

*Presented on 4/7/01 at joint meeting of Indiana & Ohio branches of American Society of Microbiology at Nashville, IN by E.D. Weinberg*

Professor Hegeman and I are very pleased with the action taken by the Indiana Branch to honor the memory of Professor McClung. I believe that Mac was actively involved in the organization of the branch and probably served as president considerably later; probably around 1960.

You may have seen the summary of Mac's professional contributions that Dr. Hegeman and I published in ASM News last August and I have brought a copy for your archives. But what I want to do in the next few minutes is to go beyond the printed summary and recount examples of Mac's extraordinary vision and his successful efforts to establish microbiology on the Bloomington and Indianapolis campuses of Indiana University.

First I must begin in 1863 when the Merrill Land Grant Act was passed by Congress and signed into law by President Abraham Lincoln. Each state was to have a single institution of higher learning designated to receive federal funds to promote education and research in agriculture and other "practical" arts. At that time, the principal institution of higher learning in Indiana was Indiana University and it was designated to be the land grant school. But the professors of humanities who essentially were in charge of the Bloomington campus said "our institution would not dirty its hands with an applied subject such as agriculture." Fortunately, Purdue University was just then becoming established and was delighted to develop an excellent tradition of teaching and research in agriculture with the aid of federal funds.

Even as recently as 1978, when the Mineral and Mining Act sponsored by Senator Birch Bayh was passed by Congress and signed into law by President Jimmy Carter, the Bloomington campus Geology department said "we do not want an applied subject such as minerals and mining on our campus." Again Purdue University was delighted to acquire the official designation and the federal funding for a Mineral and Mining Institute. These are but two examples of the peculiar resistance of the Bloomington campus faculty to disciplines that have applied aspects.

During the first half of the twentieth century, a fine Botany department had developed on the Bloomington campus. But then and now, the faculty refused to include any aspect of plant pathology. They regarded the subject as somehow impure and associated with disease. And, of course, bacteriology was regarded by the botany faculty as a dirty, applied, smelly subject that perhaps was important in designing sewage treatment plants and in the fixation of nitrogen in cultivated soil but which should have no place on a non-applied campus.

Nevertheless, it had become apparent by 1940 that botany majors might have far better job opportunities if they were at least able to have taken a lecture and laboratory course in bacteriology. Indeed, the state of Indiana was rapidly becoming an excellent source of employment in industrial microbiology. Commercial Solvents Corporation had started in Terre Haute as early as 1917 to convert the mid-west grain surpluses into solvents by

fermentation and also later to produce riboflavin and other nutrients by microbial action. Other companies developing pharmaceuticals in the 1940s included Mead Johnson in Evansville, a Pfizer lab in Terre Haute, a veterinary products lab in Zionsville, Miles Labs in Elkhart, and, not least, Eli Lilly on McCarty Street and later on Kentucky Avenue. There would be tremendous expansion of the need for fermentation and quality control scientists within the next few years. Moreover, during the 1930s, Professor Reyniers at Notre Dame University had perfected his germ free system of raising mammals and, in the 1940s, it was primed to yield extremely important microbiological information.

Now Mac had had a rather surprising and quite unusual breadth of microbiological training as compared with other microbiology students of the 1930s. His first mentor, at the University of Texas, for his undergraduate and master's degrees was I.M. Lewis, a pioneer bacterial geneticist. Recall that it was not until the early 1950s that most bacteriologists actually started to believe that bacteria have genes. But Lewis in the 1930s had shown clearly that transmission of hereditary factors does occur in bacteria.

Then for his PhD work, at the University of Wisconsin, Mac shifted to research on clostridia. Thus he became involved with microbiology of soil, of wounds, and of foods. He completed his PhD degree at age 24 and for the next few years worked in Chicago for the American Can Company. At that time, there was much concern about heating foods in the canning process to a sufficient degree to kill spores but not to damage the structure and flavor of the product. Mac then took two post-doctorate programs in top medical microbiology units... the first with Karl Meyer in San Francisco; the second with Hans Zinsser in Boston. Thus Mac had become well aware of the broad potentials in microbiology that figuratively were to explode in the 1940s and 1950s.

When Mac arrived in Bloomington in 1940 as an assistant professor of botany, he found that the botany class laboratory rooms consisted of bare benches with no gas or water. His first action was to go to the chairperson of the chemistry department to get permission to use a chemistry class lab room for the bacteriology course. No doubt the botany faculty was relieved that Mac would be teaching his smelly lab in the chemistry rather than in the biology building. I must confess that Mac's media for growing clostridia did have a very unpleasant smell, which would be worsened by growth of the bacteria.

Mac also recognized, in 1940, that microbiology research would draw far closer to chemistry than to botany and he began to build an impressive collection of microbiological journals and monographs to be housed in the chemistry rather than in the biology laboratory. He also found an office and personal lab in the chemistry building. Within a very few years, perhaps to the relief of the botany department, Mac persuaded President Herman Wells to establish a separate department of bacteriology. Finally, the barrier to applied disciplines in Bloomington was coming down.

Fortunately, Dr. Wells' vision for the second half of the twentieth century meshed quite well with that of Mac's. Moreover, it soon became apparent that there would be no

room for expansion in the chemistry building. Mac found an attic in Kirkwood hall (a building constructed in 1895) that was being used for storage of old furniture. He obtained funds from Dr. Wells to equip the attic with water, gas, and electricity. He also was able to acquire rooms on the floor below the attic. (Perhaps the attic with its water supply might have begun to flood the lower floor thus encouraging tenants to leave.) When I arrived in 1950, Mac had even been able to dislodge a few tenants on the second floor to make room for me and another new faculty member. By this time, the department had five faculty, several doctoral and post-doctoral students and very large numbers of undergraduate majors. Clearly, students had become aware of the job opportunities in microbiology.

But when Mac had started the program in 1940, very few faculty trained in the U.S. were available. Funds for graduate education had been severely limited during the depression years of the 1930s. Fortunately, however, in the early 1940s, the U.S. experienced an influx of European refugee professionals. Thus Mac's first faculty acquisition was an Italian physician, Salvatore Luria. During his eight years in Mac's department, Luria did his Nobel Prize work, and had several post-docs, one of whom also received a Nobel Prize for separate research. Moreover, Luria was Jim Watson's major professor for Jim's pre-doctoral work. Within three years following Jim's graduation, he had published the note in Nature on the structure of DNA and shared the Nobel Prize for this with Crick and Wilkins.

Thus in a real sense, one of the geographic sites of the origin of the science of molecular genetics is the attic and third floor of Kirkwood Hall. I have proposed that a plaque noting this be affixed to an outside wall. No action was taken on my proposal. Instead, a bust of Herman Wells was placed there. This indeed is appropriate because without Wells' significant help and encouragement, Mac would not have been able to have Luria appointed, let alone given a lab with water, gas, and electricity.

During the late 1940s, Mac acquired a superb enzymologist, Irwin Gunsalus, who mentored half a dozen bacterial physiology graduate students. These quickly found employment in industrial labs and universities. But Mac had not forgotten the need to develop medical aspects of microbiology. At that time, Indiana University had a split school of medicine. The first year was taught in Bloomington; the other three in Indianapolis. But the school of medicine had neither a microbiology department nor an allied health sciences division. Microbiology was tucked into the course in pathology taught in the second year. During the early 1950s, Mac persuaded the school of medicine to establish an independent department of microbiology which was to function in Indianapolis.

In 1950, Mac acquired for the Bloomington department a faculty member, Emilio Weiss, to teach virology and immunology. During his tenure here, Weiss developed the basic aspects of cultivation and chemotherapy of Chlamydia. As you know, strains of this genus contain extremely important pathogens involved in human blindness, pneumonia, genital infections, and, not least, atherosclerosis.

I also joined the department in 1950 with the primary mission of establishing an allied health sciences division. I well remember Mac addressing the entire Bloomington faculty (which at that time numbered only about 250) in the auditorium of Rawles Hall to explain the importance of training medical, X-ray and other technologists using the basic arts and sciences at Bloomington and the clinical departments at Indianapolis. One faculty member arose and asked: "Why don't we let Purdue do it?" Mac refrained from answering that President Hovde of Purdue had a sister who was developing allied health sciences at the University of Minnesota and that Hovde thought the subject was "too vocational." (Wells had checked with Hovde before giving Mac the okay to appoint me.) I designed rigorous curricula to ensure high standards and to train excellent professionals. The programs proliferated to such a large extent that, in 1959, I transferred their administration to Indianapolis while retaining the basic arts and sciences components in Bloomington.

In the late 1950s, the school of medicine had placed all four of its years in Indianapolis, thus leaving an empty building (Myers Hall) in Bloomington. Mac worked closely with Herman Wells to establish a two-year branch of the medical school to be housed in Myers hall. Students attending the branch were encouraged to do graduate work in any of the various disciplines represented on the Bloomington campus. Because of the splendid success of this move, seven more branches were established throughout Indiana in the 1970s and 1980s. The existence of the two-year branches successfully prevented the establishment of a second four-year medical school in Indiana. Many other states regretted the lack of branches in their states because now they are saddled with two or even more medical schools. Some states noted the success of our Bloomington branch and initiated their own branches. In the 40 years of the existence of the Bloomington branch, over 1000 students have completed their first two years of medical school and several dozen advanced degrees in medical and related fields have been awarded. A number of our best physicians and surgeons in Bloomington are alums of the program. Many other alumni occupy important positions in academic medicine throughout the U.S.

From 1960 until I retired from classroom teaching in 1992, I taught medical microbiology (and in many of those years, immunology) in the medical school branch in addition to my normal course loads in Arts and Sciences courses for students in nursing, medical technology, optometry, and microbiology. The medical school teaching clearly was an overload but I could not complain because Mac likewise was very heavily involved in teaching.

Of all the faculty members Mac acquired, his finest was Walt Konetzka. Walt had completed his PhD at Maryland in 1953, and had become head of the fermentation division at Merck in New Jersey. Although this was an exciting and prestigious appointment, and although it paid twice what Mac could offer, Mac recognized Walt's great ability and love for teaching. Finally, he persuaded Walt to leave Merck. Walt arrived in 1955 and the department became an exciting place for both undergraduate and graduate experiences.

Walt subsequently received national ASM recognition for his teaching; in fact, the very first ASM teaching award. Together with Mac, he made films to be used in teaching microbiology. Also, with the help and backing of Professor Postelwaithe at Purdue, Walt developed an audio-visual beginning course laboratory. But one of the most impressive things he did, as an overload, was to develop in 1960 a lecture-laboratory course in molecular biology. It was clear that the Botany and Zoology departments were unable and unwilling to do so. Walt continued to be single-handedly responsible for the molecular biology teaching for the next several years.

In the 1960s, Mac gradually shifted his main extracurricular focus from food safety research to the training of biology teachers. In his obituary, Dr. Hegeman and I briefly described some of Mac's important contributions to incorporation of microbiology into the high school biology curriculum. Mac also put much energy into developing the ASM archives. When these outgrew the Bloomington campus library facilities, he found an excellent repository at the Baltimore campus of the University of Maryland.

Thank you again for initiating the student research award in memory of Professor McClung and for listening to these reminiscences.