise and distance measured as "two bull's bellows away" to the meter defined as 1/40,000,000th part of the meridian has not yet ended; today the world's common primary standard is laser light. (We in the United States have fallen behind the rest along one path to mutual understanding among people.)

I Want to be a Mathematician: An Automathography. Paul R. Halmos. Springer-Verlag, 1985. $41.50.

"I like words more than numbers, and I always did." With this declaration, Halmos starts his story, which is neither, he proclaims, about mathematics nor about his origins and personal life. It is about his career and his reflections on professional and academic life. It is replete with gossip about mathematicians who will not be recognizable to the general reader, and it is necessarily highly personal. Nevertheless, his reflections have generality going well beyond his own discipline and his experiences in a particular selection of universities. They give a vivid account of the scholarly career today in almost any discipline.

Galileo and His Sources: The Heritage of the Collegio Romano in Galileo's Science. William A. Wallace. Princeton, 1984. $42.50.

The author, relying on early manuscripts and a study of the curricula of the Collegio Romano during Galileo's youth, finds evidence of considerable influence on his entire career. Given through his formal education an ideal of

be pronounced another technology failure in American education."

Although the early announcement of a "computer revolution" in the schools may have been premature, the recent history of computer use in the schools gives reason for guarded optimism about trends in the future. Says Tucker, "Computers (unlike language labs and film projectors) are transforming the way an increasingly information-based society works, and thus the pressure on schools from many segments of society and from within the schools themselves to make effective use of computers can only grow stronger. It will only be a matter of time before we wonder how school work ever got done without the aid of computers."

the investigative process that was scholastic in inspiration, Galileo was led by his own investigations to modify that ideal in various ways as he ran into difficulties that had to be overcome. Even in his late years, however, his writings show a degree of consonance with views found in his youthful notebooks. Wallace contrasts against prevailing doctrine Galileo's pioneering insistence that abstract mathematics can be applied to natural phenomena provided one knows how to allow for the accidental and extraneous obstacles that impede all experimentation. Here begin both the science of Mechanics and the Scientific Revolution.

Polarized Light in Nature. G. P. Können. Cambridge Univ., 1985. $32.50.

A ray of light entering one's eye has an attribute beyond color and intensity; it can possess a degree of asymmetry about its direction of travel. Rays that are asymmetric in this manner are said to be polarized. The unaided human eye is barely sensitive to the polarization of light, although many insects and other kinds of animals find use for the phenomenon. Much of the light around us, especially after it has been reflected from some surface or scattered by passage through the atmosphere, dust, or vapor, is polarized. By following Können's suggestions and using a small sheet of polaroid supplied with this book, or polarizing sunglasses or a camera filter, readers can enrich their appreciation for many natural phenomena.

Inward Bound: Of Matter and Forces in the Physical World. Abraham Pais. Oxford Univ., 1986. $24.95.

Pais, a prominent theoretical physicist, showed in his recent biography of Einstein that he has a powerful ability for combining history with exposition of physics. Here is a work of equal stature, dealing with the interval between 1895 and 1983. During this period, which begins with the opening of subatomic physics, we have journeyed toward the core of matter, reaching distances smaller by a hundred million times. Pais follows the inward path, along the "times of progress and stagnation, of order and chaos, of clarity and confusion, of belief and incredulity, of the conventional and the bizarre; also of revolutionaries and conservatives, of science by individuals and by consortia, of little gadgets and big machines, and of modest funds and big moneys." His principal intent to describe how ideas evolved is well achieved, albeit from his admittedly subjective point of view.

RICHARD N. CURRENT

The American College and the Culture of Aspiration, 1915–1940. David O. Levine. Cornell, 1986. $29.95.

Between the world wars, more and more Americans looked to higher education as the way to get ahead. But they did not enjoy anything like equal access to it, as Levine shows all too clearly. Sons of wealthy, old-stock families could expect a bachelor's degree from one of the more prestigious private institutions, which commonly limited opportunities for Jews by means of quotas. Youths of poor or immigrant background were lucky to attend one of the burgeoning but comparatively undistinguished public colleges. Here is historical perspective on the still lively question whether higher education should be considered a privilege or a right.

6

No Ivory Tower: McCarthyism and the Universities. Ellen W. Schrecker. Oxford Univ., 1986. $20.95.

Anti-Communists left their mark on academe in the 1950s. Their agitation led to the imposition of loyalty oaths and speaker bans. It caused professors and administrators to redefine academic freedom so as to deny it to those—namely, Communists—who would deny it to others. University officials cooperated with government authorities in purging faculties. Although a few of the blacklisted had no Communist connection, the great majority were or had been party members or close fellow travelers. Schrecker provides a well-documented and sympathetic account.

Ranch Life and the Hunting-Trail. Theodore Roosevelt. St. Martin's, 1985. $14.95.

At a time when his friend Owen Wister romanticized the cowboy, Roosevelt presented a realistic description of life in the cattle country, basing it on his two years' experience as a Dakota rancher. The book, originally published in 1896, supplements Roosevelt's fascinating word pictures with the classic illustrations of Frederic Remington.

Why the South Lost the Civil War. Richard E. Beringer, Herman Hattaway, Archer Jones, and William N. Still, Jr. Univ. Georgia, 1986. $29.95.

Apparently it does not satisfy many historians to say the South lost because it had too little in men and materials to start with. Certainly that explanation does not satisfy the present authors, who review all the possible causes in the most thorough and authoritative discussion of the subject yet to appear. Their surprising conclusion: defeat was due to a lack of will to win. Confederates fought harder than Americans had ever fought before, but not hard enough. "And the inadequacy of their motivation to save slavery, their only modest feeling of national distinctiveness, and their fundamentalist Christian faith explain why they did not do more."

The Insanity File: The Case of Mary Todd Lincoln. Mark E. Neely, Jr., and R. Gerald McMurtry. Southern Illinois Univ., 1986. $19.95.

Ten years after her husband's assassination Mary Todd Lincoln was adjudged insane at a trial that her son Robert had instigated. Since then, writers have disagreed as to the necessity of her commitment. Robert saved relevant letters and papers, which have only recently come to light. Neely and McMurtry, two outstanding Lincoln experts, have used these materials to fill in the gaps and correct the errors of previous accounts. They have also given a revealing perspective on the case by placing it in the context of medical jurisprudence and women's status at the time.

ANNA J. SCHWARTZ

Taxation and the Deficit Economy: Fiscal Policy and Capital Formation in the United States. Ed. by Dwight R. Lee. Pacific Research Institute for Public Policy, 1986. $34.95; paper, $14.95.

The economic effects of taxation, government spending, deficits, and other forms of hidden taxation such as federal credit activity are analyzed in this collection of essays. James M. Buchanan, one of the 18 contributors, draws on the public choice theory he originated and for which he was named the 1986 Nobel laureate in economics. In contrast to the

conventional view that a growing public debt has a positive economic effect on future productivity, Buchanan argues that public debt discourages capital formation. Because politicians find it in their self-interest to accommodate pressure group demands, he regards budget deficits as the expected result of unlimited political discretion. He therefore advocates as the quintessential fiscal reform the proposed *constitutional amendment that* would require the federal government to balance its budget. Other contributors examine the theory and evidence of the impact of the unfunded Social Security program on the direction and magnitude of private saving, the economic burden of the military sector, and the role of the political process in promoting redistributive schemes.

Social Security: Visions and Revisions. W. Andrew Achenbaum. Cambridge Univ., 1986. $19.95.

This is a historian's account of the development of the Social Security program from its roots in the Great Depression. The author traces the changes the program has undergone and discusses the problems that the existing arrangements have not confronted, including those relating to retirement age, the treatment of women and minorities, the relationship between private- and public-sector pensions, and the linkage of income maintenance and health care programs. The author advocates reforms that would magnify the welfare function of the program (although he offers no cost estimates for his proposals) and the establishment of a cabinet-level Department of Income Security. He supports giving workers the right to borrow against their future pensions to pay for training, and severing Medicare from the Social Security system. The *author's warm*-hearted viewpoint does not focus on issues of concern to economists.

Betting on Ideas: Wars, Invention, Inflation. Reuven Brenner. Univ. Chicago, 1986. $32.

In this sequel to his idiosyncratic *History: The Human Gamble* (1983), Brenner continues to explore his contention that "bets on new ideas are triggered when customary ways of behavior fail to produce expected results and lead to the perception of a loss in one's relative standing in society." Brenner predicts that people with this perception may participate in previously shunned games of chance, commit a crime, or gamble on noncustomary ideas in business, science, technology, the arts, and politics. Conversely, people whose relative standing is enhanced may take out previously shunned insurance or avoid committing a crime or betting on new ideas. He presents applications of the model to wars, facets of the Industrial Revolution, Bismarck's

introduction of progressive taxation, inheritance laws in France and England, inflation, and government expenditures. In support of these applications, Brenner quotes from a wide-ranging literature.

Economic History and the Modern Economist. Ed. by William N. Parker. Basil Blackwell, 1986. $17.95.

This *cri de coeur* of economic historians expresses the concern that the downgrading of their discipline in recent decades has impaired the education of economists. Seven economic historians and two economic theorists discuss the topic *Economic History: A Necessary Though Not Sufficient Condition for an Economist*. All agree—but for different reasons—that economic theory needs grounding in economic history and vice versa. Incidentally, readers will learn the reason why the topmost row of letters on a keyboard spell *QWERTYUIOP* rather than something else and the role of history versus theory in AT&T's divestiture of the telephone operating companies.

In Whose Interest? International Banking and American Foreign Policy. Benjamin J. Cohen. Yale Univ., 1986. $19.95.

This book attempts to define the public interest in international banking, offering proposals both to government policymakers and to banks to enable them to function more effectively. Part I discusses the internationalization of banking since 1960 and the possibility of conflict between U.S. foreign policy and banks' overseas activities. Part II focuses on four episodes: the use of Iranian deposits in U.S. banks to obtain the release of U.S. hostages; the suspension of talks to reschedule Polish debt to official creditors upon the Polish declaration of martial law; fears that OPEC deposits here would serve as an Arab money weapon; and the threat to U.S. relations with Latin American debtors posed by the continuing crisis in solving the problems of the borrowers and the lenders. Part III details actions the government and banks should take to provide structure to their relations. The author regards banks as myopic and advocates stricter supervision of international banking activity, although the agencies with responsibility for prudent regulation have been equally myopic. In stressing the advantage of bank-government consultation on possible contingencies, the author minimizes the difficulty of anticipating shocks of unknown probability.

Trends in American Economic Growth, 1929–1982. Edward F. Denison. Brookings, 1985. $31.95; paper, $11.95.

In this volume the pioneer designer of the methodology for estimating the sources of economic growth summarizes the U.S. record since 1929. Distinguishing between the growth rates of potential and actual national income, he presents tables for four output measures (total, per person employed, per hour, per unit of output) for the whole economy and for each of four sectors (nonresidential business; services of dwellings; general government, households, and institutions; and international assets) for three long subperiods (1928–48, 1948–73, and 1973–82) as well as for numerous shorter ones. Potential output is the level of real output the economy could produce at high rates of resource utilization assuming a 4 percent unemployment rate. The study focuses on the slowdown in growth since the 1948–73 period. Labor input, resource allocation, pollution abatement, safety regulations, crimes against business, and the contribution of advances to knowledge all subtracted from the level of growth attained before 1973. The author finds the outlook worrisome despite improvement since 1979 in some determinants of the slowdown.

ANDREW GYORGY

The U.S.S.R. in Third World Conflicts: Soviet Arms and Diplomacy in Local Wars, 1945–1980. Bruce D. Porter, Cambridge Univ., 1986. $9.95.

The intent of this well-documented study is to help readers to understand Soviet foreign policy in its own right rather than as issues in U.S. foreign policy. The book also contains a chapter on Soviet tactics and operations in the Third World, a list of military support facilities in the Third World used by the Soviets between 1945 and 1980, and some excellent, brief case studies including the Yemeni civil war and the Ogaden war.

On the Meaning of Victory: Essays on Strategy. Edward N. Luttwak. Simon and Schuster, 1986. $18.95.

Whereas Porter presents the tactics and operational details of the world situation, Luttwak focuses here on the recently developed geostrategic situation from the perspective of the U.S., Soviet, and Third World strategies. He argues that "there is now much more scope for third party action in the entire realm of international security" and shows how the activities of many smaller states have demonstrated the inability of greater powers to impose a modicum of order in world affairs. Chapters 9, 13, and 15 provide particularly valuable advice for achieving a militarily more rational future. Recommended only for advanced students and experts in the field.

China and the Super Powers. Roy Medvedev. Trans. by Harold Shukman. Basil Blackwell, 1986. $19.95.

Because the author concerns himself less with the "triple" balance in world affairs than with Sino-Soviet relations, this carefully written, scholarly work probably should be titled *China and the Soviet Union: Studies in Chinese Nationalism and Sinocentrism*. Medvedev's main conclusion is that "China's new leaders are wise enough to use their growing influence to reduce rather than increase international tension, and to define the 'Chinese Road' to socialism." This book will interest general readers as well as specialists.

The Harvest of Sorrow: Soviet Collectivization and the Terror-Famine. Robert Conquest. Oxford Univ., 1986. $19.95.

In this fact-filled and eminently readable book, Robert Conquest, the author of several classics in the field of Soviet "terror politics," analyzes two closely linked, frightening events: (1) the Soviet government's all-out assault, masterminded by Stalin, against the Russian peasant (*kulak*) in the 1930–33 period, in which there were 11 million immediate casualties, and (2) the systematic famine of 1932–33 in the Soviet Union, which left 5 million dead in the Ukraine and 2 million elsewhere. This reviewer deplores one weakness in this otherwise excellent study: although chapters 3 through 9 more than adequately profile the catastrophic economic picture in the Soviet Union, the overly detailed economic narrative has a distinct tendency to push the relevant political, social, and historical aspects of the tragedy into the background. More of a *human* story and fewer economic statistics would have produced an even more penetrating and fuller understanding of the terrible years of "agricultural Stalinism," the use of famine as a systematic torture weapon, and the incessant campaign of "dekulakization."

Double Talk: The Story of SALT I. Gerard C. Smith. University Press of America, 1985. $13.20.

In this instructive book, first published in 1980 and recently reissued as a paperback, the chief U.S. negotiator of SALT I draws on his own experience to illuminate the subject of arms control. The book is essential reading for everyone who seeks a better understanding of matters atomic.

LAWRENCE WILLSON

Henry Adams in Love: The Pursuit of Elizabeth Sherman Cameron. Arline Boucher Tehan. Universe Books, 1983. $17.95.

When this book first appeared, it seemed best to ignore it, principally because of its fairly lurid title, which would have scandalized Adams and his family, not to mention Lizzie Cameron and her dour senatorial mate.

Reading *(continued from page 7)*

I now think I was wrong to hide it from the membership of Phi Beta Kappa, surely less shockable than Lizzie and her "Dordy." The book is naturally dependent on gossip a century old, but it is by no means sensational and it tells the part of the Adams story that he omitted from *The Education.* Nowhere have I found a saner or more sensible account of the last year of Marian Hooper Adams's life or a clearer explanation of her suicide in 1885. Tehan shows that there was no mystery about it, nor would anybody have suspected one if Adams had not been silent on the subject. Adams emerges from the book a little battered but rather more human than sometimes he has seemed. As for Lizzie, one inclines to agree with Henry James that she was "hard, a person who sucked the lifeblood from [her] friend" even while displaying "her prettiness, grace and cleverness." Maybe Don Cameron got the best deal of the triangle, after all.

Studies in the American Renaissance, 1984; 1985. Ed. by Joel Myerson. Univ. Virginia, 1985. $35 each.

Students of American literature, especially of Emerson and his circle, must be grateful for the extension of their knowledge by the publication in these volumes of such basic Transcendentalist scriptures as the sermons of Jones Very (who was convinced that the Holy Ghost spoke through him); Elizabeth Peabody's letters to Wordsworth; the letters of Elizabeth Hoar—Elizabeth the Wise—to the Emersons and the letters to her of Charles Emerson (Waldo's brother and her fiancé, who at an early age left her in virginal widowhood from 1839 until she died, in 1878); and a packet of letters from Bronson Alcott to his hostess on several visits to Dubuque, where he was greeted "not [as] a friend but a Christ that removed scales from eyes." These are seminal volumes whose value can hardly be overstated.

Uncommon Clay: The Life and Works of Augustus Saint Gaudens. Burke Wilkinson. Photographs by David Finn. Harcourt Brace Jovanovich, 1985. $22.95.

Saint Gaudens, the son of French and Irish immigrants, rose from obscurity as a carver of cameos to become one of the towering sculptors of the late 19th century. His achievement "helped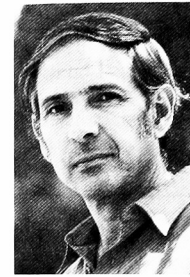 give utterance to the American Dream." After his death in 1907 he fell back into obscurity, but recently he has returned to favor in a new upsurge of patriotic pride. Americans again look with approval on such masterpieces as the figures of Admiral Farragut and General Sherman in New York, Colonel Shaw and his Negro regiment in Boston, and the hooded figure that watches above the graves of Marian and Henry Adams in Washington. Saint Gaudens composed his reminiscences late in life, but so firmly under the vigilant supervision of his wife, his son, and his niece-in-law that the book was known to some as "The Reticences of Saint Gaudens." Wilkinson's book, although somewhat inferior to Louise Hall Tharp's biography of 1969, helps to redress the balance. Wilkinson improves on Tharp through having access to the manuscript autobiography of the scornful critic Truman Bartlett and by telling in greater detail the story of Saint Gaudens's model-mistress Davida Clark and their illegitimate son.

The Harvard Book of Contemporary American Poetry. Ed. by Helen Vendler. Belknap-Harvard, 1985. $20.

From the legions of practicing poets in the nation Vendler has selected 35 who most effectively utter "the new harmonies of modern cadence." Although she omits from the roster such "earlier high modernists" as Eliot, Pound, Williams, Crane, and Moore, the first figure on her list is Wallace Stevens, who serves as a link between past and present. Most of the others will be new voices for all but the cognoscenti: Charles Simic, Rita Dove, Frank Bidart, Michael Blumenthal, and Jorie Graham, for examples. These poets sing in the language of America in the 20th century, "a language that has assimilated the syncopation of jazz, the stylishness of advertising, the technicalities of psychoanalysis, the simplicities of rural speech, the discourse of the university disciplines, the technology of the engineer, the banalities of journalism." "Each of our poets," Vendler says, "preserves some part of culture that would lapse unrecorded were it not for art." She has appended a series of brief, informative biographies of the poets to provide a kind of orientation for readers who are meeting them for the first time. No doubt some will quarrel with her choices, but they seem as good as any and better than most.

Searle to Give 4th Annual Romanell-ΦBK Lectures

John R. Searle, professor of philosophy at the University of California, Berkeley, will give a series of lectures on "Computers, Literature, and the Brain" at Berkeley on March 30 and April 1 and 6. Searle holds the Romanell–Phi Beta Kappa Professorship in Philosophy for 1986–87. The three lectures are subtitled "Cognitive Science and the Computer Meta-

John R. Searle

phor," "Literary Theory and Its Discontents," and "The Brain and Its Mind."

The professorship for 1987–88 has been awarded to Arthur C. Danto, professor of philosophy, Columbia University. *The* professorship was created to recognize the recipient's distinguished achievement and contribution or potential contribution to public understanding of philosophy.

APSA Establishes Schuck Award

The American Political Science Association has established a new annual book award for the best scholarly work published on women, gender, and politics, to be known as the Victoria Schuck Award. This award joins four other book awards: the Bunche Award in ethnic and cultural pluralism, the Woodrow Wilson in government, politics, or international affairs; the Lippincott in political theory; and the James Madison in political science.

Over the past dozen years, Victoria Schuck has reviewed 305 books and other documents for *The Key Reporter,* including the outpouring of materials on Watergate for two essays in the mid-1970s. She has also contributed to *The American Scholar.*