

Testimony to the General Assembly
September 11, 2001
C.D. Mote, Jr., President
University of Maryland, College Park

Testimony
Maryland General Assembly
Senate Budget and Taxation Committee
Subcommittee on Education, Business and Administration
House Appropriations Committee
Subcommittee on Education and Economic Development
www.umd.edu

C. D. Mote, Jr., President
University of Maryland, College Park

September 11, 2001

I appreciate this opportunity to testify on behalf of the University of Maryland, College Park on biotechnology, a topic that is of major importance to the future of the State and the University.

First of all, I would like to thank Chancellor Langenberg, the Bioscience Working Group and staff in the system office and particularly Drs. Charles Middleton and Ruth Robertson for their hard work in preparing this comprehensive report.

I. The Astounding Growth of R&D Funding for Bioscience Research in the Federal Budget

Their report and national data all lead to one conclusion: the expected growth in the biosciences is truly remarkable; the State of Maryland has to be a leader in the biosciences to remain a competitive state; and to compete effectively the State must rely on strong universities. There is no real alternative.

Since 1971, in constant dollars, total federal R&D has increased by 36%; however, in biosciences the increase is 199%. The majority is in NIH with the bulk granted to the universities. To forward the research interests to which our federal government is committed, universities must have strength in the biosciences; no university in the 21st century can be a national leader that does not have strength in biosciences. Each institution in the USM has its role to play in the larger enterprise. Each will bring funds to the State and each will strengthen biotechnology in the State.

II. The Increasing Impact of Bioscience R&D in the State of Maryland

The State of Maryland garners a major share of the federal R&D support, which has risen from about \$4.0B in 1970 to \$8.4B in 1999 in constant 2001 dollars as shown in Figure 1*, with most of this increase beginning in the early 1980's. Between 1970 and 1999, the state's share of all federal R&D funds increased from 7% to 11%, a remarkable figure given that Maryland has only 2% of the nation's population. The rise in Maryland's share really begins in 1987, as shown in Figure 2. This dramatic increase has brought Maryland up to rank 2nd only to California in *absolute* total federal R&D funds and 1st among the states in per capita R&D funds.

Testimony to the General Assembly
September 11, 2001
C.D. Mote, Jr., President
University of Maryland, College Park

The breakdown of federal R&D support to universities and colleges in Maryland in Figures 3 shows that 44% of federal funds come to the State from Health and Human Services, far and away the lion's share, and one-third larger than DOD at 32% and dwarfing NSF at 5% and even NASA at 15%. Further, the figure titled "Federal Basic Research by Agency, FY 1970-2001" (Figure 5) shows how the HHS/NIH share of total federal R&D has increased from about \$2B in 1970 to \$11B in 2001 relative to modest change in funding in all other agencies. *About 55% of all federal research funds* are distributed through HHS. The thirty-year history displays a clear national policy of increased HHS commitments that will surely continue into the future, and universities have been, and will continue increasingly to be, the major beneficiary of these federal research dollars (Figure 6).

III. Contributions to the State's economy

Basic research, collaboration, partnerships, growth for the Maryland economy: this is the pathway for increasing Maryland's leadership role in the bioscience enterprise. The discoveries we make at the level of basic research combined with special incubator and partnership programs are fueling a growth in the biotechnology industries in the State of Maryland. The University of Maryland Technology Advancement Program (TAP) has incubated a total of 26 bioscience-related companies, including world leaders such as *Digene Corp.*, which markets the only FDA-approved Human Papillomavirus (HPV) test. Two new companies incubated in the TAP program that have recently made news are *NeuralStem Biopharmaceuticals, Inc.*, which was featured in the June 11, 2001, issue of *Fortune* magazine for the company's development of cells to replace neurons lost to otherwise incurable brain disorders ranging from Parkinson's disease to Alzheimer's, and *Chesapeake PERL*, a company incubated by TAP and developed in collaboration with Dr. William Bentley, a joint appointment with UMCP and CARB-UMBI, that changes simple insect larvae into efficient mini-bioreactors for the production of high-quality, low-cost recombinant proteins. The TAP bioscience companies have attracted more than \$250M in investment funds. Two of those companies, *Digene* and *Martek*, both post-IPO, have a combined capitalization of over \$1 billion.

The University of Maryland Industrial Partnerships (MIPS) has funded 209 bioscience-related research and development contracts with 91 companies, for a total value of \$26.3M. MIPS projects have assisted in the development of successful products such as MedImmune Inc's Synagis^(R), which treated 115,000 infants last year for a serious lower respiratory tract disease, and Nabis' NABI-HBtm, a treatment for Hepatitis B, which helped boost the company's sales to \$60M during the first quarter of 2001. On the MedImmune project, the company worked with Dr. Bradford C. Braden from Bowie State University; on the NABI project, Dr. Ramachandra S. Hosmane, from UMBC helped conduct the project.

IV. The Importance of Collaborations and Partnerships, with Examples

Testimony to the General Assembly
September 11, 2001
C.D. Mote, Jr., President
University of Maryland, College Park

Building the biotechnology industry requires all facets of the sciences. The University of Maryland, College Park is growing its bioscience focus on the strengths it has in five colleges: Life Sciences; Computer, Mathematical, and Physical Sciences; Agriculture and Natural Resources; Engineering; Behavioral and Social Sciences; and Health and Human Performance.

As the report indicates, College Park produces more graduates in the life sciences than other institutions of higher education in Maryland, by a wide margin. According to the MdBIO's figures, in the period FY96-FY99, the University graduated 2,312 bachelor's students, 145 master's students, and 397 doctoral students in the life sciences.

The educational programs we have and are developing jointly with other USM institutions are of major importance to us. Steady progress is being made on a joint Ph.D. program in Audiology with the University of Maryland, Baltimore, and a joint program with UMBI in a professional Master's of Bioengineering is being discussed. Many faculty at UMBC, UMBI, UMB, and UMCES have joint appointments and work jointly with UMCP faculty in the training of graduate students and contribute greatly to strong degree programs in a variety of areas.

An exciting example of a recent collaborative initiative is the Virology Program, a joint graduate program sponsored by the Department of Cell Biology and Molecular Genetics at the University between UMCP, CAB, USDA, VetMed, and NIH. Such an arrangement will greatly extend the intellectual and physical resources available for advanced research in virology and lead to a formal partnership with NIH. Currently such partnerships exist only between NIH and single programs at Johns Hopkins and Georgetown University. By combining with the Virologists at CAB, USDA, NIH, and VetMed, we can offer one of the top Virology Graduate Programs in the country outside the strict confines of a medical school.

The University of Maryland, College Park is interested in a range of collaborations, including, for example, participating in a center for ethnobotany under consideration at UMBI and the prospective Sloan Biotechnology Center. Provost Destler met with Provost Johnson of UMBC this summer to discuss collaborative research activities and ways to forward them. In order to promote closer working ties, Dean Allewell has met with the President, Provost, Dean of Arts and Sciences, and Department Chairs at UMBC; met with the President of UMCES; met with the Provost of UMBI; and been an active participant in meetings of the USM working group on collaboration.

As of the first of March we had more than \$1M of collaborative projects with other USM institutions, and proposals for another \$3M for collaborative projects have been submitted to funding agencies and are pending.

Because of our strengths, the University contributes significantly to a growing number of research collaborations.

For example, the Exercise Physiology program in the Department of Kinesiology (College of Health and Human Performance), headed by Professor James Hagberg, has \$7 million in NIH

Testimony to the General Assembly
September 11, 2001
C.D. Mote, Jr., President
University of Maryland, College Park

funding to evaluate common genetic variations that alter the the risks for older individuals to develop age-associate diseases. This group collaborates intensely with investigators at the University of Maryland School of Medicine in Baltimore, the Baltimore VA MedicalCenter, the University of Pittsburgh, and the National Institute on Aging. One portion of the study has resulted in the discovery that individuals with high cholesterol who have certain gene variations can benefit substantially from exercise training.

Another example can be found in the partnerships with major federal laboratories. A new Joint Institute for Food Safety and Applied Nutrition is a multidisciplinary research, education, and outreach program between the University of Maryland and the US Food and Drug Administration. This Institute will be housed in a new \$80 million facility constructed adjacent to the University of Maryland Campus that is already being expanded. JIFSAN is the FDA's signature effort in leveraging with academic institutions and was so recognized in the President's Food Safety Initiative. Involving researchers from the Colleges of Life Sciences and Agriculture and Natural Resources, education and research will be conducted in four major areas: microbial pathogens and toxins, food constituents and applied nutrition, animal health sciences and food safety, and risk analysis. Maryland's strength in all these areas was one of the drawing cards for this model partnership.

The universities in the System work together to bring their special strengths to problems in which they have common interests. For example, Dr. Dianne O'Leary, Professor in Computer Science and UMIACS (University of Maryland Institute for Advanced Computer Studies), and Dr. Amitabh Varshney, Associate Professor in Computer Science and UMIACS, at University of Maryland, College Park, have been involved in collaboration with Dr. John Moulton, of the Center for Advanced Research in Biotechnology (CARB) at UMBI on a significant research project to determine protein structures. The goal is to establish a computer model for determining protein structures. Following the sequencing of the human genome, the next most important step for basic research is to understand the function of proteins. What specific proteins in the genes are associated with specific diseases? What pharmaceutical interventions are possible? The results of this effort could mean a major breakthrough in moving the biosciences closer to intervention in diseases.

These are just a few illustrations of the collaborations that are of major importance in the biosciences, and the USM report gives many other examples.

V. Major recommendations in the USM report

The USM report makes a number of important recommendations in terms of coordinating education and curricular initiatives and outreach activities within the System. At the University of Maryland, College Park, we believe the following recommendations would be particularly

beneficial in furthering our partnerships with System institutions, industry, and the federal laboratories.

Testimony to the General Assembly
September 11, 2001
C.D. Mote, Jr., President
University of Maryland, College Park

A Maryland Biotechnology Board of Advisors. Biotechnology in Maryland is to the point where we need advice and counsel from national leaders, from both within and outside Maryland.

Maryland Academy of Biosciences. This would enable undergraduate students to learn about research and educational opportunities on other campuses.

"Fast track" training at the Master's level. For example, the Smith School of Business is developing an MBA designed specifically for the biotech industry.

Articulation programs with community colleges. For example, our Bitmap program, funded by NIH, brings 15-20 community college students to College Park for a summer program designed to enable them to learn about and prepare for completing an undergraduate degree in Biology. We're also very excited about our Biology and Business programs at Shady Grove, which articulate with two year Associate programs at Montgomery and other community colleges.

Web based programs such as our Master's in Life Science program, designed for high school teachers, but also highly relevant to employees in the biotech industry.

Five- year B.S. programs with one year internships in industry. Many schools of engineering have offered these kinds of programs for several years and they have been highly successful.

Mechanisms, such as that proposed with the K-16 Maryland Partnership for Teaching and Learning, to work with our public schools to provide outstanding educational opportunities for our students. We have developed at College Park a double major in Biology and Education (as well as Physics and Mathematics) to prepare our students to teach mathematics and science in our public schools.

VI. Unique Contributions of University of Maryland, College Park

The University of Maryland, College Park's special contributions are built on its strength across many colleges and disciplines. Graduate education programs are taking advantage of our unique proximity and special relationships to such leading federal agencies as NIH and FDA, as noted in our examples of partnerships. The University is the first Land-Grant College in the State with an internationally-known College of Agriculture and Natural Resources, whose faculty conduct research related to animal and plant growth and development and diseases that often translates into basic bioscience discoveries. We also have developed degree programs that allow our graduates to work with Maryland faculty and with star researchers in federal agencies. We share a fence with BARC, the largest agricultural research center in the country and are involved in many collaborative activities with researchers from its labs.

September 11, 2001

University of Maryland, College Park
Testimony on Bioscience Collaboration
President C. D. Mote, Jr.

The doctoral program recently established between the Maryland Neuroscience and Cognitive Sciences program and the National Institute for Deafness and Hearing Disorder has been acclaimed a national model for joint programs. Based on our special strength in Computer Sciences (our department is ranked 11th in the nation), and our unique and nationally-known UM Institute for Advanced Computer Studies, the University is taking the lead in developing a Center for Computational Biology and Bioinformatics that will put the university and the State at the forefront of the next wave of discovery in the biosciences.

The life sciences disciplines are among the popular majors for undergraduates, and are a primary source for the workforce in the State in this area. We rank 11th nation wide in the total minority bachelors degrees in the biosciences.

Our current education and research strengths will be stymied unless we obtain a building of sufficient size and design to house the burgeoning research and teaching activities that accompany a growing bioscience focus. We have the college leadership in place; we have initiated an aggressive recruiting effort for top scholars; we have collaborations across many disciplines on campus, with other institutions in the USM, and new and growing partnerships; and we are a primary factor in the State's growing leadership in biosciences. The proposed research building will allow us to play an appropriate role.

VI. Conclusion

In conclusion, building strong bioscience programs in the System is in the interest of the State and the University and is our highest priority. Great universities are essential for the State's participation in the coming age of bioscience discoveries, and we intend to build our strength in biosciences so that we can take advantage of the incredible opportunities that exist for universities and compete effectively in this field that dominates research funding in the country. Collaborations will strengthen our education programs and our contributions to the workforce in this labor intensive industry; promote research activities of the highest caliber; and enhance the State's position. Support for this effort should be a major commitment of the General Assembly.

* The attached charts included in this commentary are taken from the Website of the American Association for the Advancement of Science, which tracks the historical growth by type of federal R&D funds, the source of funding, and the category of recipients. Charts also are included from the AAAS website showing distribution of funds by state. To review this and other interesting data, consult the Website at www.aaas.org/spp/dspp/rd/guihist.htm.