

From Form to Function: A History of the Department of Biochemistry of the Albert Einstein College of Medicine

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The department of biochemistry is the oldest basic science department at the Albert Einstein College of Medicine. Its first chair, who was also the first faculty member to be appointed to the medical school itself, was hired in 1952, three years before the fledgling institution opened its doors to the first entering class. Since those early days, the department has helped shape the academic environment of the college, influencing

the selection of departmental chairs, guiding medical school admissions, and teaching courses that laid the foundation for the medical school curriculum. In this article, we summarize briefly the history of the department from its inception to the present. We review the accomplishments of each of its three chairs and discuss how the department has helped define the character of the institution as a whole.

INTRODUCTION

At 1300 Morris Park Avenue stands a bustling center of academic excellence. Nearly four thousand faculty members, students, and postdocs currently inhabit the lecture halls and laboratories of the Albert Einstein College of Medicine—and some eight thousand have passed through on their way to independent careers in medicine and science.

But Einstein was not always so grand. In 1955, the doors of the Leo Forchheimer Medical Sciences Building, the sole structure on campus, opened to 56 medical students and about 75 faculty members. Among the latter were members of the new department of biochemistry.

There are valuable lessons to be harvested from history, be it the history of a nation and its people or that of an academic institution and its constituent departments. Ygal Allon, a member of the Israeli Knesset from 1955 to 1980 and one of Israel's most eminent political leaders and military commanders, once noted: "When a people ignores its past, its present has little substance and its future is clouded in doubt." And, as the poet Carl Sandburg wrote in his only published novel, *Remembrance Rock* (1948), "We know that when a nation goes down and never comes back, when a society or civilization perishes, one condition may always be found. They forgot where they came from. They lost sight of what brought them along. The hard beginnings were forgotten and the struggles farther along."

It was with these admonitions in mind that I set out to write a history of Einstein's first basic science department.

PREPARATIONS

In the summer of 2008, Dr. Vern Schramm approached me and suggested I put together a history of the department of biochemistry. He no doubt felt that, as the

last remaining founding member of the department, I would have the expertise and the enthusiasm to tackle the project.

But I quickly became overwhelmed. How could I begin to tell the story of a department that has been in operation since the college was conceived? Members of the department of biochemistry have been leading the way in the laboratory and the classroom since the early 1950s, when we provided direction to the newborn institution by influencing the selection of departmental chairs, guiding the medical school admissions committee, and helping launch both the Graduate Division and the Medical Scientist Training Program (MSTP).

I looked to previous departmental histories for guidance. But though such accounts have appeared in this journal in the past, all chronicled the evolution of clinical departments (Barnett, 1996; Onesti, 1996; Fulop, 1997; Marx, 1998; Wassertheil-Smoller, 2001; Rapin, 2003; Fulop, 2004; Scheuer, 2004). No one had yet recounted the workings of one of Einstein's basic science departments.

So I decided to seek professional help. My coauthor, Karen Hopkin, received her PhD in biochemistry from our Sue Golding Graduate Division in 1992 and went on to pursue a career in science writing. As someone familiar with the department and its character (and characters!), she agreed to help me craft this article.

After sifting through the archival data in the college library and the departmental files pertaining to the department and its members, we came to the conclusion that we could not hope to describe in depth the science that has been carried out here over the past half century. We would not be able to do it justice. Readers who are interested in a detailed account of the academic accomplishments of the department can access a website we have prepared to provide information on the research interests and scientific contributions of the faculty, from

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the early days to the present (http://www.bioc.aecom.yu.edu/dept_history). The website also includes a list of all faculty appointees and key publications, and the thesis titles of every student who graduated with a PhD degree from the department of biochemistry. This material should give readers a sense of the scientific questions that have occupied our time over the past five decades. More information can easily be found online by curious individuals.

In this essay, we provide an overview of the department's development and its role in the evolution of the college as a whole. To assemble this account, we drew on a multitude of documents, personal correspondence, and interviews with department members, past and present. We divide the department's history into three epochs: one for each of the three chairs who have led the department of biochemistry from its inception to its present day. We will meet each chair in turn and examine his role in building a strong department and in providing leadership and services to the school. But first we provide a bit of history about how Einstein itself came to be, since, as the quotations above from Allon and Sandburg suggest, if we wish to make the most of the future, we would all do well to remember the past.

A SCHOOL IS BORN: THE FOUNDING OF THE ALBERT EINSTEIN COLLEGE OF MEDICINE

The establishment of the department of biochemistry predates the opening of the medical school to its first entering class of 56 students in the fall of 1955. Dr. Abraham White, the first chair of biochemistry and the first faculty appointment at the new medical school, was hired in the fall of 1952, three years before the college opened its doors (Figure 1). Dr. White, who also took on the role of associate dean, was ideally suited to the administrative challenge of building a new medical school from scratch. In addition to having a broad knowledge of the basic sciences—biochemistry in particular—Dr. White had previously helped to establish the medical school at the University of California, Los Angeles, where he was chair of the department of physiological chemistry from 1948 to 1951.

Dr. White was not the only early departmental appointee. The second faculty member appointed to the new school was Dr. Henry Hoberman, who was brought on as an associate professor of biochemistry just four months after Dr. White was hired. Dr. White knew Dr. Hoberman from their time at Yale University in the late 1940s. Thus, Einstein's first two faculty members were established biochemists.

The college itself was the inspiration of Dr. Samuel Belkin, the second president of Yeshiva University. He began planning what would become his "Miracle on Morris Park Avenue" in 1945 (Hartstein, 1994; Jaffe, 1996). Dr. Belkin once opined to a skeptical man of wealth, "If

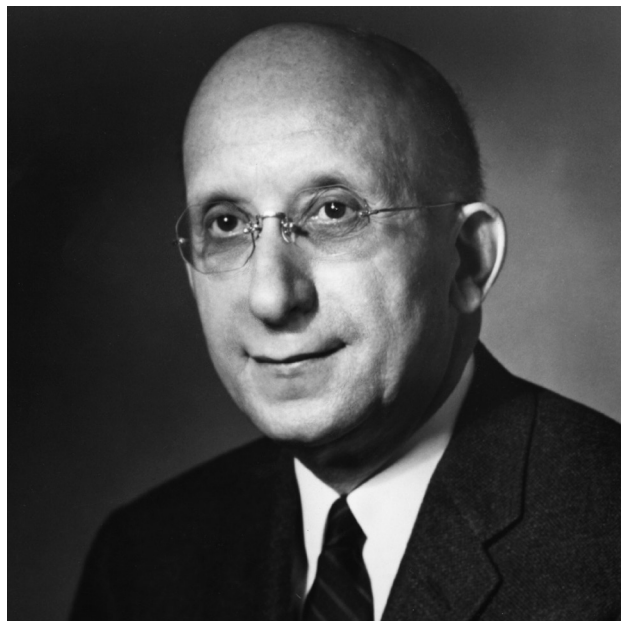


Figure 1. Dr. Abraham White, Chair of biochemistry and Associate Dean, 1953–1972. Dr. White was also the first faculty appointee at the Albert Einstein College of Medicine.

the school [Yeshiva University] does nothing else except give an opportunity to *one* student to fulfill his dreams, our work will not have been in vain. If we should succeed in giving *one* scientist the opportunity to do his research and thus enable him to convey his information and knowledge to future physicians, then our work will be of lasting importance. If we properly train *one* man and thus are instrumental in saving *one* human life, we shall then have reason to be proud of our work as if we had been able to save the entire world" (Four dimensions, 1968). That last "If only . . ." is based on a passage appearing in both the Jerusalem (Sanhedrin 4: Mishna 9) and Babylonian (Sanhedrin 37a) Talmud tractates.

So dedicated was Dr. Belkin to the cause of this "pioneering and monumental project" that he sent out personal letters of appointment to the founding faculty (http://www.bioc.aecom.yu.edu/dept_history). Early on it was agreed that the sole criterion for admission to this Jewish-sponsored medical school would be "the scholarship and character of the applicant" (Jaffe, 1996). But it wasn't until 1953 that the new medical school got its moniker. An executive committee, which included Dr. White, met with Albert Einstein at his Princeton home and convinced him to lend his name to the brand-new institution—an enterprise Professor Einstein himself declared "the greatest contribution the Jewish community has undertaken for the commonweal of the American people" (Jaffe, 1996).

But naming the college was just the beginning. "The challenge was to make sure Einstein was going to be a successful institution," says Dr. Carl Franzblau, who

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Figure 2. At the first Albert Einstein College of Medicine mass spectrometer, in the late 1950s. Dr. Henry Hoberman, seated and Dr. Sasha Englard, standing.

in 1962 was one of the first two biochemistry graduate students to be awarded a PhD by the Sue Golding Graduate Division and was, prior to his retirement, chair of biochemistry and associate dean of graduate medical sciences at Boston University. “A lot of people made a professional gamble when they decided to go to Einstein. Fortunately, it turned out to be a good bet.”

INITIAL VELOCITY: THE ABE WHITE YEARS

The school’s founding dean, Dr. Marcus Kogel, relied on Dr. White for advice in setting up this new institution. As the former commissioner of New York City hospitals, Dr. Kogel was well versed in medical administration and public health, but had less experience in academic concerns. Thus, Dr. White played a seminal role in recruiting chairs and faculty in both the basic and clinical sciences, setting a high standard for laboratory research, and guiding the new school’s educational philosophy.

In an article published in the *Annals of the New York Academy of Sciences*, Dr. White noted, “One should proceed with the staffing of a medical school on the general principle that the excellence of the faculty is the most important ingredient in the formula for the success of the school” (White, 1965). And he abided by that philosophy in staffing his own department and shaping the faculty of the school.

“Abe knew quality,” says Dr. Dominick Purpura, who as dean at Einstein from 1984 to 2006 is among the longest-serving deans at any American medical school. “He was really the academic chief in the early years.” Dr.

White helped recruit Dr. Saul Korey (director of neurology), Dr. Alfred Gilman (founding chair of pharmacology), Dr. Edward Hehre (founding chair of microbiology and immunology), and Drs. Ernst and Berta Scharrer. (Dr. Ernst Scharrer headed the anatomy department as its founding chair and first full professor.) Dr. White’s sister, who was on the faculty at the University of Denver, had recommended the Scharrers—demonstrating that Einstein’s “old boys’ network” also included women, which was highly unusual at the time. In the early 1960s, Dr. White was also influential in bringing to Einstein Dr. Harry Eagle (founding chair of cell biology and later director of the Cancer Center), Dr. Bernard Horecker (founding chair of molecular biology), and Dr. Jerard Hurwitz (founding chair of developmental biology).

Dr. White was instrumental in convincing the school that it needed a department of genetics. In 1955, he engaged in a lengthy correspondence with bacteriologist Dr. Joshua Lederberg, who subsequently won a Nobel Prize for his work on genetic recombination (http://www.bioc.aecom.yu.edu/dept_history). Dr. White hoped that Dr. Lederberg would accept a position as chair of Einstein’s nascent department of microbiology. Dr. Lederberg declined, but strongly recommended that Einstein set up a department of medical genetics, as he felt genetics was bound to play an increasingly important role in medicine in the years to come. In 1964, Einstein became the first medical school in the United States to establish such a department (<http://www.einstein.yu.edu/home/einsteinFirst.asp>).

On his home turf, Dr. White focused on building a depart-



Figure 3. Medical course laboratory exercise in the late 1950s with Dr. George Fujimoto showing medical students the proper use of a glass pipette.

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Figure 4. From left to right: Drs. Joseph Bethel, Abraham White, and Henry Hoberman, preparing to demonstrate to the medical class in the late 1950s the use of the Warburg apparatus

ment with unusual diversity in its research portfolio. Dr. Hoberman—the department’s first faculty appointee—used isotopes to probe reactions central in intermediary metabolism (Figure 2). Dr. George Fujimoto incorporated a radioactive label into the steroid ring, allowing him to trace the metabolism of various steroids, an area in which Dr. White had also made significant contributions (Figure 3). Dr. Joseph Bethel pursued his interest in protein structure (Figure 4). Dr. Bertram Lowy, who had a joint appointment in the department of medicine, focused his attention on nucleotide synthesis. Dr. Sam Seifter, who initially joined the faculty as a visiting professor but quickly became a central figure in the department, explored the metabolism of collagen. And I continued my studies on the stereospecific course of several enzymatic reactions in the citric acid cycle (Figure 2).

I brought with me the funding that turned out to be the department’s first research grant. Late in the fall of 1954, I had reapplied to the American Heart Association for a third yearlong extension of my postdoctoral fellowship at the McCollum-Pratt Institute of the Johns Hopkins University. That application was successful, and when I accepted the appointment as instructor of biochemistry at Albert Einstein College of Medicine, I asked the American Heart Association to convert the fellowship into a research grant. The association generously approved my request, and in 1955, my \$5,000 fellowship became the department of biochemistry’s first grant: “BIO.1.”

The department continued to grow. Dr. Julius Marmur augmented its expertise in nucleic acids (Figure 5). Dr. Maurice Rapport, who earlier had determined the struc-

ture of serotonin, turned his attention to lipid chemistry. Dr. Maynard Makman continued to explore the actions of cyclic AMP and dopamine in the brain. Dr. Harold Strecker brought his skills as an enzymologist to bear on amino acid metabolism. Dr. Irving Listowsky, a post-doctoral fellow in my laboratory, joined the faculty and continued to collaborate with me on studies of protein-ligand interactions and carbohydrate conformation



Figure 5. Dr. Julius Marmur, acting chair of Biochemistry, 1972–1975. Prior to joining the faculty at the Albert Einstein College of Medicine, Dr. Marmur discovered the reversible nature of DNA denaturation.

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before developing an independent research program on protein structure. Dr. Paul Gallop, who had held the position of biophysicist in the department of medicine at Long Island Jewish Hospital, followed Dr. Seifter to Einstein and was appointed associate professor of biochemistry (biophysics) in 1960. Here, in addition to pursuing his independent research activities, he continued his fruitful collaboration with Dr. Seifter on the chemistry of collagen and other structural proteins. Dr. Olga Blumenfeld, who remained active in the department for nearly fifty years, spent two years as a postdoctoral fellow in Dr. Gallop's laboratory prior to her appointment as assistant professor of biochemistry in 1962. On the advice of Dr. Harry Eagle, Dr. White recruited Dr. James Darnell, who arrived with postdoctoral fellow Dr. Jonathan Warner in 1964. Within a year, Dr. Warner was appointed assistant professor of biochemistry, and he remained a productive member of the department until 1983, when he became chair of the department of cell biology. Drs. Darnell and Warner shared with me their remembrances of those early years; their narratives are available on the website (http://www.bioc.aecom.yu.edu/dept_history).

"It was just a really exciting time to do science," says Dr. Warner, who cloned the first gene at Einstein while in the biochemistry department. "It took months to sequence this gene of 3,000 bases," he adds with a laugh, recalling his landmark study of the ribosomal protein L3. "We were using a computer that had 64K. Not M, not G. *K!* But it worked."

But it was the breadth of the department's research that made it unique. In other medical schools, chairs built departments around their own scientific interests. "But here we had people from all different disciplines—protein chemists, lipid chemists, nucleic acid researchers," says Dr. Blumenfeld. And the department also had numerous joint appointments with other departments in both the basic and clinical sciences.

"These were people who were already established in their careers," notes Dr. Robert Marion, professor of pediatrics and of obstetrics & gynecology and women's health, chair of developmental pediatrics, and director of the Children's Evaluation and Rehabilitation Center, who volunteered as an undergraduate in my laboratory for a year prior to beginning his medical studies at Einstein in 1975. "They brought with them their talents and strengths in different areas." Dr. Marmur, for example, was famous for his groundbreaking work on DNA hybridization, studies that laid the foundation for much of modern molecular biology and recombinant DNA technology.

The faculty's academic pedigrees were as impressive as their accomplishments. Several of the early appointees came from Western Reserve University's pharmacology or biochemistry departments, which were recognized

for their pioneering contributions in the areas of signal transduction and intermediary metabolism, respectively. Dr. Makman trained with Nobel laureate Earl Sutherland, who discovered cyclic AMP and adenylyl cyclase. My mentor during the last three years of my thesis work, Dr. Merton Franklin Utter, discovered and characterized phosphoenolpyruvate carboxykinase and pyruvate carboxylase, key enzymes in the gluconeogenic pathway. My postdoctoral mentor was Dr. Sidney P. Colowick, who together with Dr. Nathan O. Kaplan launched in 1955 the "Methods in Enzymology" series, which now encompasses 499 volumes. Dr. Strecker, a senior student in the department of biochemistry at Western Reserve University when I entered graduate school there, trained with Dr. Harland G. Wood, the discoverer of the heterotrophic carbon dioxide fixation known as the Wood-Werkman reaction. Dr. Strecker was also a postdoctoral fellow in 1951 in the laboratory of Prof. Hugo Theorell at the Nobel Institute in Sweden and subsequently in the laboratory of Prof. Severo Ochoa at New York University. Full biographical sketches for these faculty and the other 11 members of the first cadre of faculty appointments, which also include details of graduate and postdoctoral training, can be found at http://www.bioc.aecom.yu.edu/dept_history.

The breadth and depth of the faculty's experience "made the department a special place," says Dr. Marion. "I don't think other departments were built that way. And the philosophy was basically: continue to do what you're good at and contribute to the community."

The department of biochemistry also contributed to the Einstein community at large in many ways. Dr. Strecker was the first director of the newly conceived Sue Golding Graduate Division, which began accepting students in 1957; Dr. White, along with Drs. Eagle and Gilman, lobbied to create the MD/PhD program. "There was no MSTP program in the United States before Dr. Harry Eagle took his proposal to the NIH," says Dr. Vern Schramm, currently the Ruth Merns Chair of Biochemistry. "Einstein got one of the first MSTP programs in the country and we still have it today."

Three members of the department of biochemistry—Dr. Seifter, Dr. Lowy, and I—served many years on the medical school admissions committee and chaired the committee. Under Dr. Seifter's leadership, I served on the admissions committee for nine years and then succeeded him as chair for four years. In that capacity, I was privileged to have the loyal and dedicated assistance of Dr. Lowy, who succeeded me as the committee chair. "That really speaks to the importance of the department in the medical school," says Dr. Marion, who is current chair of the medical school admissions committee. "They [the committee staff] devoted so much time—for essentially no return. Ninety percent of the job is aggravation: people coming into your office and yelling at you because a child, relative, or acquaintance who applied did not gain



Figure 6. Dr. Sam Seifter, chair of biochemistry, 1976–1987. In addition to his commitments to teaching, research, and schoolwide committee service, Dr. Seifter founded and worked tirelessly on the *Einstein Quarterly Journal of Biology and Medicine*.

admission.” Nonetheless, I recall to this day the excitement I experienced when, during my tenure as chair of the committee, I exchanged letters with writer and Nobel Peace Prize laureate Elie Wiesel, whose nephew had applied for admission to our medical school.

But the department’s biggest contribution to the curriculum came in teaching medical biochemistry courses. Dr. White, whose *Principles of Biochemistry* was the biochemistry textbook of its day, was serious about teaching. In his *Annals of the New York Academy of Sciences* article, Dr. White noted, “As medicine becomes more and more scientific . . . it creates a demand for a strengthening of the basic scientific training of the student of medicine” (White, 1965). In his first year of teaching at Einstein, Dr. White presented all of the biochemistry lectures in the then combined Medical Biochemistry–Physiology course. He also strongly advocated the teaching of an integrated medical biochemistry/physiology course with laboratory exercises. That course formed the foundation of our first-year curriculum for the first ten years of the medical school’s existence. The school’s annual catalogs did not list separate medical biochemistry and physiology courses until 1965–66, when 149 hours in the first-year curriculum were allocated to biochemistry and 169 hours to physiology. From 1982 to 1990, the department of biochemistry also offered a separate, more clinically oriented Advanced Medical Biochemistry course for students who had already had significant exposure to biochemistry in their undergraduate education.

A strong foundation in biochemistry was, and still is, key.

“Biochemistry has historically been at the center of medical education,” says Dr. Howard Steinman, professor of biochemistry and assistant dean for biomedical science education, who organizes and teaches the basic science umbrella course, Molecular and Cellular Foundations of Medicine. “When people think of first-year medical school, they think of learning the Krebs cycle.” And biochemistry, as a subject of study, still reigns supreme. “Over the years, different departments, different courses have merged,” says Dr. Purpura. “But biochemistry has stayed pretty much on its own as a fundamental core program in every institution. It’s still the queen of the basic sciences.” Tellingly, members of the biochemistry department have led the course since Dr. White first stood at the blackboard in the spring of 1956.

The department was a hub of research activity. “There were always people coming to share our equipment,” says Dr. Franzblau, who was a student in Dr. Seifter’s laboratory. Biochemistry was the first to acquire a mass spectrometer, as well as the first optical rotatory dispersion (ORD) spectrophotometer, an instrument used to assess protein structure. Dr. Listowsky, Dr. Gad Avigad, and I used that ORD spectrophotometer extensively in our collaborative studies of the conformational aspects of a multitude of diverse carbohydrates. “Paul Gallop got one of the first amino acid analyzers,” continues Dr. Franzblau, who would run amino acid analyses in exchange for help in typing up his thesis. Of course, many of the methods were simpler back then. “We used to filter collagen preparations through cheesecloth,” says Dr. Franzblau, laughing. “It was truly bucket biochemistry—with big buckets! No one does that sort of thing anymore.”

But the heart of the department was really its members. “The camaraderie we had here, I don’t think that really existed at other places,” says Dr. Blumenfeld. “Julius Marmur would find papers for me, so I would always have reprints in my mailbox. Everyone was always so helpful. It made me feel like I was part of a community, part of a family. We had lunch and we talked and we taught and we were colleagues and friends. My life was enriched to the nth degree by being here with these people.”

STEADY STATE: THE SAM SEIFTER YEARS

In the early to mid-1970s, the school, like much of the nation at large, fell on hard times. Yeshiva University was financially strapped and instituted a freeze on hiring new faculty. With the school’s budget cuts, many of the medical school’s best, brightest, and most productive faculty members accepted positions elsewhere—including Dr. White.

In the decade that followed, the department did not experience much growth. But thanks to Dr. Sam Seifter, department members were nurtured by its prevailing great warmth (Figure 6). Dr. Seifter had taken the

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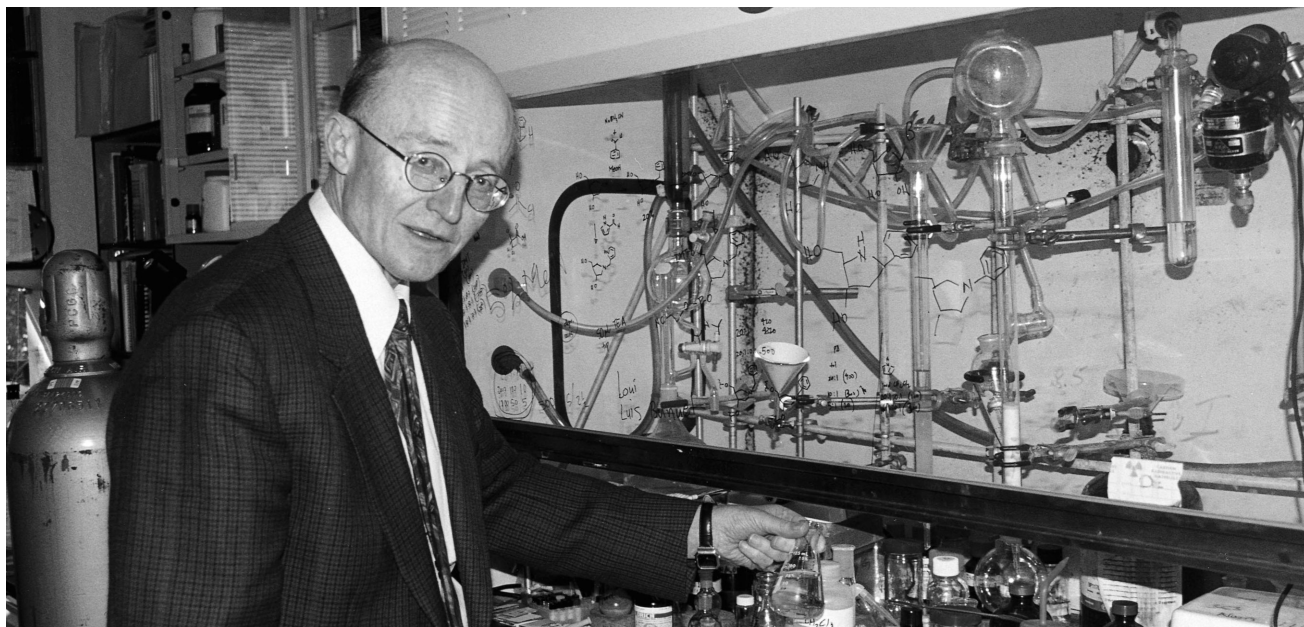


Figure 7. Dr. Vern Schramm, current chair of biochemistry. Since his arrival in 1987, Dr. Schramm has overseen an enormous expansion of the department and the establishment of core facilities in macromolecular analysis.

reins as chair in 1976, at a time when members of the biochemistry faculty experienced malaise because the spotlight had started to move from biochemistry toward the exciting new fields of molecular and cell biology. The change in focus prompted the school to divert its resources to support the departments within the division of biology, which were vigorously pursuing these new areas of research. This shift in emphasis and interest was not peculiar to Einstein. In his novel *Couples*, John Updike describes a scientist studying the biochemistry of photosynthesis: "He was wedded to the unglamorous carbon cycle while younger men were achieving fame and opulent grants in such fair fields as neurobiology, virology, and the wonderful new wilderness of nucleic acids" (Updike, 1968).

Yet Dr. Seifter did what he could to keep the department vital. When Dr. Strecker died of cancer at the age of 56, Dr. Seifter asked me to chair the search committee to recruit three new faculty members. "The starting salary was \$20,000, which is less than graduate students earn now," recalls Dr. Steinman, the only member of that triple hire who remains in the department of biochemistry. "But I remember thinking it was a kingly sum."

Space, too, was at a premium. Steinman notes in an article written in Seifter's memory, "A standing faculty joke during Dr. Seifter's chairmanship was that biochemistry was the only department where you would go to the chairman asking for an additional 400 square feet of laboratory space and leave with a plant" (Steinman, Kuperman, and Karmacharya, 2008). And Dr. Seifter did love plants. "Sam would amaze me with all the things he knew about flowers and plants and gardening," says

Dr. Franzblau. Working with departmental comrade and colleague Dr. Shizuko Takahashi, Dr. Seifter generated an extensive collection of pressed flowers—efforts that were exhibited in Einstein's Forchheimer Medical Science Building's ground-floor hallways. His knowledge of music—and his love of puns—were also put to good use. For the departmental holiday party, Dr. Seifter and his wife Eleanor would set to music the name of every person in the department, including students and staff. "For me that was a highlight," says Dr. Schramm. "They would play the piano and sing everyone's name along with a couple of words that characterized that person. It was truly incredible."

Perhaps more than anything, Dr. Seifter was a superb and dedicated teacher. "You'd have to come early to get a seat," says Dr. Franzblau of Dr. Seifter's lectures. "He just made everything so clear and so relevant." Dr. Blumenfeld agrees. "Sam was a wonderful teacher," she says. "He really loved the students." Dr. Seifter taught extensively in the Medical Biochemistry course and, in later years, he organized tutorial sessions for medical students who were having trouble with the lecture material and fundamental biochemical concepts. Based on the success of those tutorials, the school launched a department of remedial instruction, not just for biochemistry, but for all the basic science courses.

Much has been written about Dr. Seifter in this journal, which he founded, with the publication of the first issue in April 1982 under the student editorship of Lee Michael Kaplan (Kaplan, 1982). Contributors to the *Einstein Quarterly Journal of Biology and Medicine*, as it was then called, benefited from Dr. Seifter's unique and

professional editorial skills, which were widely sought after and celebrated. "There wasn't a single person in the department who didn't go in to see Sam about a paper or grant they'd written," says Dr. Franzblau. "And Sam never turned anyone away."

Dr. Seifter also instituted a tradition of honorary and memorial symposia for department faculty. Distinguished and internationally recognized scientists participated and attended these symposia to celebrate the lives and the science of their beloved colleagues. Their presence paid tribute to the stature of our faculty in the broader community. Dr. Harold Strecker's memorial symposium was addressed by Dr. Harland Wood of Western Reserve University, Dr. Severo Ochoa (at the time a distinguished member of the Roche Institute of Molecular Biology), and Dr. Alton Meister of Cornell University Medical College. Dr. Paul Gallop was remembered by Dr. Murray Goodman of the University of California, San Diego, Drs. Ephraim Katchalski-Katzir and Avraham Patchornik of the Weizmann Institute in Rehovot, Israel, and a host of colleagues from Harvard University and Einstein (In memoriam: Dr. Paul M. Gallop, 1996). Drs. James Darnell and James Watson and others shared their recollections of Dr. Marmur (In memoriam: Dr. Julius Marmur, 1996). Dr. Schramm continued this tradition by suggesting that the department sponsor a symposium celebrating the career of Dr. Marmur, which was held on May 7, 1992, and a symposium honoring Dr. Seifter's scientific contributions, held on November 7, 2002. Many of these presentations were transcribed and published in the *Einstein Quarterly* (Three decades of DNA, 1992). An entire issue of the *Einstein Journal of Biology and Medicine* (vol. 24, no. 1 [2008]) was recently dedicated to Dr. Seifter in recognition of the profound influence of his personality and intellect on members of this academic community. The programs of a number of these symposia are reproduced in the accompanying website (http://www.bioc.aecom.yu.edu/dept_history).

The scientific contributions of the department continued apace. Toward the end of Dr. Seifter's tenure as chair, however, it became clear that the department could benefit from the infusion of a number of younger talented and productive scientists. Aside from Dr. John Blanchard, who was appointed in December 1982 as instructor while still pursuing collaborative studies as a postdoctoral fellow in my laboratory, no new hires had been made in a decade. Thus Dr. Seifter and Dr. Marmur, who took on the role as acting chair from 1972 to 1975, organized a search committee and recruited Dr. Michael Brenowitz, a biophysicist who had developed a quantitative method for analyzing DNA-protein interactions. "He had already been interviewed and had accepted the position by the time I arrived," says Dr. Schramm. "His application was simply waiting for my approval." Signing off on Dr. Brenowitz's appointment was the first step Dr. Schramm took toward revitalizing the department of biochemistry.

STRUCTURE BEGETS FUNCTION: THE SCHRAMM YEARS

Dr. Vern Schramm came to Einstein by way of the Temple University School of Medicine in Philadelphia (Figures 7 and 8). He spent 16 years on the faculty there after receiving his doctorate from the Australian National University and completing postdoctoral work at the NASA Ames Research Center in California. Dr. Charles Rubin, now co-chair of the department of molecular pharmacology with Dr. Susan Band Horwitz, then a faculty member and chair of the Biochemistry Search Committee, convinced Dr. Schramm to visit Einstein. "Charlie and I were on the same NIH study section," says Dr. Schramm. "And he talked me into coming here to interview." Dr. Schramm gave a seminar and was then asked to return to meet with Dean Purpura. "But over the Christmas holidays, I went skiing with my daughters and got caught in some soft snow and broke my leg," he says. With his leg in a full cast, Dr. Schramm called off his trip to the Bronx.

Dr. Purpura was not pleased. "I wanted to get this department a chair so we could move forward," he says. "So when he said he couldn't come, I said, 'You are going to come. I'll send a limousine and the driver will carry you from the car to my office.' I wasn't going to take 'no' for an answer."

"He was very convincing," confirms Dr. Schramm, who came on board as chair of the department of biochemistry in 1987. Rather than being discouraged by the relative dearth of young faculty members, Dr. Schramm viewed the situation as "an opportunity to recruit new people in areas that Einstein obviously needed." The school, as a whole, had significant strength in the areas of molecular biology, cell biology, and genetics, he says.



Figure 8. Dr. Vern Schramm, current chair of biochemistry.

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Figure 9. Summer 2009 photograph of the department of biochemistry Faculty. Top row from left: David Schechter, David Silver, Steven Almo, Adras Fiser, Irving Litowsky, Ian Willis, Matthew Levy, Michael Brenowitz, and John Blanchard. Bottom row from left: Anne Bresnick, Steven Roderick, Mark Girvin, Maureen Charron, Vern Schramm, Jonathan Lai, Marion Schmidt, and Peng Wu. Not present: Drs. Olga Blumenfeld, Sasha England and Howard Steinman.

“But there was a paucity of mechanistic, structural, or chemical biology here at the time. We had no crystallography, no NMR to speak of, no state-of-the-art mass spectrometry, and no shared facilities. My goal in coming here was to build those facilities as a resource, not only for the department, but for schoolwide use as well. That was my mandate. And that’s what we’ve been doing.”

The facility for molecular structure analysis, for example, provides access to mass spectrometry and proteomics, structural NMR, X-ray crystallography, and macromolecular therapeutics development. “By having these shared facilities, we can really provide cutting-edge technologies to everyone at the school,” says Dr. Schramm. “So you don’t have to be an expert in everything to have expertise applied to your problem.”

The rapid growth into structural biology did require some adjustments. “These buildings were not designed to house the instruments of today,” says Dr. Schramm. “A 600-megahertz NMR machine is huge. And it has superconducting magnets, so it could erase your credit cards or stop a pacemaker if someone got too close.” Because NMR is extremely sensitive to vibration, the best place for these machines to be is resting on solid bedrock. “They had to come in with earthmoving machines and excavate part of the basement of the Ullmann building,” Dr. Schramm exclaims. The coffee shop and lockers were replaced by three NMR machines and a legion of pumps to keep the groundwater at bay. “If you go down there and look, there’s a basement level floor and then

a hole that goes down another ten feet. The machines are sitting in that hole.”

In addition to the equipment, Dr. Schramm brought in new people and accommodated them, one by one, in the space along the Morris Park Avenue side of the third floor of Forchheimer. In the early days, the medical student biochemistry laboratories were located in that space along the northern corridor of the Forchheimer building. When curriculum revisions eliminated the laboratory exercises from the medical biochemistry and physiology courses, the newly created department of molecular biology occupied that space before biochemistry claimed it for good. “We took out that whole side of the building,” says Dr. Schramm. “You could see from one end of the building to the other. The plumbing and wiring hadn’t been renovated since the building was constructed. So what we did is recruit people one at a time, build them a laboratory, put up a wall, and then recruit another faculty member.” Dr. Brenowitz was followed by Dr. Ian Willis, and then by Dr. Maureen Charron, and the department continued to expand (Figure 9). “Once you get good people, it’s autocatalytic,” explains Dr. Schramm.

The focus of the science remains the same. “We’ve tried to build in areas related to the major fields of biochemistry: proteins, nucleic acids, and metabolism,” says Dr. Schramm. But the craft has changed with the times. “It’s remarkable how archaic the old methods seem now. How slow, how macro,” says Dr. Steinman. “It used to be

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that if you purified and crystallized a protein, it was an amazing thing. Now that would be just part of a thesis.”

Dr. Schramm himself used to grow bacteria in a 300-liter tub when his laboratory needed a large quantity of a particular purified protein. “That fermenter always operated on the edge of disaster,” says Dr. Schramm. “If a single phage got in, the whole culture would turn to foam. I would grow the cultures on weekends because they smelled pretty bad and because people would get upset when there was foam spilling out into the hallways. Julie Marmur would always grab his camera whenever he caught me carrying my bucket of bacteria down the hall.

“The times change faster than you can keep up,” adds Dr. Schramm. “But we adapt so quickly, we forget what it was like before.” Some things, however, haven’t changed since the department opened its doors in the 1950s. “It seemed to me to be a place where you could get things done,” says Dr. Schramm. And the faculty and staff, students and postdoctoral fellows, keep the department scientifically vigorous—and inviting. “It’s a community of scientists that feels like a family,” says Dr. Schramm, “with people helping each other to get their science done.”

And so, more than five and a half decades after the inception of the department of biochemistry at Albert Einstein College of Medicine of Yeshiva University, we are fortunate to experience, through Dr. Vern Schramm’s energetic and dynamic leadership, a renewal of Dr. Abraham White’s characteristic optimism, excitement, enthusiasm, and hope. Truly, in a metaphoric sense we are witnessing the fulfillment of Jeremiah’s prayerful plea to “renew our days as of old”—a sentiment as fitting today as it was 2,597 years ago (Lamentations 5:21).

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