



**Report of the**

**Task Force on the Life Sciences**

**The Ohio State University**

**September 21, 2009**

## Task Force on the Life Sciences Report

### Preface

*This report presents the main findings and recommendations of the Task Force on the Life Sciences. The accompanying document, Summary of the Work of the Task Force, provides the supporting information on which the findings and recommendations are based. It describes and summarizes the activities of the task force and its working groups over the last year. It also gives links to the reports of the working groups and other relevant documents such as internal and external presentations made to the task force. Taken together, the material constitutes the record of task force efforts and provides a base for implementation activities.*

### Origin of the Task Force

The Task Force on the Life Sciences is a consequence of the university-wide review of doctoral programs at Ohio State carried out by the Graduate School and reported in April 2008. As that report stated:

*The highest priority finding for Ohio State to emerge from the assessment of doctoral programs is that there are critical issues about the organization and administration of the multiple doctoral and research efforts in the biological and life sciences across the university. These must be addressed for the university as a whole to achieve the enormous potential it has to be a world leader in these fields, which include some of the most important scientific and health challenges of the 21<sup>st</sup> century. More than 500 faculty members from 12 colleges and schools are involved just in the six interdisciplinary graduate programs in the life sciences.<sup>1</sup> In addition, there are five doctoral programs in the biological sciences and 11 in the health sciences. Ohio State has made a large investment in building new facilities and recruiting top-ranked researchers for these programs. By optimizing the organizational and administrative arrangements to enable the faculty and their students to work at their full potential, Ohio State has the opportunity to develop unique and cutting edge research and graduate programs and achieve world-wide prominence.*

Based on these findings, Provost Joseph Alutto established the task force<sup>2</sup> in July 2008 with the charge to

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<sup>1</sup> This task force focused its work on the four interdisciplinary graduate programs in Biochemistry; Biophysics; Molecular, Cellular, and Developmental Biology; and Neuroscience and did not address the Environmental Sciences Graduate Program or OSU Nutrition.

<sup>2</sup> Originally called the Task Force on the Biological and Life Sciences, we changed the name to Task Force on the Life Sciences for brevity and to cover all life sciences activity on campus.

- *Identify how Ohio State's graduate level education, especially at the doctoral level, and research in the biological and life sciences should be optimally configured.*
- *Recommend appropriate organizational processes and arrangements to support high-quality doctoral educational and research efforts. The task force will look at overarching research themes, existing strengths, and opportunities for Ohio State.*

The membership of the task force was chosen to include appropriate representation across the biological and life sciences at both the faculty and dean levels to enable coordination of all related activities.

The task force was co-chaired by **Joan R. Leitzel**, Interim Executive Dean for Arts and Sciences and Vice Provost, and **Patrick S. Osmer**, Vice Provost for Graduate Studies and Dean of the Graduate School. Members include:

**Mark A. Bennett**, Professor, Department of Horticulture & Crop Science  
**Kathleen A. Boris-Lawrie**, Professor, Department of Veterinary Biosciences  
**David L. Denlinger**, Distinguished University Professor, Department of Entomology  
**Jeffrey L. Firkins**, Professor, Department of Animal Sciences  
**Michael Ibba**, Associate Professor, Department of Microbiology  
**Bobby D. Moser**, Vice President for Agricultural Administration and Executive Dean of the College of Food, Agricultural, and Environmental Sciences  
**Karin M. Musier-Forsyth**, Ohio Eminent Scholar, Professor, Department of Chemistry  
**Randy J. Nelson**, Professor, Department of Psychology and Neuroscience  
**Matthew S. Platz**, Distinguished University Professor and Interim Dean, College of Mathematical and Physical Sciences and College of Biological Sciences  
**Amanda A. Simcox**, Professor, Department of Molecular Genetics  
**Larry S. Schlesinger**, Professor and Director, Division of Infectious Diseases  
**Wiley W. Souba, Jr.**, Vice President and Executive Dean for Health Sciences and Dean of the College of Medicine  
**Caroline C. Whitacre**, Vice President for Research  
**W. Randy Smith**, Vice Provost, Office of Academic Affairs' liaison to the task force

In addition, the reorganization and restructuring of the colleges of the Arts & Sciences has been proceeding in parallel with specific actions that connect with the work of the task force: the combining of the colleges of Biological Sciences and of Mathematical and Physical Sciences and the significant restructuring of units and programs within Biological Sciences that is in process under the leadership of Interim Dean Matt Platz.

### **A Next Generation of Scholarship: The Importance of Interdisciplinary Research and Education**

Modern universities often describe their missions as the creation of knowledge and the transmission of knowledge. For generations, research universities have organized around core

areas of knowledge that have come to be called “disciplines.” Traditionally, knowledge advanced within disciplines, and curriculum was organized within discipline-based departments. However, we now see knowledge advancing not only within the core of the various disciplines but increasingly on the interface of disciplines and through new combinations of disciplines. Because of their complexity, current societal, global, and scientific problems frequently require contributions from multiple fields to achieve understanding and solution. In particular, many groundbreaking advances in science and technology are being achieved by combining results from fields once thought to be unrelated: e.g., the discovery of the structure of DNA, medical imaging techniques such as MRI, and satellite-based global positioning system (GPS).

The challenge now for modern universities is to better position themselves to undertake the kinds of research and to develop the kinds of instructional programs that address issues with many dimensions and that require combining knowledge from more than one field. Ohio State will make these changes in order to strengthen its research and educational programs, to address compelling national and global problems, to assume even stronger leadership in higher education in this country, and to continue serving the people of Ohio well. Indeed, the comprehensiveness of Ohio State’s academic programs and the quality of Ohio State’s faculty provide exceptional opportunities to accomplish here what cannot be attempted at other institutions. In this regard, Ohio State not only has an opportunity but also has the responsibility to fully engage in a next phase of knowledge generation, one that is more interdisciplinary, more cross-disciplinary than has previously been undertaken. Current research in the life sciences demonstrates that these areas are particularly ripe for this kind of inquiry at this time.

Indeed, in several parts of Ohio State’s campus there is evidence of movement in these directions. The Comprehensive Cancer Center, the Mathematical Biosciences Institute, and the Center for Microbial Interface Biology are examples of forefront interdisciplinary research in the life sciences. In response to the call from the Ohio Board of Regents for each of the state’s 13 public universities to identify its centers of excellence, Ohio State named five areas of particular institutional strength: climate, energy, and the environment; health and well-being, human behavior, and bioinformatics; state, regional, and urban development; food production, supply, and safety; materials, manufacturing technologies, and nanotechnology. Excellence in each of these areas currently requires the participation of programs across several fields, and continued strength will depend on successful interdisciplinary research and education.

Even with these positive examples, there are many challenges at the institutional level. The existing departmental and college structures and the historical concentration on discipline-based programs provide, on the one hand, important structures for on-going research in foundational areas but also potentially significant barriers to establishing new ways of doing research and instruction that cross traditional boundaries. As described succinctly by the National Academy of Sciences report, *Facilitating Interdisciplinary Research*, these barriers include “especially the academic promotion and reward system and the department-based

budgeting structure of universities.”<sup>3</sup> Many of the findings in the NAS report are issues that Ohio State must resolve if interdisciplinary work in the life sciences here is to achieve its potential. The Task Force on the Life Sciences has studied these issues and in this report makes recommendations to address them, anticipating that changes in this one area can serve as a model for other areas as they, too, move to more effectively combine disciplines in order to expand knowledge and to address problems of great complexity.

### **Activities of the Task Force**

The task force began its work by establishing three working groups to gather and review basic information in three critical areas:

**Inventory.** This group compiled and summarized information on activities, people, and programs in the biological and life sciences at Ohio State. This information was fundamental to the work of the task force and demonstrates the remarkably large scale and breadth of activity: 750 faculty across 26 departments and programs housed in 12 colleges and schools.

**Research Frontiers.** This group was charged to review and identify current areas of frontier research in the biological and life sciences together with main areas of activity and excellence at Ohio State. This information provided a base and framework for future directions of research and education at Ohio State. Strengths identified at Ohio State include: translational science, sustainability, systems biology, and chemical biology. Potential targets of excellence are RNA biology, genomics, and plant translational sciences. Opportunities for enhanced interactions are seen for the areas of cellular and molecular biology, organismal interactions and pathobiology, and therapeutics and applications science as one grouping and for environmental sustainability, and neuroscience as another grouping.

**Best Practices.** This group was charged to review organizational structures for interdisciplinary education and research at other institutions to gain ideas about what approaches would work best for Ohio State. The group organized insightful discussions with the director of the laboratory of genetics at the University of Wisconsin-Madison and the director of biomedical graduate studies at the University of Pennsylvania, two organizations with very successful track records in interdisciplinary research and education. The group also reviewed the organization and activities of the Center for Microbial Interface Biology, an example of a successful interdisciplinary group at Ohio State. Among the common themes that emerged were that groups achieve success in research, external funding, and graduate education by developing approaches that lower traditional barriers between departments, facilitate cooperation among faculty and students from different programs, and focus on new initiatives that bring in large training and interdisciplinary grants.

As the NAS report made clear, the optimal approach for supporting interdisciplinary research and education in universities is not a solved problem in social-science research, and Ohio State

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<sup>3</sup> National Academy of Sciences report, *Facilitating Interdisciplinary Research*, 2004, p. xi.

thus must develop its own solution, based on experiences of what has been learned elsewhere and what has been successful on this campus.

The findings of these groups (which are summarized in later sections of the report and appendices, together with what was learned from the series of open forums for faculty, students, and researchers) led to the identification of six major findings by the task force. These findings and the resulting recommendations developed by the task force constitute the main part of this report.

## **Findings and Recommendations**

President Gee has recently noted: “At this defining moment – when our communities and our nation need us more than ever—we must fundamentally reinvent our institutions. We must become more agile, more responsive, less insular, and less bureaucratic.”<sup>4</sup>

The findings and the recommendations of the task force challenge Ohio State to reinvent its approach to the life sciences. More details may be found in the task force summary document.

## **Findings**

The first three findings concern administrative, curricular and organizational issues that must be addressed to provide the foundation needed to strengthen the graduate and research programs in the life sciences at Ohio State. The last three findings identify requirements for Ohio State to develop and carry out the initiatives that will propel Ohio State to a significantly higher level of national excellence in the life sciences.

1. There is a need to change the financial and administrative structure for the interdisciplinary graduate programs. The IGPs and college/department programs at present compete for both financial and human resources. The conflict issues that have been uncovered among departments and programs must be addressed. There is a lack of ownership of the IGPs at the college level; they seem to be regarded as cost centers without much value to their programs.
2. There is a need to design a process to periodically review and update the curricula in the graduate programs (both departmental and interdisciplinary) with the expectation that this will also strengthen and broaden the research programs.
3. There is a need to ensure that department chairs develop written agreements with faculty who participate in cross-disciplinary centers and/or in IGPs. There is a perception by some faculty that work outside their department is not valued and is viewed as detrimental to departmental goals. The objective is to change the culture of deans, department chairs, and

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<sup>4</sup> *The Christian Science Monitor*, March 13, 2009.

faculty members about the expectations, annual goals, and reward structures for faculty regarding their work within departments and without, e.g., on interdisciplinary programs.

4. There is a need to expand forums, trans-university information and networking tools, and knowledge management efforts and to develop, enhance, and maintain web-based portals and new mediums of communication in support of interdisciplinary research and educational efforts and to attract prospective students.
5. There is a need to establish that a main goal of broad university initiatives and investments in the life sciences is to leverage major external support. Internal support is not the end point.
6. There is a need to identify space requirements and establish flexible, responsive administrative structures to enhance interactions, strengthen existing groups, and promote formation of new interdisciplinary groupings and initiatives.

## **Recommendations**

### **1. Administrative Structure**

The task force identified several critical players in changing the way interdisciplinary graduate programs are administered and funded, including the life sciences deans, the dean of the Graduate School, chairpersons in related departments, and program directors for the four interdisciplinary graduate programs (Biochemistry; Molecular, Cellular, and Developmental Biology; Neuroscience; Biophysics). The task force further identified a need for stronger staff support for these programs with responsibilities directed to 1) student recruitment and admissions (utilizing application procedures that would make it possible for a student to apply to more than one program with a single application and a single fee); 2) communications, web development, the life sciences portal; and 3) support for grant proposal writing. An organizational structure will be required to meet these needs. One model developed by the task force is described in the summary document. In this model, the four IGPs would be placed under an umbrella structure called the Life Sciences Interdisciplinary Graduate Programs with an associate dean of the Graduate School serving as executive director and oversight provided by the Council of Life Sciences Deans.

The task force also made recommendations about financial support for the life sciences IGPs. Instructional subsidy for each course taught in an IGP should flow to the budget unit of the instructor. If funding is needed for new staff and office operations in the Life Sciences Interdisciplinary Graduate Programs, those funds can be requested from the Office of Academic Affairs, the Colleges, and the Graduate School, but should not be requested for more than five years. Similarly, life sciences deans could be expected to continue to support 45 first-year

fellowships per year for another five years.<sup>5</sup> However, beyond this five-year period, continued support would be contingent on each IGP attracting major external support, specifically T32 training grants or program project grants, and in attracting a diverse pool of high-quality students, particularly domestic students. Research priorities and quality of the doctoral program would dictate the continued existence of each IGP as well as the resources directed to it. Currently, some departments combine fellowship offers with graduate associate offers and have had positive results in their rate of acceptance.

## **2. Curricula**

One responsibility of the Council of Life Sciences Deans, working in conjunction with the Graduate School and OAA, must be to design a periodic review process for life sciences graduate programs. The goal will be to evaluate the quality of the programs, identify redundancy, and determine the appropriateness of the mix of current programs. Initial reviews will be undertaken in light of the findings of the doctoral review, the recommendations of this task force, and the reorganization of the biological sciences within Arts and Sciences. The task force further recommends that a responsible-conduct-of-research course, a writing course, and a careers core be taught across the life sciences IGPs. A faculty panel convened by the Life Sciences Interdisciplinary Graduate Programs should recommend additional opportunities for moving toward shared courses.

## **3. Formalizing Faculty Interdisciplinary Work**

Faculty members associated with an IGP will be expected to contribute to its work either by teaching or service to the interdisciplinary program, and these contributions will be acknowledged as equivalent to teaching and service provided to academic departments. This expectation was set by Provost Alutto in his March 20, 2009, memo to the faculty, "Principles for Faculty Reward Systems in a High Performance Academic Culture." It will be important for Academic Affairs and the deans to monitor departmental policies with respect to this expectation. Faculty membership in each IGP should be viewed as a privilege rather than an entitlement and will be limited to those faculty with a defined threshold indirect cost return, for example one or more grants with full or partial indirect costs. (This requirement would be waived for newly recruited faculty.)

## **4. Forums, Communications, Web Portals**

The life sciences must support initiatives to host forums, workshops, and symposia that improve the quality of research and of the student experience. While examples of successful offerings exist on campus, more can be done to expand events and to invite broader participation. The need for a high-quality life sciences web portal is equally essential for

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<sup>5</sup> The task force recommends that for the next five years these fellowships continue to be distributed according to their historical pattern which reflects quality, quantity, and yield of applicants: Biochemistry, 12-14; MCDB, 16-18; Biophysics, 6-8; and Neuroscience, 8-10, eliminating the perception of competition for these fellowships.

recruiting new graduate students and for enhancing the quality of their experience after they come to campus. Such a portal would contribute to the research mission as well. The university lacks a single electronic location for sharing information across the disciplines and for postings of life sciences seminars, speakers, or events. Expanding the use of video conferencing capabilities both on campus and beyond its borders would provide opportunities for greater involvement in research enterprises.

## **5. Increasing External Support**

Too often, internal financial support has been seen as the end rather than the means of research efforts. University seed money must be leveraged to attain external funds, and Ohio State must develop and sustain a tradition of securing major NIH, NSF, and other agency training grants and program project grants. Fundamental to this effort is the need to use the metrics for NIH training grants to evaluate and improve the life sciences graduate programs on campus. The availability of seed money for interdisciplinary groups (akin to innovation groups) that have a goal of obtaining external funding is critical as is developing a program by which investigators can receive funding to pay for outside consultants to review grant proposals and advise on key issues. Such a relatively small investment has the potential to reap big rewards.

Achieving the goal of increased external support will require focused planning and action. Deans, department chairs, and program directors must provide needed leadership in identifying those areas of research and funding opportunities that will yield the greatest overall impact for Ohio State.

## **6. Co-Location and Space Requirements**

A requirement for successful interdisciplinary research and education is appropriate co-location of people, laboratories, and equipment. Ohio State has a critical need for collaborative work space as well as quiet space for faculty, students, and postdocs to think and write. This space should be available across campus and in many buildings. Further, more common space allowing for daily interactions among those engaged in the academic research enterprise is needed. This “intensity of collisions” is important not only for purposes of collegiality and community but also for providing opportunities for new collaborations and partnerships to develop. Strategic establishment of cafes and cafeterias is a simple but critically important action to jump-start action on this recommendation. Its importance is well established.<sup>6</sup>

In the longer term, the involvement of Sasaki & Associates in campus space planning provides a unique opportunity to think creatively about how researchers, students, and postdocs interact. A ‘research hotel’ concept for both dry and wet bench space would allow for open wet and dry laboratory space for collaborative group interaction as well as space for personal endeavors. Creating flexible space within existing research buildings (where cutting-edge scientific platform

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<sup>6</sup> NAS report, p. 94.

technology already exists) would allow investigators from different disciplines to pursue new collaborative projects in order to enhance competitiveness.

The quality of work space is also an issue for many researchers on campus. The quality of current lab space in some areas is suboptimal to the extent that it limits research productivity and results in faculty consistently pressing to be moved to better space.

## **Conclusions**

This report addresses Ohio State's life sciences programs and offers recommendations aimed at providing the essential foundation required for successful research and graduate education, both interdisciplinary and disciplinary, to enable Ohio State to advance its national standing in critical research and graduate areas. The task force is not recommending formation of new colleges or new rigid structures at this time. Rather, it is recommending more flexible structures, more agile procedures, better communication, more contact among faculty across programs, and expectation of greater external support so that faculty and programs will be better positioned to respond to new opportunities and emerging needs. The task force identifies an urgency in making the proposed changes in the life sciences and very much hopes that its recommendations will be implemented quickly. As President Gee has said, this is the time to reinvent critical components of the university, of which life sciences surely is one.