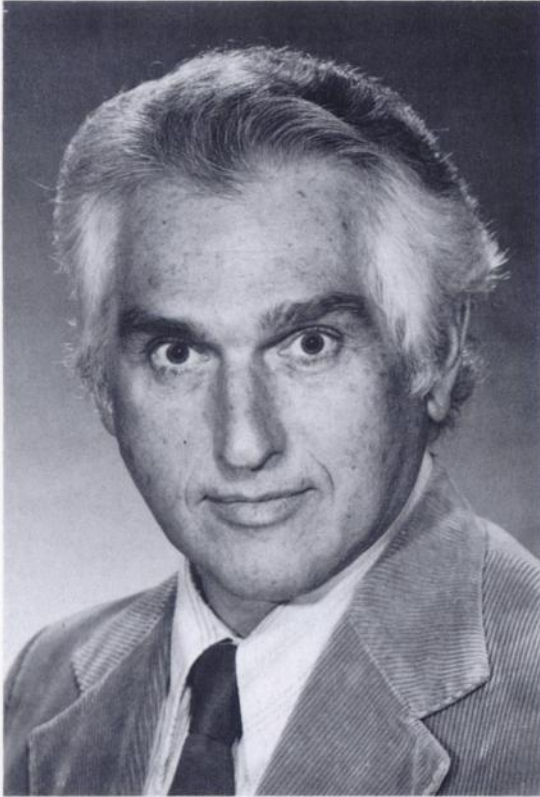


HEVESY NUCLEAR MEDICINE PIONEER LECTURE



MONTE BLAU, Ph.D.



MERRILL A. BENDER, M.D.

Much has been said of the importance of the physician-scientist team in the development of nuclear medicine. Perhaps uniquely, this concept is epitomized by the distinguished contributions of the 1980 Hevesy Nuclear Medicine Pioneers, Merrill Bender and Monte Blau. By rightfully honoring them for their scientific and medical achievements and for their long and valuable service to the Society of Nuclear Medicine, the Society honors itself.

It is unfortunate that the dignity has been stripped from the term “dynamic duo” by its ludicrous use in a comic strip, for no expression is more apt in the description of this team in its pursuit of goals that range across the entire scope of nuclear medicine. As a team and as individuals they have contributed to our increased knowledge in instrumentation, radiopharmaceuticals, and clinical nuclear medicine. As individuals they have given of themselves to public service through advisory committees, organizational officerships, and education. It is appropriate, therefore, to discuss their accom-

plishments as they were achieved—some together, and some separately.

Merrill Arthur Bender, born in Cleveland, Ohio, attended Goddard and Middlebury colleges in Vermont and received the degree of Doctor of Medicine in 1948 from Harvard Medical School. He began a rotating internship at the National Naval Medical Center in Bethesda, Maryland, in which he spent some time in psychiatry. The progression here is not clear, for next we find him beginning a residency in radiology at Bethesda; perhaps the exposure to psychiatry strengthened him for that which was to follow.

His residency was interrupted by a trip to the Far East, where he served in the 1st Marine Division Hospital in Korea. Despite the fact that he found himself behind enemy lines when his unit failed to receive word of a pull-out, by way of a circuitous route he finally made his way back to the Naval Hospital in Bethesda. Here, he directed his training toward radiation therapy, and following additional training at Francis Delafield Hos-

pital in New York, returned to Bethesda as a staff radiation therapist and head of the Radioisotope Laboratory. The first entry in his bibliography is a paper on the use of colloidal gold-198 in intracavitary therapy, which he co-authored with E. Richard King and others.

Bender's association with Roswell Park Memorial Institute in Buffalo began when he went there in 1953 as a cancer research radiologist. Certification in radiation therapy by the American Board of Radiology came in 1954, and in 1955 he became chief of the Department of Radioisotope Research at Roswell Park. Among his interests in radiation research we find imaging—two papers in 1956 on “. . . a Scintiscanner” and “Photoscanning.” Blau came to Roswell Park Memorial Institute in 1954 to work on tracer studies on antitissue antibodies and radiolabels for proteins. The team was formed when he later joined Bender in the Department of Nuclear Medicine to develop instruments, agents, and methods of tumor localization by scanning.

Bender and Blau presented a paper on scintillation scanning for a symposium at NNMC in Bethesda in October 1958. This was the first in a series of “scanning meetings” to be conducted over the next several years by the imaging fraternity, which by now was growing rapidly. Bender's 12th paper and Blau's 15th was “A Versatile, High-Contrast Photoscanner for the Localization of Human Tumors with Radioisotopes,” which appeared in the *International Journal of Applied Radiation and Isotopes* in 1959. In 1960 they co-authored a paper on localization in the pancreas, the first of several. Their combined interest both in localization mechanisms and detection instrumentation is abundantly evident; the team co-authored 29 papers in the period 1959–1972, while Bender published 16 others by himself or with co-authors in that same period.

It is likely that the strength of the team effort of our 1980 Nuclear Medicine Pioneers was greater than the sum of its parts, for they recognized very early the importance of adequate selective localization as a requirement for instrumental detection. The term “target-to-nontarget ratio” came into use and figured prominently in directing their efforts. For example, although admittedly less than optimum by today's standards, their use of mercury-203-labeled chlormerodrin for brain tumor localization represented a “first” in the deliberate selection of physical and biological properties of an agent to be used in the imaging process. Although supplanted later by the use of technetium-99m, the introduction by Blau and Bender of mercury-203 in 1962 was unquestionably the cornerstone on which the shaky house of clinical nuclear medicine was first built.

While their work continued on the development of rectilinear scanning, Bender and Blau revealed an “autofluoroscope,” a non-scanning device for tumor localization, at the Estes Park meeting of the Society in 1960. Writing later (1963), they said: “One of the major dis-

advantages of radioisotope scanning is the time required to perform the examination. Seriously ill patients are unable to lie still for the necessary period of time. . . .” They went on to describe the need for devices capable of viewing an entire organ system at one time. They identified the Autofluoroscope as a direct descendent of Hal Anger's pinhole camera, but also as a further attempt to provide higher efficiency, adequate resolution and high-contrast data presentation. Later, in efforts to couple the 294 detector crystals of the Autofluoroscope to multiple photomultiplier tubes, Bender and Blau necessarily became expert in forming plastic into weird shapes. They learned by bending toothbrush handles in hot water. They were successful in the development of the instrument to the point that it attracted commercial development and exploitation; today the commercial descendent of the Autofluoroscope, with its high-count-rate capability, figures prominently in the first-pass studies in cardiovascular nuclear medicine.

Merrill Bender became a member of the Society of Nuclear Medicine in 1956, and by 1957 was serving on the Board of Trustees. He served a second term as a Trustee from 1963–1966, and was the 15th President of the Society in 1967–1968. Outside the Society, he served on several consultant groups to the U.S. Atomic Energy Commission, including its Medical Advisory Committee (1968–1973). He was an original member of the Food and Drug Administration's Radiopharmaceutical Advisory Committee, on which he served from 1968 to 1973. All of this was done while compiling a list of 60 publications documenting a variety of contributions, an effort that is in itself noteworthy. It was also in this time period, however, that Bender gave his greatest efforts to secure the establishment of the field of nuclear medicine.

In 1968 Dr. Bender was appointed Chairman of the Society's Committee on Competence and Certification, from which position he became chairman of the Proponents of an American Board of Nuclear Medicine. The Proponents, under Bender's leadership, accomplished—against considerable difficulties—the establishment of the American Board of Nuclear Medicine, a conjoint Board of the American Boards of Medicine, Pathology, and Radiology. The Society of Nuclear Medicine, a sponsor of the Board, has honored Dr. Bender with Life Membership for his outstanding and unique leadership in this accomplishment.

Today, in addition to his affiliation at Roswell Park Memorial Institute, Bender is Clinical Professor of Nuclear Medicine at State University of New York at Buffalo. He also is a Life Member of the American Board of Nuclear Medicine and a Consociate Member of the National Council on Radiation Protection and Measurements. In 1978, he was the recipient of the First William E. Wehr Award in recognition of an outstanding career in cancer research, therapy, and education.

Monte Blau is Professor and Chairman of the Department of Nuclear Medicine at the School of Medicine, State University of New York at Buffalo. He entered professional life following the receipt of a Ph.D. in chemistry, with a major in radiochemistry and a minor in biochemistry, from the University of Wisconsin in 1952. In 1952–1953, he did archeological and geological dating by isotope measurements at Yale. Following a year at Montefiore Hospital, where he worked with calcium-45 kinetics in humans, he went to Roswell Park Memorial Institute's Biochemistry Department. By 1958 he had published 14 papers, including five on localization of antitissue and antitumor-labeled antibodies. On this first work by Blau, Day, and Pressman rests much of the current work in this reemerging field.

In 1957, Blau joined Bender and, among other accomplishments, helped develop another "first," a large-crystal photoscanner with a focusing collimator and controllable data presentation circuits for density and contrast, capable of scanning a variety of organ systems. His incorporation of selenium-75 in selenomethionine produced the first gamma-emitting analog of a natural metabolite that could be used in imaging. The introduction of mercury-203-labeled chlormerodrin was the first brain-scanning agent (and perhaps the first of any kind) with deliberately optimized gamma energy and blood clearance. The Bender-Blau Autofluoroscope made possible the first "radioangiocardiology" known to this writer; in 1963 they described the use of barium-137m in a first-pass heart study, as well as (another "first") quantitative dynamic regional function studies. The use of fluorine-18 for bone imaging, so strongly espoused by Blau, was displaced only by technetium-labeled phosphates introduced in 1971 by Subramanian and by the instrumental dependence on low-energy emitters that had developed.

The scientific contributions of Monte Blau and his colleagues and students continue. His 95 publications include 21 from 1977–1980; they range over a wide scope of instrumental and biochemical topics. The latest, in the February 1980 *Journal of Nuclear Medicine*, opens up an exciting new idea and was the subject of a teaching editorial by Michael Loberg in the same issue. In this paper Hank Kung and Monte Blau discuss "Regional Intracellular Shift: A Proposed New Mechanism for Radiopharmaceutical Uptake in Brain and Other Tissues." Loberg says: "The work of Kung and Blau has brought us much closer to the goal of developing Tc-99m radiopharmaceuticals capable of crossing the intact BBB and thereby describing cerebral function." It is fortunate for nuclear medicine that Monte Blau's prodigious productivity continues.

Monte Blau, too, joined the Society of Nuclear Medicine in 1956, serving as a Trustee from 1960–1963

and 1968–1972. In 1964–1965 he was Vice-President. He had earlier served the Eastern Great Lakes Chapter as secretary, vice-president, and president. Following a long period of service as Chairman of the Finance and Scientific Exhibits Committees and as a member of several other committees including Publications, Program, Competence and Certification and Awards, Monte Blau became the 20th President of the Society of Nuclear Medicine.

It was as a founding member and later co-chairman of the Society's Medical Internal Radiation Dose Committee that Monte Blau made some of his more lasting contributions. Each time that an estimate of absorbed dose is made, it is determined more easily and more accurately because of this committee's work.

Monte Blau has also given of himself to "community service." He has been a member of the USP Advisory Panel on Radioactive Pharmaceuticals, has served as the SNM Book Editor, as a member of the Editorial Board of the *Journal of Nuclear Medicine*, and as a World Health Organization Advisor to the Radiation Medicine Centre in Bombay, India. He is currently a member of several national-scope committees and, in addition to being chairman of the Los Alamos Scientific Laboratory Medical Isotopes Advisory Committee, serves as chairman of the New York State Bureau of Radiological Health Medical Advisory Committee.

Those of us who have known Monte Blau well cherish his fierce adherence to Polonius's advice to Laertes in Hamlet: "... This above all, to thine own self be true, And it must follow, as the night the day, Thou canst not then be false to any man. . .". In testimony thereto is his abiding disdain for the devices listed in his "How Not to Develop Radiopharmaceuticals": The No-compound Complex; The Excised Organ Exercise; The Paper Picture Ploy; The Great Zinc Mystique; The Fluorescence Fallacy; The Transplanted Tumor Trap. He is scathing in his denunciation of these malfeasances that, unfortunately, he illustrates with examples from the literature.

It is undeniably true that the state of nuclear medicine and its usefulness to humanity are the summation of the devoted work of some unique people with rare talents. To recognize these people, the Society of Nuclear Medicine began a citation that is now a high tradition, that of the Hevesy Nuclear Medicine Pioneer Award. Merrill Bender and Monte Blau, men of rare talent, prolific accomplishments and great devotion to nuclear medicine, and who have brought strength and dignity with their presence, now take their rightful place in the select company of the Nuclear Medicine Pioneers.

C. CRAIG HARRIS
Duke University Medical Center
Durham, North Carolina