Strategic Plan for the Department of Biochemistry

Outline

I. Mission (from the Department's "Appointments, Promotions, and Tenure" document)

The mission of the Department of Biochemistry is to conduct integrated research, classroom and individualized instruction in biochemistry, and to provide service to the university as well as local, state, and professional communities. The faculty are committed to providing a well-balanced program of undergraduate and graduate education in line with the university's mission and vision statement as a major public, research-oriented university.

The undergraduate teaching mission of the department involves both general, service-oriented courses in basic biochemistry designed to contribute to the education of a diverse student body as well as more specialized courses designed for students majoring in biochemistry and closely related disciplines. Research is an integral part of our mission and contributes in a significant fashion to our teaching goals, particularly in graduate education and for individualized research studies for undergraduate students. Research is essential for the continued growth of knowledge and for developing concepts and methodologies that are fundamental in the training of young scientists.

II. Goals

This plan is designed to dramatically improve the discipline of Biochemistry over the next 5 years with the goal of bringing us into the top quartile of schools in Biochemistry. Based on NIH funding, we as an aggregate were 19th of Universities with Medical Schools, but this internal strength has not been recognized in our external rankings. We believe that this is due in large part to the fragmentation of the Biochemistry discipline on campus, and the absence of clear disciplinary strengths, other than in RNA biology. By implementing our strategic plan, we hope to:

(1) Unify the discipline of Biochemistry on campus
(2) Improve recruitment and retention of top-tier Biochemistry undergraduate and graduate students
(3) Recruit excellent new faculty and retain our current faculty
(4) Establish areas of excellence in new emerging research areas of Biochemistry that will put OSU on the map
(5) Obtain training grants and center grants that will bring additional resources to OSU

III. Vision – Unification of Biochemistry at OSU

Biochemistry is a central discipline in the Life Sciences. Despite its importance, the Biochemistry faculty at OSU have not been unified. Perhaps because the tools and concepts of biochemistry are so universal to life science research and education, representatives of the discipline are spread across a campus-wide graduate program and three administratively- and geographically-separated units: the Department of Biochemistry, the Department of Molecular and Cellular Biochemistry (MCB), and the Biological Division of the Department of Chemistry. For historical reasons, the disciplinary graduate program, The Ohio State Biochemistry Program (OSBP), has not been directly managed by any of the biochemistry units. Other than a program-wide seminar series, the administrative units have worked independently.

The recent restructuring by the University has opened a rare opportunity to improve cooperation between biochemistry units, with the ultimate goal of achieving unification of the discipline at OSU. The Department of Biochemistry is committed to playing a central role in this process. As an important first step, responsibility for oversight of the OSBP is being transferred directly to the three academic units: Biochemistry, Chemistry and MCB Departments. This partnership is further strengthened by the initiation of a joint interdepartmental seminar program. In parallel with its partnership with the MCB department in the medical school, the Biochemistry Department is serving as a bridge between the College of Arts and Science and College of Medicine by promoting closer partnership with the Chemistry Department. This partnership will involve significant %FTE exchange of faculty as a mechanism to lead to closer cooperation between these groups, with the goal of merging the Biochemistry and Chemistry departments as suitable space becomes available.

As an important hallmark of these developments, a unified website representing all three groups will be developed for http://www.biochemistry.ohio-state.edu. This step will set the stage for overcoming more than 30 years of fragmentation of the Biochemistry discipline at OSU– a change that alone will dramatically improve the visibility of Biochemistry at OSU to the outside community.

IV. Restructuring Plan for Biochemistry at OSU

The Department of Biochemistry was instructed by Dean Platz to include a restructuring plan as a major component of its strategic plan. During the summer, a faculty task force evaluated the potential merger of the Departments of Chemistry and Biochemistry and their findings were released in early October. Efforts are now underway to clarify the implementation challenges for such a merger. At the same time, the Life Science Deans charged the Chairs of Biochemistry and MCB to develop a plan to jointly oversee OSBP as an interdepartmental, disciplinary graduate program. This plan, which has been modified by Dean Platz to include the Department of Chemistry, will be forwarded to the Deans for review in the near future.

Based on these developments, and following discussion among the faculty of the Departments of Biochemistry, Chemistry, and MCB, we have developed the following two-phase plan for unifying the Biochemistry discipline at OSU. Phase 1: establishment of a Center for Biochemistry, which will serve to cement partnerships that build interaction between the units, and to provide a unified face for Biochemistry, and Phase 2: merger of the Biochemistry and Chemistry departments to simplify their administration and strengthen synergistic interactions.

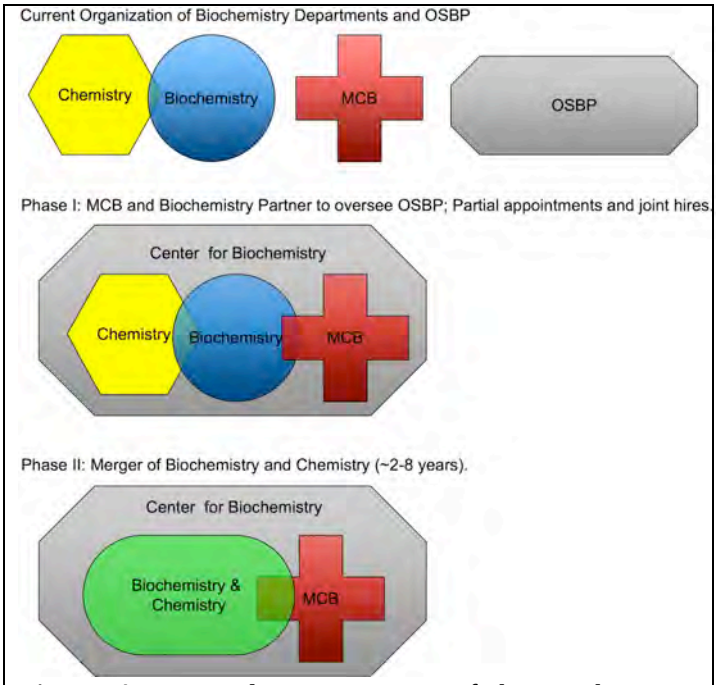


Fig. 1. A proposed reorganization of the Biochemistry discipline. Phase 1 would occur immediately. Phase 2 would take place once the major implementation challenges (e.g spatial proximity) could be resolved.

Phase 1: Phase 1 of this plan would be implemented immediately. A Center of Biochemistry would be established to jointly manage OSBP and to develop a strategic plan for the discipline of Biochemistry on campus. Under this partnership, the three chairs would constitute an executive committee responsible for refining and executing strategic plans for building Biochemistry at OSU, and managing the Center. Governance of OSBP would be managed by committees comprised of equal members of faculty from Biochemistry, Chemistry, and MCB.

An underlying theme of Phase 1 will be to promote increased interactions between the partner departments by encouraging the use of joint salaried or courtesy appointments. Indeed, several faculty are already joint between the units Chemistry and Biochemistry (Bell, Chan, Dalbey, Musier-Forsyth, Magliery, Wang). To achieve this, we plan to hire faculty jointly between departments and to provide incentives to existing faculty to pursue joint or courtesy appointments. Such incentives could include teaching load adjustments, access to infrastructure and resources, participation in departmental graduate programs, and participation in teaching activities, consistent with their FTE%.

Phase 2: Although Phase 1 is concentrated on improving cooperation between the three existing units, the new possibilities created by the administrative merger of the colleges of CBS and MAPS, has led to significant grass-roots interest in exploring a formal merger of the Departments of Biochemistry and Chemistry. This enthusiasm is tempered by a number of understandable concerns about the details of implementing a merger. A key benefit of implementing phase 1 of the strategic plan is that the resulting increased interaction and joint appointments will help lessen those concerns. Nevertheless, it is essential to ensure that the merger, if implemented, is in the best long-term interests of OSU. The first step in implementing a departmental merger will be initiate productive dialog between the faculty of the two departments in order to identify the relevant implementation hurdles (e.g., differences in graduate salaries, student area distribution, teaching – many of which are highlighted in the report by the Committee charged with examining the Biochemistry and Chemistry merger), and then develop a strategy for addressing the hurdles in a productive manner.

One key conclusion of the recent study on the merits of a departmental merger was that administrative merger alone would have little effect on the national rank of OSU's Biochemistry graduate program, but that significant improvements could result from reorganizations that led to productive synergies between existing and future faculty. A significant hurdle to achieving this synergy is the spatial separation of the existing units. While there is broad consensus on the importance or proximity in a merged department, implementation details remain to be sorted out. One possibility would be to relocate the faculty in the Chemistry bio-division (Pei, Dalbey, Musier-Forsyth, and Magliery) to the Biological Sciences complex; such a move might be achieved within two years. This would unify the Biodivision in the merged Biochemistry and Chemistry Department, but may, at least temporarily, diminish the presence of biology on the Chemistry Department as a whole. Another possibility to achieving spatial proximity could present itself within four years when construction on the current Lord Hall site is completed. Given proper planning, space could be available to house the Biochemists in the new building; alternatively, Biochemistry faculty could relocate to a renovated Evans lab in subsequent years. Upon resolution

of the spatial and other major implementation issues, the two departments could merge to form a combined, and unified, Biochemistry and Chemistry Department. This new department would, together with MCB, continue to administer the Center for Biochemistry, and affiliated graduate and undergraduate programs.

Table 1. Summary of Projected Hires (2009-2014)

Department	Protein-Nucleic Interactions	Membrane Proteins	Chemical Biology
Biochemistry	3	3	-
MCB	2	-	-
Chemistry	-	-	3
Net	5	3	3

V. Strategic Plan

The Department of Biochemistry plays a unique role in Life Sciences Research at OSU through its strength in the area of macromolecular structure and function. Nearly all of the structural biologists, biophysicists, and enzymologists on campus are affiliated with the Department. In addition to serving this unique scientific role on campus, the department also houses a highly successful undergraduate major in biochemistry.

As part of its strategic plan, the Department has developed a faculty hiring strategy that will help establish scientific eminence in emerging fields, and will lead to improved quality indicators of the department. While remaining true to our core strengths in macromolecular structure and function, the Department plans to hire new faculty with research foci in three areas, (1) nucleic acids and protein-nucleic interactions, (2) membrane proteins, and (3) chemical biology.

In concert with our long-term goal of unifying Biochemistry on campus, for the next 5 years we propose 10-11 new faculty hires who will be jointly appointed between Biochemistry and the Departments of Chemistry and MCB. Such faculty would be ~70% appointments in their TIU department, and ~30% in their affiliated department. Of these faculty, 6 would be housed within the Department of Biochemistry, and BMAPS would be asked to provide most of their startup costs. The space assignments and startup costs are described in section IV.

In the area of nucleic acids, MCB plans to hire 2 faculty over the next two years studying epigenetics by either biochemical or structural methods. The Biochemistry Department is requesting 3 positions in this area, leading to a net strengthening of 5 faculty at OSU. In the area of membrane proteins, the Biochemistry Department is requesting 3 faculty positions to be jointly hired with Chemistry. All of these membrane protein faculty would be housed in Biochemistry space. We propose that 3 faculty in chemical biology would be hired jointly with Chemistry, but where they are housed would depend on their specific research area, which could include nucleic acids and membrane biology. Rationale for hiring in these areas is provided below.

1. Nucleic acids and protein-nucleic interactions

The Ohio State University boasts an enviable cadre of scientists exploring various aspects of the role of nucleic acids in fundamental biomedical processes. Nucleic acids researchers at OSU span the disciplines of molecular medicine, virology, cell biology, genetics, bioengineering, physics, mathematics and chemistry. This research area is integral to each of the existing components of the NIH Roadmap; not surprisingly, the OSU researchers engaged in this research area are generally among the best-funded investigators at OSU. Ongoing efforts to develop centers of excellence and training grants in RNA Biology attest to the faculty's existing strength, and potential for international prominence. The Department of Biochemistry serves as an essential linchpin to OSU's efforts to continue and expand its accomplishments in nucleic acids research by providing critical expertise in mechanism, structure and function.

Because of the Department's unique strength in macromolecular structure and function, the best candidates who will be using this approach to studying important nucleic acids-related problems will be pursued. Within this broader framework, a particular emphasis will be placed on new investigators applying the tools of structural biology (e.g., X-ray crystallography, NMR spectroscopy, cryo-electron microscopy), structural biophysics (e.g., single molecule methods, time-resolved spectroscopy, thermodynamics) and chemical biology (e.g., structural probes, genetic engineering, nucleic acid-binding ligands, non-natural amino acids).

Structural Biology: Together with MCB, we will work to hire 2 faculty in the structural biology area (**Table 2**). Crystallographic analysis of RNA and RNA-protein complexes is a specialized discipline that is not well represented at OSU. Although Charles Bell (MCB) works in this area, a new hire with expertise in the crystallization of RNAs and nucleic acid-protein complexes could have significant impact on the research productivity of faculty at OSU, many of whom have instead established outside collaborations with crystallographers, including: Zucai Suo: mechanism of DNA polymerase, Jen Ottesen and Michael Poirier: chromatin remodeling, Jane Jackman: mechanism of tRNA processing enzymes, Tina Henkin: structure and function of RNA regulatory elements, Irina Artsimovitch: structure, mechanism and inhibition of RNA polymerase. Notably, these collaborations have resulted in numerous publications in high-prestige journals, with the structural kudos residing, unfortunately, outside of OSU. Hiring of a nucleic acids crystallographer is further justified by the

Table 2. Proposed Biochem/MCB Hires in Nucleic Acid and Protein- Nucleic Acid Interactions

Protein Biochemist in Epigenetics	**Hire A** (MCB)
Protein Crystallographer	**Hire B** (MCB)
Cryo-electron Microscopist	**Hire C**
Nucleic acids biophysicist	**Hire D**
Nucleic acid chemical biologist	**Hire E**

existence of a state-of-the-art biomolecular X-ray facility that is currently underutilized.

Cryo-electron microscopy (cryo-EM) and NMR spectroscopy are two other methods that provide complementary information to high-resolution X-ray crystallography. Although cryo-EM represents an important tool for studying the structures macromolecular assemblies, and their structural transitions during function, suitable facilities are not currently available and would need to be purchased as part of the startup package of a qualified individual. Importantly, a specialist in cryo-EM would also be well positioned to interact with the faculty in the membrane protein research core (below). If obtaining such funding is not possible, we propose to target a person in NMR. Excellent resources for NMR spectroscopy are already currently available at OSU, and the addition of a spectroscopist with specific strength in nucleic acids structure and dynamics would complement the existing faculty, helping to take the sub-discipline of NMR at OSU to a new level.

Nucleic acids biophysics: OSU currently has a paucity of experimental biophysicists specializing in thermodynamic and kinetic analyses of nucleic acid structure and protein-nucleic acid interactions. In particular, in recent years the development of single-molecule spectroscopic methods has had tremendous impact on our understanding of fundamental biological processes involving nucleic acids. An investigator using ensemble and single molecular techniques for studying nucleic acids biophysics (e.g., fluorescence, EPR, calorimetry) would complement several existing projects at OSU, including: Mark Foster and Venkat Gopalan: the structure and assembly of RNase P, Karin Musier-Forsyth: retroviral RNA-protein interactions, Ralf Bundschuh: statistical mechanical and theoretical calculations of RNA folding, Michael Ibba: tRNA proofreading, Kurt Fredrick: translational fidelity in protein synthesis, Richard Fishel: DNA repair. Depending on the selected candidate, highly specialized instrumentation would need to be included in the startup package.

2. Membrane Protein Biology

The study of membrane proteins is undergoing a revolution given recent advances in our understanding of membrane protein folding and the development of improved techniques to obtain their functional forms. The structure determination of membrane proteins is accelerating rapidly (**Fig. 2**) and many of these structures have been published in *Science*, *Nature*, and *PNAS*. Notably, OSU has existing strength in this area with multiple faculty on campus working on membrane proteins as well established human infrastructure (Membrane Focus Group, Lipid Focus Group, and Center for Interface and Microbial Biology) each of which has an active interest in membrane proteins. Given these factors, we propose to hire 3 membrane protein biochemists and biophysics to increase the prominence of the Department/OSU in this reemerging area.

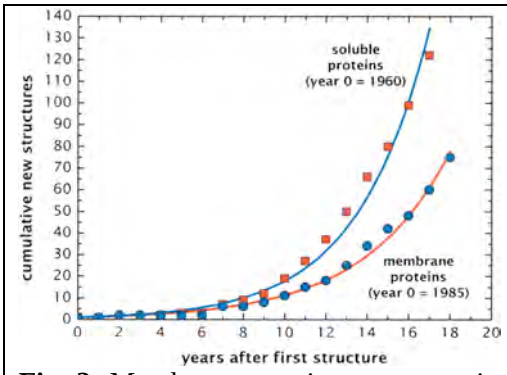


Fig. 2. Membrane protein structures since publication of first structure. (White, S.H, *Protein Sci*., **2004**, 13, 1948)

To identify the optimal faculty to hire within the membrane protein field, the strengths of the existing faculty were catalogued, and an analysis was performed to determine what faculty would best complement these faculty (**Table 3**). This analysis has led us to propose the hiring of 3 faculty in the following areas: (1) a biochemist focused on purifying and characterizing novel membrane proteins – particular those involved with outer membrane protein biogenesis, (2) a biophysicist using spectroscopy to elucidate the mechanism of membrane proteins structure function, such as an EPR spectroscopist that uses NO spin-labels to study membrane protein conformational changes, and (3) a structural biologist using crystallography to determine the structures of membrane proteins and their complexes with other associated proteins. An Cryo EM spectroscopist was the highest priority, but we felt that this would only be feasible with support from the Comprehensive Cancer Center which is more aligned to Protein-Nucleic Interactions.

Table 3. Biochemistry faculty in membrane protein biology

Membrane protein biochemists	
Inner Membrane Protein Biogenesis	Ross Dalbey
Outer Membrane Protein Biogenesis	**Hire F**
Membrane Protein Glycosylation	George Wang
Cry Toxins: proteins insert into membranes	Donald Dean
Trp channels: proteins that transport Ca^{2+}	Mike Zhu
Membrane protein biophysicists	
Protein crystallographer	Michael Chan
Protein crystallographer #2	**Hire G**
Protein solution NMR	Justin Wu
Protein solid state NMR	Chris Jaronic
Cryo EM (Nucleic-acid hire)	**Hire C**
Membrane protein biophysicist (EPR)	**Hire H**
Membrane protein chemists	
Small molecule mediated membrane fusion	Dennis Bong
Inhibitors of membrane proteins	Dehua Pei

The hiring of these faculties will result in a strong group that is well positioned to tackle the important problems in the membrane protein field. A membrane protein biochemist working in the area of outer membrane protein biogenesis would complement Ross Dalbey who works on inner membrane protein biogenesis, and Peng George Wang who works on membrane protein glycosylation providing OSU with a team targeting many of the most important systems in membrane

protein biogenesis. The hiring of membrane protein biophysicist, membrane protein crystallographer, and Cryo EM spectroscopist will solidify OSU further by providing new technologies to OSU that can be used to study these membrane protein systems. With such a unit OSU could compete effectively for Center grants (a P50 has been submitted already) and for training grants in the membrane protein field - things that if successful would facilitate the recruitment of additional faculty and top students to OSU.

3. Chemical Biology

"Chemical Biology" is the term used to describe the application of chemical tools for probing or manipulating biological pathways. Although several faculty at OSU currently apply chemical biology techniques to problems in protein biochemistry (e.g., Maglieri, Ottesen, Pei), the ongoing efforts in the biology of nucleic acids and membrane biology would be greatly aided by investigators applying such tools to biochemical problems. We propose to hire a chemical biologist (**Hire E**) in the area of nucleic acids, as it appears to be the area of greatest need. Investigators in this area could be developing new inhibitors of RNA-based enzymes such as the ribosome and RNase P, ligands that serve as probes of RNA structure, or bind to specific sites on DNA and modulate processes such as transcription and recombination. Such investigators could interface well with ongoing efforts by: Irina Artsimovitch: RNA polymerase, Venkat Gopalan: bacterial RNase P, Tina Henkin: RNA "riboswitches", Michael Ibba: tRNA synthetases, Richard Fishel: DNA repair, Kurt Fredrick: ribosome, Karin Musier-Forsyth: viral replication, packaging, Zucai Suo: DNA polymerase. Other hires in chemical biology will be made by the Department of Chemistry, with possible areas of common interest being synthetic chemists focused on problems relevant to membrane proteins, or the synthetic biologists working to co-opt biological systems for the synthesis of biofuels or novel pharmaceuticals.

VI. Space and Startup

A major challenge in developing a space plan is the number of different space consolidation scenarios possible for a merger of Chemistry and Biochemistry. Given the current budget climate and the level of interest by the upper administration in a merger, we will assume for the purposes of this document that the biological division of Chemistry will move to the Biological Science building. Under this plan, Dr. Musier-Forsyth would occupy Aronoff as part of the RNA Center and the Pei and Dalbey laboratories would move to occupy the 9th floor of Biosci. The Magliery lab appears entrenched in Evans and has joint equipment with the Bong and Jaronic labs making such a move prohibitive. This would leave two slots available on the 9th floor for two assistant professors that we would assign to the Cryo EM spectroscopist (**Hire C)** and membrane protein biophysicist (**Hire H)** given their unique space requirements. New faculty (**Hires A-B**) with primary appointment in MCB would be placed in Hamilton Hall. The remaining hires (**Hires D-G**) would be placed in the 7th floor of Bioscience, and 7th floor of Riffe as space became available due to retirements. These hires could be placed in temporary space as needed. As a consequence of these moves, the Biochemists in the department of Chemistry/Biochemistry would be primarily consolidated in the 7th, 8th, and 9th floors of Bioscience, and the 7th floor of Riffe. The placement of Chemistry's chemical biology hires will depend on their number, their needs, and the availability of space. Projections of space, salary, and startup costs for the remaining faculty are provided in **Table 4**.

Table 4. Space, startup and salary requirements for projected hires in Biochemistry

Year	Faculty	Space	Salary	Startup
2008-2009	Hire A	Hamilton Hall	$70,000	$650K
2009-2010	Hire B	Hamilton Hall	$72,500	$650K
	Hire D	Bioscience 720, 726, 726A, 728	$72,500	$700K, $75K Renovation
2010-2011	Musier-Forsyth	Aronoff (as described in RNA Center proposal)		
	Pei	Bioscience 9th floor, L#3, L#6, L#8, PO#4, PO#6 (3155 sq. ft)		
	Dalbey	Bioscience L#4, L#5, PO#2 (1820 sq. ft)		
	Hire C	Bioscience 9th floor, 912, L#7, SL 921, PO#2	$75,000	$2,000K
	Hire H	Bioscience 9th floor, L#1, L#2, PO#4	$75,000	$750K
2011-2012	Hire F	Riffe R702,R704, R705, R706, R707,	$80,000	$800K
2012-2013	Hire G	Riffe R709, R711, R712, R714	$82,500	$850K
2013-2014	Hire E	Biosci 712, 712A, 712B, 715	$85,000	$900K

VII. International Partnerships

To strengthen our undergraduate program and international graduate recruiting, we plan to setup several student exchange programs with foreign universities. There is great interest as evidenced by the response of more than 60 Biochemistry/Biology undergraduates to the announcement of an exchange program with Chinese Hong Kong University. Thus we believe that creating such exchange programs will help to attract top Biochemistry undergraduate to OSU.

VIII. Targeted investment in structural biology infrastructure

One of unique challenges to research in macromolecular crystallography and NMR is their high equipment and maintenance costs. Currently, OSU is falling behind relative to other peer institutions with respect to state of the art structural biology infrastructure and cost sharing. In order to remain competitive, direct investment in these technologies is needed. In particular, OSU should invest in necessary crystallization equipment, outdated NMR instrument consoles should be updated, and the NMR fee structure should be revised to bring user costs in line with other peer institutions.

Investment in Crystallization Equipment

The current macromolecular crystallography infrastructure consists of a single Rigaku Rotating Anode Generator with two RAXIS IV++ detectors one of which was purchased by the OSU College of Biological Sciences and the OSU Medical School, and the other using funds obtained from the Ohio Board of Regents. Technological improvements in crystallizing and screening proteins is rapidly accelerating the pace of protein structure determinations, and are allowing investigators to tackle more difficult crystallographic problems (e.g. membrane proteins). To remain competitive in the area of protein crystallography, OSU needs to invest in crystal automation robots that will increase the number of conditions that can be screened, and the rate at which the work can be done. Robots are needed to help make crystallization solutions, to set up crystallization drops, and to screen crystallization trials in an automated fashion.

The first step in this direction will be the purchase of a UV-fluorescence microscope to rapidly distinguish protein crystals from salt/lipid crystals. This will be purchased from an R21 grant to the Chan/Dean groups that was recently funded. A P50 for a center of membrane protein production has been submitted which if funded would establish this infrastructure, but such grants are extremely competitive. If the P50 grant is not funded, we request internal investment for this important crystal automation hardware (**Table 5**). The crystallization robot will allow investigators to screen conditions using much smaller drops, thus enabling them to screen for more conditions using the same amount of protein. Equally important are a solution robot that will allow users to prepare crystallization screens much faster, and a plate hotel that would enable the automated screening of the crystallization drops. Notably, all of the items requested have become standard equipment at peer institutions; thus, without these technologies, investigators at OSU will be at a competitive disadvantage.

Table 5. Existing and proposed investment in X-ray crystallography infrastructure

Instrument	Status	Cost
Rotating Anode Generator with 2 Rigaku RAXIS IV++ detectors	Present	
UV-fluorescence microscope	Planned	$100K
Crystallization Robot (Mosquito or Phoenix)	Needed	$125K
Solution Preparation Robot	Needed	$125K
Plate Hotel	Needed	$200K

Investment in Macromolecular NMR

In the mid-late 1990s, the State of Ohio, the Ohio Board of Regents, the OSU Office of Research, and a Consortium of Ohio Universities, made significant investments in NMR technologies, resulting in development of a state of the art, regional facility for NMR spectroscopy at OSU within the CCIC (Campus Chemical Instrumentation Center). Since then, institutional investment in macromolecular NMR spectroscopy has been limited, and as a consequence, technologies at the NMR center are becoming outdated. Concomitant with decreased investment in NMR infrastructure, OSU has suffered from loss of NMR investigators who have relocated to institutions with better NMR resources and support.

Significant investment and cost restructuring is critically needed to ensure that OSU continues to be competitive in the application of NMR methods to important biomedical problems, and to reinforce OSU's standing as a statewide resource for NMR spectroscopy. To address this challenge, two courses of action are required: (1) invest in new technologies, and (2) restructure user fees to make the center competitive with peer institutions. To meet the first objective, the CCIC plans to submit a shared instrumentation grant proposal to the NIH/NSF in March 2009, requesting funds to upgrade the consoles for the three high-field instruments on campus: a 600 MHz instrument located in Johnston lab, and the 600 and 800 MHz instruments located in the Riffe building. The cost of upgrading each console is ca. $350K; appropriate matching funds will be requested from the Office of Research, and various colleges and centers.

While macromolecular NMR investigators at OSU have enjoyed excellent instrumentation, they have been significantly disadvantaged relative to their peers in terms of operating costs for instrument use. In fact, for macromolecular NMR, usage fees are prohibitively high, particularly in comparison to most peer institutions (e.g., ranging from 20% to 160% higher than Minnesota, 60% higher than Wisconsin). The current fee structure discourages investigators from doing experiments, forcing them to choose between personnel to carry out experiments, and the hourly fees to record data. In fact, in part because of the current fee structure, the CCIC instruments are often idle. In addition, the current fee structure in the CCIC facility actually discourages training the next generation of NMR scientists.

A key reason for the high cost of using the CCIC facility in comparison to peer institutions is the requirement that the CCIC fully recoup operating costs while simultaneously being subject to facilities and administrative (F&A) overhead costs that might otherwise be included in departmental or college budgets. Over the past five years, this F&A surcharge as

accounted for as much as 33% of the NMR center's annual costs, which are currently ca. $100K/year. Because the user base for the center is small (over the past three years, four (4) investigators in BMAPS have accounted for 60% of the NMR center revenue), the current cost structure represents a significant cost burden to these investigators. Since the university already receives F&A overhead from research grants, adding such costs to NMR usage fees paid by OSU researchers in a sense represents "double billing". Removing these additional fees alone would reduce NMR usage rates by 20-30%. These investments will allow Macromolecular NMR faculty at OSU to be more productive, and will make NMR resources at OSU sufficiently attractive to hire new faculty in this area. Requested BMAPS investment in Macromolecular NMR is summarized in **Table 6**.

Table 6. **Proposed investment in Macromolecular NMR**

Investment	Cost
Console upgrades (20% match)	$210K
Recurring F&A Subsidy (30%)	$30K per year

Table 7. Biochemistry Performance Metrics*

OSBP Graduate Program Metrics			
	OSU (historical)	Comparison Group**	OSU (projected)
Degrees awarded (2001-2006)[a]	41	52.5	45
Time to Degree (2003-2006)[a]	6	5.6	5.6
Average Verbal GRE (2003-2006)[b]	572.5	532.9	575
Average Math GRE (2003-2006)[b]	776.8	727.2	777
Grad. Student Accept. Rate (2002-2006)[a]	40.1%***	55.9%	56%
Female Student Percentage (2003-2007)[b]	48.3%	47.5%	48.3%

Research Metrics (Biochemistry and MCB)			
	OSU (historical)	Comparison Group**	OSU (2012 projected)
Annual NIH Funding $$$ (2007)[c]	10,416,784	9,055,884	11,00,000
# of NIH Grants (2007)[c]	32	27.5	36
Ave. Annual Publications (2003-2008)[d]	68.2	46.1	70

*Given the overall goal of integrating the different units of Biochemistry, and the fact that disparate units are combined in different databases, we provide data for the combined Biochemistry discipline at OSU, and for its primary graduate program, OSBP.

**The comparison group includes Biochemistry departments and programs in their various forms from the following institutions: Boston University, George Washington University, The University of Kansas, Tufts University, University at Buffalo, SUNY, University of Maryland, College Park, University of Miami, University of Michigan, University of Minnesota-Twin Cities, University of Nebraska-Lincoln, University of North Carolina at Chapel Hill, University of Pittsburgh, University of Wisconsin-Madison. These schools were chosen primarily because they had provided sufficient public data to perform the requested comparative analyses.

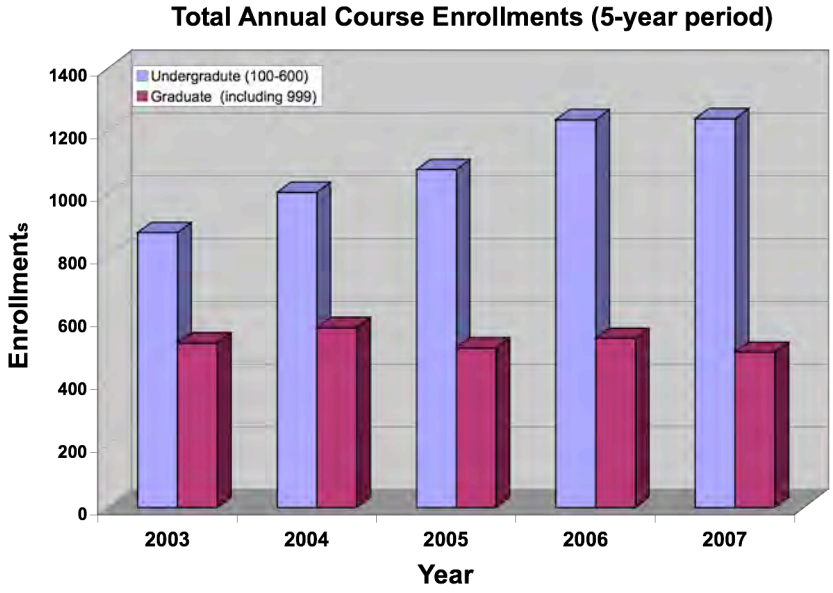
[a] Data provided by WebKaspar with the help of Kendi Woolley and Julie Carpenter-Hubin of OSU Institutional Research and Planning.

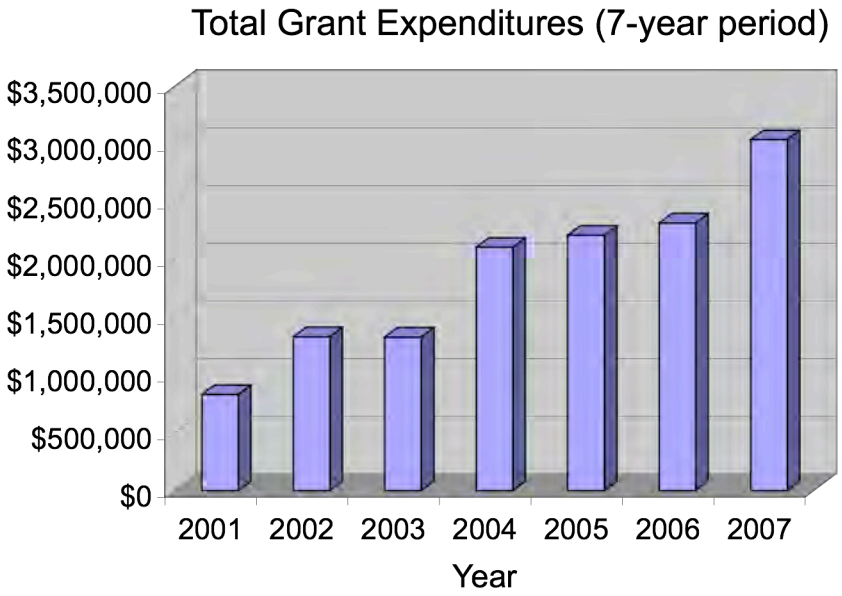
[b] Data retrieved from Federal Databases by OSU Institutional Research and Planning, and then modified.

[c] Data obtained from NIH Research Portfolio Online Reporting Tool.

[d] Data obtained from NIH Pubmed database using the following query: “School”[AD] AND “City/State”[AD] AND Biochemistry[AD] AND (2003[DP] OR 2004[DP] OR 2005[DP] OR 2006[DP] OR 2007[DP] OR 2008[DP]). “Biochemistry” was replaced with “Molecular Biosciences” or “Biological Chemistry” for the University of Kansas and the University of Michigan, respectively.

Table 8. Historical Teaching and Research Metrics for Department of Biochemistry





Department of Molecular and
Cellular Biochemistry

333 Hamilton Hall
1645 Neil Avenue
Columbus, OH 43210-1218

Phone; (614) 292-5451
Fax: (614) 292-4118

November 28, 2008

Michael Chan
Professor & Interim Chair
Department of Biochemistry

Dear Michael,

The Department of Molecular and Cellular Biochemistry enthusiastically endorses the Department of Biochemistry's strategic plan to unify Biochemistry at OSU. This lack of unity has been one of the major problems here for the last 30 years. Towards this end, our department is committed to working with the Departments of Biochemistry and Chemistry to organize a Center for Biochemistry which will take ownership of and oversee a reorganized Interdepartmental Biochemistry Program. Similarly, we are enthusiastic about working with the Department of Biochemistry to jointly hire 4-5 faculty in the area of Protein-Nucleic Acid Interactions over the next 3-4 years. As you know, our department has two faculty positions focused on identifying and hiring (1) candidates utilizing structural and biophysical approaches to study problems related to gene regulation and cancer, or (2) candidates studying chromatin structure and epigenetic mechanisms underlying gene expression. We look forward to jointly hiring these faculty as partial appointments in your department, and 2-3 additional faculty in the areas of protein nucleic acid interactions outlined in your proposal as partial faculty in our department. I would expect that these hires would be 70% in their primary department, and 30% in their secondary department. How to handle the startup and salary will need to be negotiated by the Deans, but one reasonable scenario is dividing it based on percentage appointment.

I am extremely encouraged by recent events, in particular interactions with faculty in your department and our plan to begin a joint research in progress series as a forum for both faculty and students to present their work. This type of interaction will further bridge the gap between the Biochemistry units and hopefully will lead to collaborative projects, joint publications and new grant applicaiotns. We look forward to working with the Departments of Biochemistry and Chemistry to enhance training and research in the discipline of Biochemistry at OSU. Together we can become a national and international force in Biochemistry.

Sincerely,

Michael Ostrowski
Professor & Chair
Molecular and Cellular Biochemistry

THE OHIO STATE UNIVERSITY

Department of Chemistry

Newman and Wolfrom Laboratory
100 West 18th Avenue
Columbus, OH 43210-1185
www.chemistry.ohio-state.edu

Professor Malcolm H. Chisholm
Phone: 614-247-6348
FAX: 614-292-0368
chisholm@chemistry.ohio-state.edu

November 10, 2008

Professor Michael Chan
Interim Chair, Department of Biochemistry
The Ohio State University
148 Riffe Bldg.
496 W. 12th Avenue
Columbus, OH 43210

Dear Michael,

As you go forward with your strategic plan, I want to assure you that chemistry is keen to increase its interactions with biochemists in the Department of Biochemistry. We already have a number of faculty who hold joint appointments and I expect this number to increase as a result of new appointments to our department and because some existing faculty will seek joint appointments. These appointments will need to be approved under the provisions of the department's Patterns of Administration. This having been stated I can well imagine that in our future hiring over the next few years, up to three new appointments will seek a joint appointment with the Department of Biochemistry.

Good luck in your endeavors to strengthen biochemistry at OSU.

Sincerely yours,

Malcolm H. Chisholm
Department Chair and Distinguished University Professor

MHC:sdk

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Bell, Charles E.	Associate Professor of Molecular and Cellular Biochemistry
eRA COMMONS USER NAME Bell489	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Bucknell University, Lewisburg PA	B.S. Chem	1987-1991	Chemistry
University of California at Los Angeles	Ph.D.	1991-1996	Chem. & Biochem.
University of Pennsylvania, Philadelphia PA	Post Doc	1997-2001	Biochem. & Biophys.

A. Positions and Honors.

Positions and Employment

2008- Adjunct Associate Professor, Department of Biochemistry, Ohio State University
2007- Associate Professor, Department of Molecular and Cellular Biochemistry, Ohio State University, College of Medicine and Public Health
2001-2007 Assistant Professor, Department of Molecular and Cellular Biochemistry, Ohio State University, College of Medicine and Public Health
2001-present Member, Ohio State University Comprehensive Cancer Center
2001-present Member, NIH Chemistry/Biology Training Grant Program, Ohio State University

Other Experience and Professional Memberships

1993 Member, Protein Society
1993 Member, American Crystallographic Association
1997 Member, American Association for the Advancement of Science
2004 Member, Biophysical Society
2005 Science Reviewer, Prostate Cancer Research Program, Department of Defense
2006-2007 Science Reviewer, Breast Cancer Study Section, Department of Defense
2006 Science Reviewer, Cancer Research UK
2006- Science Reviewer, Advanced Photon Source General User Program
2007-2008 Science Reviewer, American Cancer Society, Genetic Mechanisms in Cancer Study Section, ad hoc member
2008 Science Reviewer, NIH Fellowships Panel in Biophysics and Biochemistry, ad hoc member

Honors

1990 NSF Summer Research Stipend Recipient at Bucknell University
1990 Sigma Xi Scientific Research Society, nominated member, Bucknell University chapter
1992 Departmental Prize for Excellence in the First Year of Graduate Study, Department of Chemistry and Biochemistry, UCLA
1993-1995 NIH Cellular and Molecular Biology Training Grant, Department of Chemistry and Biochemistry, UCLA
1994 Bauer prize for Excellence in Research, Department of Chemistry and Biochemistry, UCLA
1995-1996 Dissertation Year Fellowship, UCLA
1998-2000 NIH Post-Doctoral Fellowship (3-year Individual NRSA), University of Pennsylvania. Title: "Structural Studies of the *E. coli* Lactose Repressor"
2006 Ohio State University College of Medicine School of Biomedical Sciences Excellence in Research and Teaching Award

B. Selected peer-reviewed publications (of 28 total in chronological order).

1. Bell, C.E., and Lewis, M. (2000) A closer view of the conformation of the Lac repressor bound to operator. *Nat. Struct. Biol.* 7, 209-214.
2. Bell, C.E., Frescura, P., Hochschild, A., and Lewis, M. (2000) Crystal structure of the λ repressor C-terminal domain provides a model for cooperative operator binding. *Cell* 101, 801-811.
3. Rajan R., Zhu, J., Hu, X., Pei, D., and Bell, C.E. (2005) Crystal structure of S-Ribosylhomocysteinase (LuxS) in complex with a catalytic 2-ketone intermediate. *Biochemistry* 44, 3745-3753.
4. Bohl, C.E., Gau, W., Miller, D.D., Bell, C.E., and Dalton, J.T. (2005) Structural basis for antagonism and resistance of bicalutamide in prostate cancer. *Proc. Natl. Acad. Sci. USA* 102, 6201-6206.
5. Bohl, C.E., Miller, D.D., Chen, J., Bell, C.E., and Dalton, J.T. (2005) Structural basis for accommodation of nonsteroidal ligands in the androgen receptor. *J. Biol. Chem.* 280, 37747-37754.
6. Wilson, R.C., Bohlen, C.J., Foster, M.P., and Bell, C.E. (2006) Structure of Pfu Pop5, an archaeal RNase P protein. *Proc. Natl. Acad. Sci. U.S.A.* 103, 873-878.
7. Rajan, R., Wisler, J.W., and Bell, C.E. (2006) Probing the sequence specificity of *E. coli* RecA protein. *Nucl. Acids. Res.* 34, 2463-2471.
8. Wu, Z., Xing, X., Bohl, C.E., Dalton, J.T., and Bell, C.E. (2006) Domain structure and DNA binding regions of beta protein from bacteriophage lambda. *J. Biol. Chem.* 281, 25205-25214.
9. Ndjonka, D., and Bell, C.E. (2006) Structure of a hypercleavable monomeric fragment of phage lambda repressor containing the cleavage site region. *J. Mol. Biol.* 362, 479-489.
10. Bohl, C.E., Wu, Z., Miller, D.D., Bell, C.E., and Dalton, J.T. (2007) Crystal structure of the T877A human androgen receptor ligand-binding domain complexed to cyproterone acetate provides insight for ligand-induced conformational changes and structure-based drug design. *J. Biol. Chem.* 282, 13648-13655.
11. Pauff, J.M., Zhang, J., Bell, C.E., Hille, C.R. (2008) Substrate orientation in xanthine oxidase, crystal structure with 2-hydroxy-6-methylpurine. *J. Biol. Chem.* 283, 4818-4824.
12. Bohl, C.E., Wu, Z., Chen, J., Mohler, M.L., Yang, J., Hwang, D.J., Mustafa, S., Miller, D.D., Bell, C.E., and Dalton, J.T. (2008) Effect of B-ring substitution pattern on binding mode of propionamide selective androgen receptor modulators. *Bioorg. Med. Chem. Lett.* 18, 5567-5570.
13. Galkin, V.E., Yu, X., Bielnicki, J., Ndjonka, D., Bell, C.E., and Egelman, E.H. (2008) Cleavage of bacteriophage λ cI repressor involves the RecA C-terminal domain. *J. Mol. Biol.* In the press.

C. Research Support.

Ongoing Research Support

RO1 GM067947-04 Bell (PI) 05/01/03-04/30/09
NIH/NIGMS
Structural Studies of RecA-DNA complexes.
The major goals of the project are to determine the crystal structures of *E. coli* RecA protein in new crystal forms and in complex with DNA and ATP analogs.
Role: Principal Investigator

R01 AI062901 Pei (PI) 07/01/2005-03/31/2010
NIH/NIAID
Mechanism and Inhibition of S-Ribosylhomocysteinase (LuxS)
The goal of this project is to elucidate the molecular mechanism of autoinducer synthesis and design inhibitors to block bacterial quorum sensing as a novel antibacterial strategy.
Role: Co-Investigator

RO1 GM62820 Pei (PI) 07/01/2007-3/31/2011
NIH/GMS
Recognition and Catalysis of Phosphotyrosyl Proteins.
The goals of the project are to determine the substrate specificity of PTPs, to develop PTP inhibitors, to determine the sequence specificity of SH2 domains, and to develop SH2 domain inhibitors.
Role: Co-Investigator

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Caroline Anna Breitenberger	Associate Dean, College of Biological Sciences Director, Center for Life Sciences Education Associate Professor, Biochemistry
eRA COMMONS USER NAME (credential, e.g., agency login)	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Ohio University, Athens, OH	BS	1972-1976	Chemistry
University of North Carolina, Chapel Hill, NC	PhD	1976-1981	Chemistry
Massachusetts Institute of Technology, Cambridge, MA		1981-1986	Chemistry/Biology

Please refer to the application instructions in order to complete sections A, B, and C of the Biographical Sketch.

A. Positions and Honors

Positions Held

1986-2008 Assistant, Associate Professor, Department of Biochemistry, The Ohio State University
1986-2008 Member: Program in Molecular, Cellular and Developmental Biology (MCDB) and Ohio State Biochemistry Program (OSBP), The Ohio State University
1998-2008 Associate Dean, College of Biological Sciences, The Ohio State University
2006-2008 Director, Center for Life Sciences Education, The Ohio State University

Honors

1975 Phi Beta Kappa
1977 Graduate Teaching Fellowship for Outstanding Teaching Abilities
1982 NIH Postdoctoral Fellowship
1987 NIH FIRST Award
1994 NSF Career Advancement Award
1995 Alumni Distinguished Teaching Award, Ohio State University
1997, 2006 Sphinx & Mortar Board Outstanding Faculty Award
2005 Outstanding Service Award, Assoc. for Women in Science, Central Ohio Chapter
2007 Honorary faculty member, Mortar Board

B. Selected Peer-reviewed Publications

M.A. Wolfe and **C.A. Breitenberger** (1995) Mutational Analysis of the Effector Domain of Elongation Factor G. *Proc. Miami BioTechnology Winter Symposia* **6**, 37.

B. Chen, A.R. Kubelik, S. Mohr and **C.A. Breitenberger** (1996) Cloning and characterization of the *Neurospora crassa cyt-5* gene: A nuclear-coded mitochondrial RNA polymerase with a poly-glutamine repeat. *J. Biol. Chem.* **271**, 6537-6544.

S.T. Abedon, **C.A. Breitenberger**, E.E. Roden, and J.B. Williams (2007) Respiration. In Sven Erik Jorgensen and Brian D. Fath (Editor-in-Chief), Ecological Processes. *Encyclopedia of Ecology* **4**, 3010-3020

C. Selected Research Support

- National Science Foundation Louis Stokes Alliance for Minority Participation; "Ohio Science and Engineering Alliance;" $3,500,000; 2003-2008 (Jean Girves, P.I.) (1% time, Steering Committee member)
- Battelle Endowment for Technology and Human Affairs (BETHA); "Conferences on Ethics in Science, Technology and Medicine and Workshops for Women in Science (Grades 7-12);" $50,000; 1998-2000 (P.I.)
- NSF Career Advancement Award; "Structure-Function Analysis of Protein Synthesis Elongation Factor G;" $22,100; 1994-1996 (P.I.)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Charles L. Brooks	Professor of Biochemistry and Laboratory Medicine
eRA COMMONS USER NAME (credential, e.g., agency login) brooks08	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Michigan State University	BS	1971	Microbiology
Michigan State University	PhD	1976	Cell Biology and Endocrinology

ADDITIONAL TRAINING

1976 -1979 Post-Doctoral Fellow, University of Chicago, Ben May Lab for Cancer Research
1979 -1981 Post-Doctoral Fellow, University of Iowa, Department of Physiology and Biophysics
1981 -1983 Post-Doctoral Fellow, Washington University School of Medicine

PROFESSIONAL EXPERIENCE

1983–present Department of Veterinary Biosciences, The Ohio State University
1984-present The Graduate School, The Ohio State University
1984-1999 Department of Pathology, College of Medicine, The Ohio State University
1988-present Department of Animal Science, College of Agriculture, The Ohio State University
1989-present Member: Ohio State Biochemistry Program
1997-present Member: Ohio State Biophysics Program
2000-present Department of Biochemistry, Ohio State University

PROFESSIONAL HONORS and ACTIVITIES (selected)

1976 -1979 Public Health Service Postdoctoral Fellow
1980 Sigma Xi
1991 -1996 Research Career Development Award
1991 Diplomat, American Board of Clinical Chemistry
1996 -1999 Editorial Board, American Journal of Veterinary Research
1993 - pres. Ad hoc Reviewer: N.I.H., N.S.F. and U.S.D.A.
1990, 93 & 98 Speaker Gordon Research Conferences (Prolactin and Mammary Gland Biology)
1999 Fellow, National Academy of Clinical Biochemistry
2002 Teaching Excellence Award for Graduate Education, The Ohio State University
2006 Award for Creative Teaching, College of Veterinary Medicine, The Ohio State University

PROFESSIONAL SOCIETY MEMBERSHIPS (selected)

American Chemical Society
American Society for Biochemistry and Molecular Biology
Protein Society

COMMITTEE ASSIGNMENTS (selected)

Member, Campus Chemical Instrumentation Center (CCIC) Steering Committee (1995-2000).
Member, CCIC Mass Spectrometry Committee, (1996-present, Chairperson 1996-1998)
University Radiation Safety Committee (1995-1999, Chairperson, 1998-1999)
Ohio State Biochemistry Program, Graduate Studies Committee (1999-2003)
Veterinary Biosciences, Graduate Studies Committee (1995-2005)
Director, Molecular Biology and Biochemistry Core, College of Veterinary Medicine (2002-present)
Chairperson Committee on Academic Freedom and Responsibility (2007-2008).
University Senator (2006-present)

SELECTED RECENT RESEARCH PUBLICATIONS: (from approximately 90 peer-reviewed publications)

1. Maciejewski, P.M., Peterson, F.C., Anderson P.J., and Brooks, C.L.. Mutation of Serine 90 to Glutamic Acid Mimics Phosphorylation of Bovine Prolactin. Journal of Biological Chemistry 270, 27661-27665 (1995)

2. Peterson, F.C. and Brooks, C.L. Identification of a Motif Associated with the Lactogenic Actions of Human Growth Hormone. J. Biol. Chem. 272:21444-21448 (1997).
4. Frangione-Beebe, M., Albrecht, B., Dakappagari, N., Rose, R.T, Brooks, C.L., Schwendeman, S.P., Lairmore, M.D. and Kaumaya, P.T.P. Enhanced Immunogenicity of a Conformational Epitope of Human T-Lymphotropic Virus Type 1 using a Novel Chimeric Peptide. Vaccine 19: 1068-1081 (2001).
6. Zhang, X., Glendening, C., Link, H., Parks, C.L., Brooks, C.L., Uden, S.A. and Oglesbee, M. Identification and Characterization of a Regulatory Domain on the Carboxy Terminus of Measles Virus Nucleocapsid Protein. Journal of Virology 76: 8737-8746 (2002).
8. Duda, K.M. and Brooks, C.L., Identification of Residues Outside the Two Binding Sites that are Critical for the Lactogenic Activity of Human Growth Hormone. J. Biol. Chem. 278: 22734-22739 (2003).
9. Duda, K.M. and Brooks, C.L., Differential Effects of Zinc on Functionally Distinct Human Growth Hormone Mutations. Protein Engineering 16: 531-534 (2003).
10. Svensson, M., Fast, J., Mossberg, A.-K., Duringer, C., Gustafsson, L., Hallgren, O., Brooks, C.L., Berliner, L., Linse, S. and Svanborg, C. α-Lactalbumin Unfolding is Not Sufficient to Cause Apoptosis but is Required for the Conversion to Hamlet (human α-lactalbumin made lethal to tumor cells). Protein Science 12: 2794-2804 (2003).
11. Peterson, F.C. and Brooks, C.L., Mini-helix-1 is Required for Lactogenic But Not Somatotrophic Activity of Human Lactogenic Hormones. Protein Engineering, Design and Selection, 17: 417-424 (2004).
12. Sivaprasad, U. and C.L. Brooks, Mechanism of Ordered Lactogen Receptor Binding by Human Prolactin. Biochemistry, 43: 13755-13765 (2004).
13. Permyakov S.E., Makhatadze G.I., Owenius R., Uversky V.N., Brooks C.L., Permykov, E.A. and Berliner, L.J., How to Improve Nature: Study of the Electrostatic Properties of the Surface of α-Lactalbumin. Protein Engineering, Design and Structure 18: 425-422 (2005).
14. Schenck, E.J.H. and Brooks, C.L., Effects of S85E Bovine Growth Hormone in Transgenic Mice. Experimental Biology and Medicine 231: 296-302 (2006).
15. Chaudhury C., Brooks C.L., Carter D.C., Robinson J.M. and Anderson C.L. Albumin Binding to FcRn: Distinct from the FcRn-IgG Interaction. Biochemistry,45: 4983-4990 (2006).
16. Liu, T., Joo, S.H., Voorhees, J.L., Brooks, C.L. and Pei D. Synthesis and Screening of a Cyclic Peptide Library: Discovery of Small-Molecule Ligands against Human Prolactin Receptor. Bioorganic & Medicinal Chemistry, 2008 doi:10.1016/j.bmc.2008.01.015)

RESEARCH PROJECTS ONGOING OR COMPLETED DURING THE LAST 3 YEARS:

The principal focus of the Brooks Laboratory is the identification of functional motifs in proteins and the elucidation of their mechanisms. This focus is pursued by several complementary technologies that include: molecular genetics, biochemistry, modeling, and biophysical techniques including surface plasmon resonance, calorimetry, circular dichroism, fluorescence, UV spectroscopy, and site-directed EPR.

Title: **Functional Motifs in Human Lactogens**
P.I. **Charles L. Brooks**
Funding: **N.I.H., R01 DK56117 and DK56117-02S1 (8/01/99 to 7/30/04)**

Our understanding of the protein mechanics of lactogen action have allowed us to design and build a highly potent prolactin antagonist that binds the prolactin receptor with a higher affinity but has a lactogenic activity reduced by greater than 10,000-fold. This rationally designed protein has recently been tested for its abilities to influence established cell lines from human breast tumors; results from both morphologic and gene-chip experiments demonstrate that our prolactin antagonist induces apoptosis (15). We have developed and characterized a lead hPRL antagonist and documented that it induces a robust apoptosis in cells derived from human breast tumors. The Ohio State University has filed a provisional patent that claims proprietary rights to this mechanism, all hPRL antagonists derived from this mechanism, and the use of such compounds as pharmaceutical agents.

Patent Applications submitted:

Antagonist for Human Prolactin, filed 12/12/03 U.S. Patent and Trademark Office

Title: **Kinetics and Energetics of Prolactin Receptor Binding**
P.I. **Charles L. Brooks**

Funding: N.I.H., R01 DK072275 (8/01/05 to 7/30/09)

We propose to use several newly-developed approaches to identify the contributions of individual residues to hPRL/hPRLr binding and biological activity, as well as determine the mechanistic details of binding.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Bundschuh, Ralf	Associate Professor of Physics and Biochemistry

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Cologne	Diplom	1987-1993	Physics and Math.
Max Planck Institute for colloid and interface res.	Ph.D.	1993-1996	Polymer physics
University of Cologne	Postdoc.	1996-1997	Cond. matter physics
University of California at San Diego	Postdoc.	1997-2001	Biophysics

A. Positions and Honors.

Positions and Employment

1993-1994 Research assistant, Forschungszentrum Juelich
1994-1996 Research assistant, Max-Planck-Institute for colloid and interface research
1996-1997 Postgraduate researcher, University of Cologne
1997-2001 Postgraduate researcher, University of California at San Diego
2001-2006 Assistant professor, The Ohio State University
since 2006 Associate professor, The Ohio State University

Other Experience and Professional Memberships

1999- Reviewer: Science, Nature, PNAS, Physical Biology, Biophysical Journal, Journal of Computational Biology, Bioinformatics, Nucleic Acids Research, RNA Biology, Physical Review Letters, Physical Review E, Europhysics Letters, European Physical Journal B, Journal of Theoretical Biology, Journal of Physical Chemistry
2001- Moderator of the “Genomics” and “Quantitative Methods” subsections of the quantitative biology preprint server on arXiv.org
2003- Ad hoc grant reviewer for: National Science Foundation, Department of Energy, Israel Science Foundation, German Science Foundation, Dutch Science Foundation, Los Alamos National Laboratory, US-Israeli Binational Science Foundation, Ohio Supercomputer Center
2004- Editorial Board Member, Physical Review E
2004- Member of several review panels of the National Science Foundation
2004-2006 Nominating Committee Member, Division of Biological Physics of the American Physical Society
2004 Ad hoc member of a Board of Scientific Counselors for the National Center for Biotechnology Information
2004 Co-organizer of workshop on “Regulatory Networks” at the Mathematical Biosciences Institute
2005- Member, local scientific advisory board of the Mathematical Biosciences Institute
2005 Chair, organizing committee for the “Biological Membranes” workshop at the Ohio Center for Technology and Science
2006 Vice-Chair, Rustbelt RNA meeting
2006- Co-director of the interdisciplinary Biophysics Graduate Program at OSU
2007 Chair, Rustbelt RNA meeting

Honors

1999 Outstanding paper award at the Seventh International Conference on Intelligent Systems for Molecular Biology (ISMB 1999), Heidelberg
2000 Best paper by young scientist award at the Forth Annual International Conference on Computational Molecular Biology (RECOMB 2000), Tokyo
2005 Dr. Elizabeth L. Gross award for faculty excellence

B. Selected peer-reviewed publications (in chronological order).

Fastenrath, U., Adams, G., Bundschuh, R., Hermes, T., Raab, B., Schlosser, I., Wehner, T., and Wichmann, T. (1991) Universality in the 2D localization problem. *Physica A* **172**, 302-308.

Everaers, R., **Bundschuh, R.**, and Kremer, K. (1995) Fluctuations and stiffness of double-stranded polymers: railway-track model, *Europhys. Lett.* **29**, 263-268.

Bundschuh, R., Cassanello, C., Serban, D., and Zirnbauer, M. (1998) Localization of quasiparticles in a disordered vortex. *Nucl. Phys. B* **532**, 689-732.

Bundschuh, R., and Hwa, T. (1999) RNA secondary structure formation: a solvable model of heteropolymer Folding. *Phys. Rev. Lett.* **83**, 1479-1482.

Bundschuh, R. (2000) An Analytic Approach to Significance Assessment in Local Sequence Alignment with Gaps. *Proceedings of the Fourth Annual International Conference on Computational Molecular Biology (RECOMB 2000)*, 86-95 (ACM press, New York, NY, 2000).

Altschul, S., **Bundschuh, R.**, Olsen, R., and Hwa, T. (2001) The Estimation of Statistical Parameters for Local Alignment Score Distributions. *Nucleic Acids Research* **29**, 351-361.

Gerland, U., **Bundschuh, R.**, and Hwa, T. (2001) Force-induced denaturation of RNA. *Biophys. J.* **81**, 1324-1332.

Bundschuh, R., and Hwa, T. (2002) Phases of the secondary structures of RNA sequences. *Europhys. Lett.* **59**, 903-909.

Bundschuh, R., Hayot, F., and Jayaprakash, C. (2003) The role of dimerization in noise reduction of simple genetic networks. *J. Theor. Biol.* **220**, 261-269.

Gerland, U., **Bundschuh, R.**, and Hwa, T. (2004) Translocation of structured polynucleotides through Nanopores. *Phys. Biol.* **1**, 19-26.

Bundschuh, R. (1004) Computational prediction of RNA editing sites. *Bioinformatics* **20**, 3214-3220.

Layton, D.M., and **Bundschuh, R.** (2005) A Statistical Analysis of RNA Folding Algorithms Through Thermodynamic Parameter Perturbation. *Nucleic Acids Res.* **33**, 519-524.

Gott, J.M., Parimi, N., and **Bundschuh, R.** (2005) Discovery of new genes and deletion editing in *Physarum* mitochondria enabled by a novel algorithm for finding edited mRNAs. *Nucleic Acids Res.* **33**, 5063-5072.

Bundschuh, R., and Gerland, U. (2005) Coupled dynamics of RNA folding and nanopore translocation. *Phys. Rev. Lett.* **95**, 208104/1-208104/4.

Itaya, A., Zhong, X., **Bundschuh, R**., Qi, Y., Wang, Y., Takeda, R., Harris, A.R., Molina, C., Nelson, R.S., and Ding, B. (2007) A structured viroid RNA is substrate for dicer-like cleavage to produce biologically active small RNAs but is resistant to RISC-mediated degradation. *J. Virol.* **91**, 2980-2994.

Habib, F., Johnson, A.D., **Bundschuh, R.**, and Janies, D. (2007) Large scale genotype-phenotype correlation analysis based on phylogenetic trees. *Bioinformatics* **23**, 785-788.

Bundschuh, R. (2007) Computational approaches to insertional RNA editing. *Meth. Enzym.* **424**, 173-195.

Lee, M., **Bundschuh, R.**, and Chan, M. (2007) Distant Homology Detection Using a Length and Structure-based Sequence Alignment Tool (LESTAT). *Proteins* **71**, 1409-1419.

Djordjevich, M., and **Bundschuh, R.** (2008) Formation of the Open Complex by Bacterial RNA Polymerase – a Quantitative Model. *Biophys. J.* **94**, 4233-4248.

Lee, M., Chan, M., and **Bundschuh, R.** (2008) Simple is beautiful: a straightforward approach to improve the delineation of true and false positives in PSI-BLAST searches. *Bioinformatics* **24**, 1339-1343.

Beargie, C., Liu, T., Corriveau, M., Lee, H.Y., Gott, J., and **Bundschuh, R.** (2008) Genome annotation in the presence of insertional RNA editing. *Bioinformatics*, *in press*.

C. Research Support

9/07-8/10 **National Science Foundation DMR-0706002**, "Statistical Physics Approaches to RNA Editing". Principle investigator, the overall goal of this project is to use methods from statistical physics such as optimization on complex energy landscapes to find genes and predict editing sites in the presence of insertional RNA editing

9/05-8/09 **American Chemical Society PRF #42555-G9**, "Translocation of structured polymers through nanopores".
Principle Investigator, the overall goal of this project is to quantitatively model the translocation of RNA molecules through pores that are so small that the molecule has to unfold to pass as a single strand

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Chan, Michael K.	Professor
eRA COMMONS USER NAME MCHAN1	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Harvey Mudd College, CA	B.S.	1982-1986	Chemistry
University of California, Berkeley, CA	Ph.D.	1986-1991	Inorganic Chemistry
California Institute of Technology, Pasadena, CA	Postdoc	1991-1995	Protein Crystallography

A. Positions and Honors.

Positions and Employment

1991-1995 Postdoctoral Research Associate, Department of Chemistry, California Institute of Technology, Pasadena, CA (Advisor: Professor Douglas C. Rees).
1995-2001 Assistant Professor, Departments of Chemistry and Biochemistry, The Ohio State University, Columbus, OH.
2001-2005 Associate Professor of Chemistry and Biochemistry, The Ohio State University, Columbus, OH
2005-present Professor of Chemistry and Biochemistry, The Ohio State University, Columbus, OH
2008-present Interim-Chair of Biochemistry, The Ohio State University, Columbus, OH

Honors and Other Professional Activities

1984 Lando-SOHIO Fellowship, University of Minnesota
1985 Sigma Xi
1986 Phi-Lambda Upsilon
1986 Regents Fellowship, University of California
1991 Amoco Foundation Fellowship in Chemistry
1992-1995 NIH Postdoctoral Fellowship
2000 NSF Career Award
2000 Alfred P. Sloan Fellowship
2001 Adhoc, NIH Study Section - Physical Biochemistry
2001 Adhoc, NIH Study Section - BMT
2002-2005 Member, NIH Study Section - BMT
2004 Dean's Award for Research and Graduate Education (OSU)
2005-2006 Member, NIH Study Section – MSFA
2006 Visiting Scholar of the National Research Council of the Republic of China (2006)
2006 Japan Society for Promotion of Science Fellowship (2006)

B. Selected peer-reviewed publications (out of 54).

1. Fekner, T.; Li, X.; Lee, M.M.; Chan, M.K., “A pyrrolysine analog for protein click chemistry” *Angew.Chem.*, *accepted*.
2. Li, W.-T.; Mahapatra, A.; Longstaff, D.G.; Bechtel, J.; Zhao, G.; Kang, P.T.; Chan, M.K.; Krzycki, J.A., “Specificity of pyrrolysyl-tRNA synthetase for pyrrolysine and pyrrolysine analogs” *JMB*, *in press.*
3. Gong, W.; Hao, B.; Wei, Z.; Ferguson, D.J. Jr.; Tallant, T.; Krzycki, J.A.; Chan, M.K., “Structure of the CODH component of the *M. barkeri* ACDS complex” *Proc. Natl. Acad. Sci. USA* **2008**, 105, 9558-63.

4. Lee, M.M.; Chan, M.K.; Bundschuh, R., “Simple is beautiful: a straightforward approach to improve the delineation of true and false positives in PSI-BLAST searches” *Bioinformatics*, **2008**, 24, 1339-43.
5. Lee, M.M.; Bundschuh, R.; Chan, M.K., “Distant homology detection using a LEngth and STructure-based sequence Alignment Tool (LESTAT)” *Proteins* **2008**, 71, 1409-19.
6. Isaza, C.E.; Zhong, X.; Rosas, L.E.; White, J.D.; Chen, R.P.-Y.; Liang, G.F.-C.; Chan, S.I.; Satoskar, A.R.; Chan, M.K., “*Leishmania major* carboxypeptidase: a proposed role in pathogens” *Biochem. Biophys. Res. Commun.* **2008**, 373, 25-9.
7. Li, X.; Jayachandran, S.; Nguyen, H.H.-T; Chan, M.K. “Structure of the *Nitrosomonas europaea* Rh protein” *Proc. Natl. Acad. Sci. USA* **2007**, 104, 19279-19284.
8. Jain, R.; Chan, M.K., “Support for a potential role of *E. coli* oligopeptidase A in protein degradation”, *Biochem. Biophys. Res. Commun.* **2007**, 359, 486-90.
9. Chan, S.I.; Wang, V.C.-C.; Lai, J.C.-H.; Yu, S.S.-F.; Chen, P.P.-Y.; Chen, K.H.-C.; Chen, C.-L.; Chan, M.K., “Redox potentiometry studies of particulate methane monooxygenase: Support for a trinuclear copper cluster active site” *Angew. Chem. Int. Ed.*, **2007**, 46, 992-4.
10. Isaza, C.E.; Silaghi-Dumitrescu, R.; Iyer, R.B.; Kurtz, Jr, D.M.; Chan, M.K, “Structural basis for O_2 sensing by the hemerythrin-like domain of a bacterial chemotaxis protein: substrate tunnel and fluxional N-terminus” *Biochemistry*, **2006**, 45, 9023-31.
11. Jain, R., Hao, B. Liu, R.-P, Chan, M.K., “Structures of *E. coli* peptide deformylase bound to formate: insight into the preference for Fe^{2+} over Zn^{2+} as the active site metal” *J. Am. Chem. Soc.*, **2005**, 127, 4558-9.
12. Hao, B., Zhao, G., Kang, P.T., Soares, J.A., Ferguson, T.K., Gallucci, J., Krzycki, J.A., Chan, M.K., “Reactivity and chemical synthesis of *L*-pyrrolysine - the 22nd genetically-encoded amino acid” *Chem. Biol.*, **2004**, 11, 1317-24. (cited in *C&E News*)
13. Blight, S.K.; Larue, R.C., Mahapatra, A., Longstaff, D.G., Chang, E. Zhao, G., Kang, P., Green-Church, K.B., Chan, M.K., Krzycki, J.A., “Direct charging of $tRNA^{CUA}$ with pyrrolysine *in vitro* and *in vivo*” *Nature*, **2004**, 431, 333-5. (cited in *Nature*, *C&E News*)
14. Hao, B., Gong, W., Ferguson, T.K., James, C.M., Krzycki, J.A., Chan, M.K., “Identification of novel UAG encoded residue: structure of a methanogen methyltransferase” *Science*, **2002**, 296, 1462-1466. (cited in *C&E News*, *Nature, Science,* CNN Headline News, Reuters)
15. Gong, W., Hao, B., Mansy, S.S., Gonzalez, G. Gilles-Gonzalez, M.A., Chan, M.K., “Structure of a biological oxygen sensor: a new mechanism for heme-driven signal transduction” *Proc. Natl. Acad. Sci. USA*, **1998**, 95, 15177-15182.
16. Chan, M.K., Mukund, S., Kletzin, A., Adams, M.W.W., Rees, D.C., "The 2.3Å resolution structure of the tungstoprotein aldehyde ferredoxin oxidoreductase from the hyperthermophilic archaeon *Pyrococcus furiosus*" *Science*, **1995**, 267, 1463-1469.
17. Chan, M.K., Kim, J., Rees, D.C., "The nitrogenase FeMo-cofactor and P-cluster pair: 2.2 Å resolution structures" *Science*, **1993**, 260, 792-794.
18. Chan, M.K., Armstrong, W.H. “A tetranuclear manganese complex that consists of a di-alkoxo-bridged dimer of di-oxo-bridged dimers, $[(Mn_2O_2)_2(tphpn)_2]^{4+}$. Toward a model for the water oxidation catalyst in photosystem II”,*J. Am. Chem. Soc.*, **1991**, 113, 5055-5057.

C. Research Support.

Ongoing Research Support

RO1 GM61796 Chan (PI) 7/1/05-6/30/09
National Institutes of Health
L-Pyrrolysine Chemical and Structural Biology
The long term objective of this project is to elucidate the structures of L-pyrrolysine-containing proteins and proteins involved in L-pyrrolysine incorporation.

Pending Research Funding

PI: Chan; Co-PI: Donald Dean 12/1/08-11/30/10
National Institutes of Health Score: 125
Structural Studies of *Bacillus thuringiensis* Cry toxins
The long-term objective of this project is to determine the structure of a Cry toxin in its membrane inserted conformation.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Ross E. Dalbey	Professor of Chemistry
eRA COMMONS USER NAME dalbey	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Washington, Seattle, WA	B.S.	1978	Chemistry
Washington State University, Pullman, WA	Ph.D.	1983	Biochemistry
University of California, Los Angeles, CA			Molecular Biology

A. Positions and Honors.

Positions and Employment

1977	Research Assistant, University of Washington, Seattle, WA
1978-1983	Research Assistant, Washington State University, Pullman WA (Advisor: Dr. Ralph Yount)
1983-1987	Postdoctoral Fellow, University of California, Los Angeles, CA (Advisor: Dr. William Wickner)
1988-1993	Assistant Professor of Chemistry, The Ohio State University, Columbus, OH
1993-1998	Associate Professor of Chemistry, The Ohio State University, Columbus, OH
1999	Professor of Chemistry, The Ohio State University, Columbus, OH

Honors

1988-1991	American Cancer Junior Faculty Research Award
1996-1999	Review panel Member for Ford Foundation Fellowship Programs
1998-2000	Member of the Cell Biology NSF Review Panel
1997-2002	Editorial Board, *Journal of Biological Chemistry*
2001	Adhoc Reviewer for the Microbial Physiology NIH study section
2005	Adhoc Reviewer of Prokaryotic Cell and Molecular Biology NIH study section
2005	Co-chair of the "Protein Transport Across Cell Membranes" Gordon Conference

B. Selected peer-reviewed publications (in chronological order).

(Selected from 98 peer reviewed publications)

1. Paetzel, M., Dalbey, R. E., and Strynadka, N. C. J. (1998). "Crystal Structure of a Bacterial Signal Peptidase Complex with a ß-lactam Inhibitor", *Nature*, **396,** 186-190.
2. Dalbey, R. E. and Kuhn, A. (2000). "Evolutionarily Related Insertion Pathways of Bacterial, Mitochondrial and Thylakoid Membrane Proteins", *Ann. Rev. Cell Develop. Biol*., **16**, 51-87.
3. Samuelson, J., Chen, M., Jiang, F., Wiedmann, M., Brunner, J., Phillips, G. and Dalbey, R. E. (2000). "YidC is Required for Membrane Protein Insertion in *E. coli*", *Nature*, **406**, 637-641.
4. Yi, L., Jiang, F., Chen, M., Cain, B., Bolhuis, A. and Dalbey, R. E. (2003). "YidC is Strictly Required for Membrane Insertion of Subunit a and c of the F_1F_0ATP Synthase and SecE of the SecYEG Translocase", *Biochemistry*, **42**, 10537-10544.
5. Jiang, F., Chen, M., Yi, L., de Gier, J-W., Kuhn, A. and Dalbey, R. E. (2003). "Defining the Regions of *Escherichia coli* YidC that Contribute to Activity", *J. Biol. Chem*., **278**, 48965-48972.

6. Kuhn, A., Stuart, R., Henry, R. and Dalbey, R. E. (2003). "The Alb3/Oxa1/YidC Protein Family: Membrane-localized Chaperones Facilitating Membrane Protein Insertion", *Trends in Cell Biol*., **13**, 510-516.
7. Serek, J., Bauer-Manz, G., Struhalla, G., van den Berg, L., Kiefer, D., Dalbey, R. E. and Kuhn , A. (2004). "*Escherichia coli* YidC is a Membrane Insertase for Sec-independent Proteins", *EMBO J*., **23**, 294-301
8. Paetzel, M., Goodall, J. J., Kania, M., Dalbey, R. E. and Page, M. G. P. (2004). "Crystallographic and Biophysical analysis of a bacterial Signal Peptidase Complex with a Lipopeptide-based Inhibitor", *J. Biol. Chem*. **279**, 30781-30790.
9. Yi, L., Celebi, N., Chen, M. and Dalbey, R. E (2004). "Sec/SRP Requirements and Energetics of Subunits a, b, and c of the *Escherichia coli* F_1F_0ATP Synthase", *J. Biol. Chem*., **279**, 39260-39267.
10. Dalbey, R. E. and Kuhn, A. (2004). "YidC Family Members are Involved in the Membrane Insertion, Lateral Integration, Folding and Assembly of Membrane Proteins", *J. Cell Biol*., **166**, 769-774.
11. Dalbey, R. E. and Chen, M. (2004). "Sec-mediated Membrane Protein Biogenesis", *Bioc. Biophys. Acta*., **1694**, 37-53.
12. Karla, A., Lively, M.O., Paetzel, M. and Dalbey, R. E. (2005). The Identification of Residues that Control Signal Peptidase Cleavage Fidelity and Substrate Specificity, *J. Biol. Chem*. **280**, 6731-6741.
13. Chen, M., Xie, K., Yuan, J., Yi, L., Facey, S. J., Pradel, M., Wu, L-F., Kuhn, A. and Dalbey R. E. (2005). Involvement of SecDF and YidC in the Membrane Insertion M13 Procoat Mutants. *Biochemistry* **44**, 10741-10749.
14. Celebi, N., Yi, L., Facey, S. J., Kuhn, A. and Dalbey, R. E. (2006). Membrane Biogenesis of Subunit II of Cytochrome bo Oxidase: Contrasting Requirements for Insertion of N- terminal and C-terminal Domains. *J. Mol. Biol*., **357**, 1428-1436.
15. Xie, K., Kierfer, D., Nagler, G., Dalbey, R. E. and Kuhn, A. (2006). Different Regions of the Nonconserved Large Periplasmic Domain of Escherichia coli YidC Are Involved in the SecF Interaction and Membrane Insertase Activity. *Biochemistry* **45**, 13401-13408.
16. Ekici, O., Karla, A., Paetzel, M., Lively, M. O., Pei, D. and Dalbey, R. E. (2007). Altered -3 Substrate Specificity of Escherichia coli Signal Peptidase 1 Mutants as Revealed by Screening a Combinatorial Library. *J. Biol. Chem*. **282**, 417-425.
17. Yuan, J., Phillips, G. J., and Dalbey, R. E. (2007). Isolation of Cold-sensitive yidC Mutants Provides Insights into the Substrate Profile on the YidC Insertase and the Importance of Transmembrane 3 in YidC Function. *J. Bacteriol*., **189**, 8961-8972.
18. Xie, K., Hessa, T., Seppala, S., Rapp, M., von Heijne, G. and Dalbey, R. E. (2007). Features of Transmembrane Segments that Promote the Lateral Release From the Translocase into the Lipid Phase. *Biochemistry*, **46**, 15153-15161.
19. Celebi, N., Dalbey, R. E. and Yuan, J. (2008). Mechanism and Hydrophobic Forces Driving Membrane Protein Insertion of Cytochrome Bo Oxidase. *J. Mol. Biol.*, **375**, 1282-1292.
20. Xie, K. and Dalbey, R. E. (2008). Inserting Proteins in Bacterial Cytoplasmic Membranes using the Sec and YidC Translocases. *Nature Review- Microbiology* **6**, 234-244.
21. Dong,Y., Palmer, S. R., Hasona, A., Nagamori, S., Kaback, H. R., Dalbey, R. E. and Brady, L. J. (2008). Functional Overlap but Lack of Cross-Complementation of *Streptococcus mutans* and *Escherichia coli* YidC Orthologs. *J. Bacteriol*. **190**, 2458-2469
22. Wang, P., Shim, E., Cravatt, B., Jacobsen, R., Schoeniger, J., Kim, A. C., Paetzel., M. and Dalbey, R. E. (2008). *Escherichia coli* Signal Peptide Peptidase A is a Serine-Lysine protease with a Lysine Recruited to the Nonconserved Amino-terminal Domain in the S49 Protease Family. *Biochemistry*, **47**, 6361-6369
23. Dogan Ekici ,O. Paetzel, M. and Dalbey, R. E. (2008) Unconventional Serine/Threonine Proteases: Variation on the Catalytic Ser/His/Asp triad Configuration. *Protein Science*, in press
24. Klenner, C., Yuan, J., Dalbey, R. E. and Kuhn, A. (2008). The Pf3 Coat Protein Contacts TM1 and TM3 of YidC during Membrane Protein Biogenesis. *Febs Lett*, in press.

Ongoing Research Support

R01 GM63862-05 Dalbey (PI) 06/01/05-05/31/09
NIH/NIGMS
Inner Membrane Protein Assembly in Bacteria

The goals of the project are to determine the substrate specificity of YidC, identify the substrate binding region of YidC, determine the relationship between YidC and partner proteins, and determine the function of YidC in membrane protein biogenesis.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format on preceding page for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Donald H. Dean	Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Texas Christian University, Ft. Worth, TX	B.S.	1965	Biology
Texas Christian University, Ft. Worth, TX	M.S.	1968	Biology
University of Michigan, Ann Arbor	Ph. D.	1972	Cell & Mol. Biol.

Research Experience

1966 Research Assistant, Graduate Research Center of Southwest, Dallas, Texas (now University of Texas at Dallas).
1967-68 Masters thesis research with Dr. J.D. Smith, Texan Christian University
1969-72 Doctoral thesis research with Dr. H.A. Douthit and Dr. A.S. Sussman, at Univ. Michigan
1972-73 Postdoctorate at Washington University, St. Louis, MO with Dr. D. Apirion
1973-75 Postdoctorate at Brandeis University, Waltham, MA with Dr. H.O. Halvorson
1975-80 Assistant Professor of Microbiology, Adjunct Assistant Professor in Genetics, The Ohio State Univ.
1980-86 Associate Professor of Microbiology, Adjunct Associate Professor in Genetics, Member of the Mol., Cell., Develop. Biol. Program, The Ohio State Univ.
1983, 1984 Approved Assigned Research Leave at the Institut Pasteur, Paris France with Dr. Raymond Dedoner (9/1-12/30), Approved Assigned Research Leave at the Institut Pasteur, Paris France with Dr. Raymond Dedoner (9/1-12/30)
1986 Professeur Associe at Universite of Paris VII to conduct research at the Institut Pasteur, Paris France with Drs. Georges Rapaport and Andre Klier.
1986-91 Associate Professor of Biochemistry, Adjunct Associate Professor in Genetics, Member of the Mol., Cell., Develop. Biol. Program, Member of Ohio State Biochem. Program, The Ohio State Univ.
1989-91 Adjunct Associate Professor of Entomology, The Ohio State University
1991-pres. Professor Professor of Biochemistry, Adjunct Professor in Molecular Genetics, Adjunct Professor of Entomology, Member of Ohio State Biochem. Program
1996-pres. Member of the Biophysics Program, The Ohio State Univ.
1999-2001 Associate Director of The Ohio State Biochemistry Program, Chair of Admissions, Chair of the Graduate Studies Committee.
2001-2004 Director of the Ohio State Biochemistry Program and Chair of the Graduate Studies Committee

Selected Publications (out of a total of 121, edited 2 books, authored 5 patents)

1. Alcantara, E., O. Alzate, and D.H. Dean. 2001. Roll of α-helix seven of *Bacillus thuringiensis* Cry1Ab δ-endotoxin in membrane insertion, structural stability and ion channel activity and toxicity. Biochemistry 40: 2540-2547.
2. Lee, M.K., J.L. Jenkins, T.H. You, A. Curtiss, J.J. Son, M.J. Adang and D.H. Dean. 2001. Mutations at the arginine residues in α8 loop of Cry1Ac *Bacillus thuringiensis* δ-endotoxin affect

toxicity and binding to *Manduca sexta* and *Lymantria dispar* aminopeptidase N. FEBS Letts. 497: 108-112.
3. Daniel, A., Sreedhara Sangadala, S., Dean, D.H. and Adang, M.J. 2002 Denaturation of either *Manduca sexta* aminopeptidase N or *Bacillus thuringiensis* Cry1A toxins exposes binding epitopes hidden under non-denaturing conditions. Appl. Environ. Microbiol. 68: 2106-2112.
4. Gómez, I., D.H. Dean, A. Bravo and M. Soberón. 2003. Molecular basis for *Bacillus thuringiensis* Cry1Ab toxin specificity: Two structural determinants in the *Manduca sexta* Bt-R1 receptor interact with loops α-8 and 2 in domain II of cry1Ab toxin. Biochemistry 42:10482-10489.
5. Alcantara, E.P., R.M. Aguda, A. Curtiss, D.H. Dean and M.G. Cohen. 2004. *Bacillus thuringiensis* δ-endotoxin binding to brush border membrane vesicles of rice stem borers. Arch. Insect Biochem. Physiol. 55: 169-177.
6. Lertcanawanichakul, M, C. Wiwit, A. Bhumiratana, and D. H. Dean. 2004. Expression of chitinase-encoding genes in *Bacillus thuringiensis* and toxicity of engineered *B. thuringiensis* subsp. aizawai toward *Lymantria dispar* larvae. Current Microbiol. 48: 175-181.
7. Liu, X.S., Dean, D.H., Redesigning *Bacillus thuringiensis* Cry1Aa toxin into a mosquito toxin, Protein Eng Des Sel. 2006,19: 107-11.
8. Abdullah, M.A., Valaitis, A.P., Dean, D.H., Identification of a *Bacillus thuringiensis* Cry11Ba toxin-binding aminopeptidase from the mosquito, *Anopheles quadrimaculatus*, BMC Biochem. 2006, 7:16.
9. Alzate, O,, You, T., Claybon, M., Osorio, C., Curtiss, A., Dean, D.H. Effects of disulfide bridges in domain I of *Bacillus thuringiensis* Cry1Aa delta-endotoxin on ion-channel formation in biological membranes., Biochemistry. 2006, 45:13597-605.
10. Li, A.Q., Popova-Butler, A., Dean, D.H., Denlinger, D.L., Proteomics of the flesh fly brain reveals an abundance of upregulated heat shock proteins during pupal diapause, J Insect Physiol., 2007, 53:385-91.
11. You, T.H., Lee, M.K., Jenkins, J.L., Alzate, O., Dean, D.H., Blocking binding of *Bacillus thuringiensis* Cry1Aa to *Bombyx mori* cadherin receptor results in only a minor reduction of toxicity, BMC Biochem. 2008. 9:3.
12. Nair, M.S., Liu, X.S., Dean, D.H., Membrane insertion of the *Bacillus thuringiensis* Cry1Ab toxin: single mutation in domain II block partitioning of the toxin into the brush border membrane, Biochemistry. 2008, 47:5814-22.
13. Nair, M.S., Dean, D.H., . All domains of Cry1A toxins insert into insect brush border membranes, J Biol Chem. 2008, 283:26324-31.

Support

Project Number (PI):	R01 AI29092-14 (D.H. Dean)
Source:	NIH
Title of Project (*and/or Subproject*):	Functional domains of *Bacillus thuringiensis* σ-endotoxins
Dates of Approved/Proposed Project:	09/15/03 – 09/14/08
The goal of this project:	To understand the mode of action of mosquitocidal toxins

Project Number (PI):	0000162151 (D.H. Dean)
Source:	H.M Jackson Fdn/U.S. Naval Med. Res. Ctr.
Title of Project:	Evaluation & Advanced Development of Detection Capabilities of Countermeasures Against Biological Threat Agents.
Dates of approved project:	8/31/07-9/1/10.
The goal of this project:	To develop vaccines against biological threat agents

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Foster, Mark P	Associate Professor
eRA COMMONS USER NAME foster.281	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Clarkson University, Potsdam, NY		1983-1985	Chemistry
University of Illinois, Urbana, IL	BS	1986-1987	Chemistry
University of Utah, Salt Lake City, UT	Ph.D.	1987-1993	Medicinal Chemistry
Scripps Research Institute, La Jolla, CA	Postdoc	1993-1997	Structural Biology

Please refer to the application instructions in order to complete sections A, B, and C of the Biographical Sketch.

A. Positions and Honors.

Positions and Employment

1986-1987 Research Associate, Department of Chemistry, University of Illinois-Urbana
1987-1993 Doctoral Candidate, Department of Medicinal Chemistry, University of Utah
1993-1997 Postdoctoral Fellow, Department of Molecular Biology, The Scripps Research Institute
1997-2003 Assistant Professor, Department of Biochemistry, The Ohio State University
2003- Associate Professor, Department of Biochemistry, The Ohio State University
2004- Director, Structural Biology and Molecular Biophysics Division, OSU Biophysics Program

Other Experience and Professional Memberships

1987- Member, American Chemical Society
1993- Member, American Association for the Advancement of Science
1997- Member, Biophysics Graduate Program, The Ohio State University
1997- Member, Protein Society
1998- Member, Chemistry-Biology Training Program, The Ohio State University
2005-2006 Co-organizer, Rustbelt RNA Meeting
1998-2001 *Ad hoc* reviewer for the ACS/Petroleum Research Fund
2001- *Ad hoc* reviewer for NIH (BBCA, BBCB, NCRR, NIEHS, MSF-C, MSF-B)
2001- *Ad hoc* reviewer for NSF MCB
2002- *Ad hoc* reviewer, The Wellcome Trust
2006 *Ad hoc* reviewer for The American Heart Association, Ohio Valley Affiliate
1997- Manuscript reviewer (*Biochemistry, Biophys J., J Biomol NMR, , J Med Chem, J Mol Biol, Nature Struct Biol, Protein Science*)

Honors

1991 Lloyd Library and Museum Travel Grant
1992 NIH/NIGMS NRSA postdoctoral fellowship awardee
1993-1996 American Cancer Society postdoctoral fellow
2001-2007 NSF CAREER Award Recipient

B. Selected peer-reviewed publications (in chronological order).

1. McElroy CA, Manfredo A, Wendt A, Gollnick P and Foster MP, "TROSY-NMR of the 91 kDa TRAP Protein Reveals Allosteric Control of a Gene Regulatory Protein by Ligand-Altered Flexibility." *J. Mol. Biol.* (2002) **323,** 463-47.

2. Murray TA, Foster MP and Swenson RP, “Mechanism of Flavin Mononucleotide Cofactor Binding to the *Desulfovibrio vulgaris* Flavodoxin: II. Evidence for Cooperative Conformational Changes Involving Tryptophan 60 in the Interaction between the Phosphate- and Ring-binding Subsites.” *Biochemistry* (2003) **42**(8), 2317-27.
3. Kamadurai HB, Subramaniam S and Foster MP, “Electrospray Mass Spectrometry Reveals Protein Folding Coupled to DNA Binding in the Catalytic Domain of Bacteriophage Lambda Integrase.” *Protein Science* (2003) **12**(3), 620-6.
4. Subramaniam S, Tewari AK, Nunes-Duby SE and Foster MP, "Dynamics and DNA Substrate Recognition by the Catalytic Domain of Lambda Integrase." *J Mol Biol* (2003) **329**(3), 423-439.
5. Boomershine WP, McElroy CA, Tsai HY, Wilson RW, Gopalan Vand Foster MP, "Structure of Mth11/Mth Rpp29, an essential protein subunit of archaeal and eukaryotic RNase P." *Proc Natl Acad Sci U S A* (2003) **100**(26), 15398-403.
6. Wilson RW, Bohlen CJ, Foster MP and Bell CE, “Structure of Pfu Pop5, an archaeal RNase P protein.” *Proc Natl Acad Sci U S A* (2006) **103** (4), 873-878.
7. McElroy CA, Manfredo A, Gollnick P and Foster M.P., “Thermodynamics of Tryptophan-Mediated Activation of the trp RNA-Binding Attenuation Protein (TRAP).” *Biochemistry* (2006) **45**(25):7844-53.
8. Foster MP, McElroy CA, Amero CD, "Solution NMR of Large Molecules and Assemblies." *Biochemistry* (2007) **46**(2):331-340.
9. Subramaniam S, Kamadurai HB and Foster MP, "Trans Cooperativity by a Split DNA Recombinase: The Central and Catalytic Domains of Bacteriophage Lambda Integrase Cooperate in Cleaving DNA Substrates When the Two Domains Are not Covalently Linked." (2007) *J Mol Biol* **370**(2):303-314.
10. Kamadurai HB, Foster MP, "DNA recognition via mutual-induced fit by the core-binding domain of bacteriophage lambda integrase." (2007) *Biochemistry*, **46**(49):13939-47.
11. Amero CD, Arnold JJ, Moustafa IM, Cameron CE, and Foster MP, "Identification of the oriI-binding site of poliovirus 3C protein by NMR spectroscopy." (2008) *J Virol*, **82**(9):4363-70.
12. Amero CD, Boomershine WP, Xu Y, Foster M. "Solution structure of Pyrococcus furiosus RPP21, a component of the archaeal RNase P holoenzyme, and interactions with its RPP29 protein partner." (2008) *Biochemistry*. **47**(45):11704-10.

C. Research Support

Ongoing Research Support

NIH R01 GM067807 Foster (PI) 4/1/04-3/31/2009
NIH/NIGMS
Structure and function in catalytic RNP assembly
This project aims to use biochemical and biophysical methods to probe the structure and function of RNA-protein complexes, with a particular emphasis on RNase P from higher organisms.
Role: PI; Co-Investigator: Venkat Gopalan (Ohio State Univ.)

NIH R01 AI053531 Cameron (PI) 7/1/2005-5/31/2009
NIH/NIAID
Picornavirus genome replication
This project seeks to use NMR spectroscopy to map RNA protein interactions in the PV 3C protease.
Role: co-Investigator
PI: Craig Cameron (Penn State Univ.)

NIH R01 GM077234 Foster (PI) 8/1/2007-5/31/2011
NIH/NIGMS
Structural and Dynamics in Allosteric Gene Regulation
This project involves the application of biophysical methods for understanding structural and dynamic aspects of ligand-mediated gene regulation, using the TRAP protein from Bacilli as a model system.
Role: PI; Co-investigator: Paul Gollnick (Univ. at Buffalo)

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Venkat Gopalan	Associate Professor of Biochemistry
eRA COMMONS USER NAME GOPALAN05	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Madras, Madras, INDIA	B.Sc.	1986	Chemistry
University of New Mexico, Albuquerque, NM	Ph.D.	1991	Biochemistry
Yale University, New Haven, CT	Postdoc.	1992-1997	Molecular biology

A. Positions and Honors

Academic Appointments

1986-1991	Doctoral studies with Robert H. Glew, Ph.D., Dept. of Biochemistry, University of Pittsburgh, Pittsburgh, PA and University of New Mexico, Albuquerque, NM
1992-1997	Postdoctoral training with Sidney Altman, Ph.D., Dept. of Molecular, Cellular and Developmental Biology, Yale University, New Haven, CT
1998-2003	Assistant Professor, Dept. of Biochemistry, The Ohio State University, Columbus, OH
2000-present	Adjunct Faculty, Dept. of Plant Biology, The Ohio State University, Columbus, OH
2003-present	Associate Professor, Dept. of Biochemistry, The Ohio State University, Columbus, OH

Selected Professional Activities

1998-present	Reviewer: BBA, Biochemistry, Genome Biology, Journal of Biological Chemistry, Journal of Molecular Biology, Molecular BioSystems, Molecular Microbiology, Mutation Research, Nucleic Acids Research, Oligonucleotides, PNAS, RNA, and Science.
1999-present	Ad hoc grant reviewer for: Petroleum Research Fund, Wellcome Trust, and NSF
2003-2004	Panel Member, Biochemistry of Gene Expression Panel, NSF

Honors

1993-1995	Post-doctoral Fellow of the Donaghue Medical Research Foundation
1995-1996	Post-doctoral Fellow of the Anna Fuller Cancer Research Fund
2003	OSU College of Biological Sciences Dean's Award for Undergraduate Research Mentoring
2005	OSU College of Biological Sciences Dean's Award for Classroom Teaching
2007	OSU Department of Biochemistry Award for Excellence
2008	OSU Harlan Hatcher Memorial Award for Academic Excellence

B. Selected Publications (of 40)

Gopalan, V., Daniels, L. B., Glew, R. H., and Claeyssens, M. (1989) Kinetic analysis of the interaction of akyl glycosides with two mammalian beta-glucosidases. *Biochem. J.* **262**, 541-548.

Glew, R. H., **Gopalan, V.**, Hubbell, C. A., Beutler, E., Geil, J. D., and Lee, R. E. (1991) A case of non-neurologic Gaucher's disease that resembles the neurologic type biochemically. *J. Neuropathol. Exp. Neurol.* **50**, 108-117

Gopalan, V., Vander Jagt, D. J., Libell, D. P., and Glew, R. H. (1992) Transglucosylation as a probe of the mechanism of action of mammalian cytosolic beta-glucosidase. *J. Biol. Chem.* **267**, 9629-9638.

Gopalan, V., Pastuszyn, A., Galey, W. R., Jr., and Glew, R. H. (1992) Exolytic hydrolysis of toxic plant glucosides by guinea pig liver cytosolic beta-glucosidase. *J. Biol. Chem.* **267**, 14027-14032.

Gopalan, V., Baxevanis, A., Landsman, D. and Altman, S. (1997) Analysis of the functional role of conserved residues in the protein subunit of ribonuclease P from *Escherichia coli*. *J. Mol. Biol.* **267**, 818-829.

Gopalan, V., Golbik, R., Schreiber, G., Fersht, A. and Altman, S. (1997) Fluorescence properties of a tryp-

tophan residue in an aromatic core of the protein subunit of ribonuclease P from *Escherichia coli*. *J. Mol. Biol.* **267**, 765-769.

Gopalan, V., Kuhne, H., Biswas, R., Li, H., Brudvig, G. W. and Altman, S. (1999) Mapping RNA-protein interactions in ribonuclease P from *Escherichia coli* using electron paramagnetic resonance spectroscopy. *Biochemistry* **38**, 1705-1714.

Biswas, R., Ledman, D., Fox, R. O., Altman, S. and **Gopalan, V.** (2000) Mapping RNA-protein interactions in ribonuclease P from *Escherichia coli* using disulfide-linked EDTA-Fe. *J. Mol. Biol.* **296**, 19-31.

Stephen Raj, M. L., Pulukkunat, D. K., Reckard, J. F., Thomas, G. and **Gopalan, V.** (2001) Cleavage of bipartite substrates by rice and maize RNase P: Application to targeted degradation of mRNAs in plants. *Plant Physiol.* **125**, 1187-1190.

Biswas, R., Kuhne, H., Brudvig, G. and **Gopalan, V.** (2001) Use of EPR spectroscopy to study macromolecular structure and function. *Sci. Prog.* **84**, 45-67.

Wu, C-W., Eder, P. S., **Gopalan, V.** and Behrman, E. J. (2001) Kinetics of coupling reactions that generate monothiophosphate disulfides: Implications for modification of RNAs. *Bioconj. Chem.* **12**, 842-844.

Gopalan, V., Vioque, A. and Altman, S. (2002) RNase P: variations and uses. *J. Biol. Chem.* **277**, 6759-6762.

Eubank, T., Biswas, R., Jovanovic, M., Litovchick, A., Lapidot, A. and **Gopalan, V.** (2002) Inhibition of bacterial RNase P by modified aminoglycosides. *FEBS Lett.* **511**, 107-112.

Jovanovic, M., Sanchez, R., Altman, S. and **Gopalan, V.** (2002) Elucidation of structure-function relationships in the protein subunit of bacterial RNase P using a genetic complementation approach. *Nucleic Acids Res.* **30,** 5065-5073.

Tsai, H-Y., Masquida, B., Biswas, R., Westhof, E. and **Gopalan, V.** (2003) Molecular modeling of the three-dimensional structure of the bacterial RNase P holoenzyme. *J. Mol. Biol.* **325**, 661-675.

Pulukkunat, D. K., Stephen Raj, M. L., Pattanayak, D., Lai, L. B. and **Gopalan, V.** (2003) Exploring the potential of plant RNase P as a functional genomics tool. In "Functional genomics: Methods and Protocols" (Grotewold, E., Ed.), pp. 295-309, Humana Press, Totowa, NJ.

Eder, P. S., Hatfield, C., Vioque, A. and **Gopalan, V.** (2003) Bacterial RNase P as a potential target for novel anti-infectives. *Curr. Op. Invest. Drugs* **4**, 937-943.

Boomershine, W. P., Stephen Raj, M. L., **Gopalan, V.** and Foster, M. P. (2003) Preparation of uniformly labeled NMR samples in *Escherichia coli* under the tight control of the *ara*BAD promoter: Expression of an archaeal homolog of the RNase P Rpp29 protein. *Prot. Expr. Purif.* **28**, 246-251.

Boomershine, W. P., McElroy, C. A., Tsai, H. Y., Wilson, R. C., **Gopalan, V.** and Foster, M. P. (2003) Structure of Mth11/MthRpp29, an essential protein subunit of archaeal and eukaryal RNase P. *Proc. Natl. Acad. Sci. USA* **100**, 15398-15403.

Rangarajan, S., Raj, M. L. S., Hernandez, J. M., Grotewold, E. and **Gopalan, V.** (2004) RNase P-mediated disruption of gene expression in maize cells. *Biochem. J.* **380**, 611-616.

Behrman, E. J. and **Gopalan, V.** (2005) Cholesterol and plants. *J. Chem. Ed.* **82**: 1791-1793.

Tsai, H-Y., Pulukkunat, D. K., Woznick, W. and **Gopalan, V.** (2006) Functional reconstitution and characterization of *Pyrococcus furiosus* RNase P. *Proc. Natl. Acad. Sci. USA* **103**, 16147-16152.

Lai, L. B., Gopichandran, V., and **Gopalan, V.** (2006) Tangier disease: A disorder in the reverse cholesterol transport pathway. In "Clinical Studies in Medical Biochemistry", (Glew, R. H. and Rosenthal, M. D., Eds.), pp. 159-166, Oxford University Press, New York, NY.

Gopalan, V. and Altman, S. (2007) Ribonuclease P: structure and catalysis. In "The RNA World" (Gesteland, R. F., Cech, T. R. & Atkins, J. F., Eds.), Electronic version, CSH Laboratory Press, New York, NY.

Gopalan, V. (2007) Uniformity amid diversity in RNase P. *Proc. Natl. Acad. Sci. USA* **104**, 2031-2032.

Behrman, E. J. and **Gopalan, V.** (2007) The anomeric specificity of enzymes which act on sugars. *J. Chem. Ed.* **84**, 1608.

Kawamoto, S. A., Sudhahar, C. G., Hatfield, C., Sun, J., Behrman, E. J., **Gopalan, V.** (2008) Studies on the mechanism of inhibition of bacterial RNase P by aminoglycosides. *Nucleic Acids Res.* **36**, 697-704.

Pulukkunat, D. K. and **Gopalan, V.** (2008) Studies on *Methanocaldococcus jannaschii* RNase P reveal insights into the roles of RNA and protein cofactors in RNase P catalysis. *Nucleic Acids Res.* **36**, 4172-4180.

Behrman, E. J. and **Gopalan, V.** (2008) Phosphoenolpyruvate: An end to handwaving. *BAMBED* **36**, 323-324.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
James E. Hopper	Professor
eRA COMMONS USER NAME JEHOPPER	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Wisconsin, Madison	B.S.	1964	Natural Science
University of Wisconsin, Madison	M.S.	1967	Science Education
University of Wisconsin, Madison	Ph.D.	1970	Genetics
University of Illinois, Urbana	Postdoctoral	1969-71	Enzymology
University of Washington, Seattle	Postdoctoral	1971-75	Molecular Biology

A. Positions and Honors

Positions and Employment

1966-1969 Predoctoral NIH Genetics Trainee, Genetics Department, University of Wisconsin.
1969 NIH Research Trainee in the Fertilization and Gamete Physiology Program, Woods Hole, MA.
1969-1971 Postdoctoral training with Dr. David Dickinson, Plant Physiol. Program, University of Illinois.
1972-1975 NIH Postdoctoral Fellow, Dr. Ted Young Dept. Biochem., University of Washington
1975-1976 Instructor, Department of Microbiology, University Massachusetts Medical Center
1976-1979 Adjunct Assistant Professor, Rosenstiel Basic Science Research Center, Brandeis University
1979-1987 Associate Professor, Dept of Biochem & Mol Biol, College of Medicine, Penn State Univ.
1987-1988 Sabbatical Research at Zymogenetics, Inc., Seattle, WA
1987-2006 Professor, Dept of Biochem. & Mol. Biol, College of Medicine, Penn State Univ.
1995-1996 Sabbatical Research at the Fred Hutchinson Cancer Research Center, Seattle, WA
2006-present Professor, Dept of Biochem & Dept of Molecular Genetics. Ohio State University.

Other Experience and Professional Memberships

1980, Ad Hoc member NIH Biomedical Sciences Fellowship Review Committee
1986-1991 Editorial Board Membership, Journal of Bacteriology
1982, Ad Hoc member, NIH Molecular Biology Study Section
1986 Co-chairman, 5th Summer Symp. in Mol. Biol., "The Nucleus", Penn State Univ.,
1986, Ad Hoc member NIH Microbiology, Physiology and Genetics Study Section.
1987, Member, American Association Western Peer Review Committee,
1990, Member, NSF Special Projects Review Panel, Divisions of Cell & Molecular Biosciences
1991, Ad Hoc member NIH Biomedical Sciences Fellowship Review Committee.
1991-1997, Member NSF Microbial Genetics Grant Review Panel.
1992, Co-chairman, 11th Summer Symp. in Mol. Biol., "Cell Growth and Regulation", Penn State Univ
1994-1995 Chairman, Penn. State Univ. Intercollege Program in Genetics
1999, Member, Organizing Committee, 18th Summer Symp. in Mol. Biol. "Chromatin Structure and DNA Function: 25 Years of the Nucleosome", Penn State Univ.
1999- Member, Genetics Society of America

B. Selected peer-reviewed publications (in chronological order).

1. Hopper, J.E., L.B. Rowe and J.R. Broach (1978). Regulation of the galactose pathway in *Saccharomyces cerevisiae*: Induction of uridyl-transferase-specific mRNA and dependency on GAL4 function. Proc. Natl. Acad. Sci. 75:2878-2882.
2. Hopper, J.E. and L.B. Rowe (1978). Molecular expression and regulation of the galactose gene cluster in *Saccharomyces cerevisiae*. Messenger RNA sizes and GAL4 control of inducible mRNAs. J. Biol. Chem. 253:7566-7569.
3. Perlman, D. and J.E. Hopper (1979). Constitutive synthesis of the GAL4 protein, a galactose pathway regulator in *Saccharomyces cerevisiae*. Cell 16:89-95.
4. Hopper, J.E., Bostian, K.A., Rowe, L.B. and Tipper, D.J. (1977).Translation of the L-species dsRNA genome of the killer-associated virus-like particles of *Saccharomyces cerevisiae*. J. Biol. Chem. 252:9010-9017.

5. Bostian, K.A., J.E. Hopper and D.T. Rogers (1980). Translational analysis of the dsRNA genome of the killer-associated virus-like particles of *Saccharomyces cerevisiae*: M-dsRNA encodes toxin. Cell 19:403-414.
6. Johnston, S.A. and J.E. Hopper (1982). Isolation of the yeast regulatory gene, *GAL4*, and analysis of its dosage effects on the galactose/melibiose regulon. Proc. Natl. Acad. Sci. USA 79:6971-6975.
7. Torchia, T., R.W. Hamilton, C. Cano and J.E. Hopper (1984). Disruption of the regulatory gene GAL80 in yeast: effects on the carbon-controlled regulation of the gal/mel pathway genes. Mol. Cell. Biol. 4:1521-1527
8. Lohr, D. and J.E. Hopper (1985). The relationship of regulatory proteins and DNAse I hypersensitive sites in the yeast GAL1-10 genes. Nucleic Acids Res. 13:8409-8423.
9. Johnston, S., M. Zavortink, C. Debouck, M. Rosenberg and J.E. Hopper (1986). Functional domains of the yeast regulatory protein GAL4. Proc. Natl. Acad. Sci. USA 83:6553-6557.
10. Lohr, D., T. Torchia and J.E. Hopper (1987). The regulatory protein *GAL*80 is a determinant of the chromatin structure of the yeast GAL1-10 control region. J. Biol. Chem. 262:15589-15597.
11. Bajwa, W., T. Torchia, J. Tschopp and J.E. Hopper (1988). The yeast regulatory gene, *GAL*3: carbon regulation; UASgal elements in common with *GAL1*, *GAL2*, *GAL10*, *GAL80*, and *MEL1*; and an encoded protein strikingly similar to yeast and *E. coli* galactokinases. Mol. Cell. Biol. 8:3439-3447.
12. Mylin, L.M., J.P. Bhat and J.E. Hopper (1989). Regulated phosphorylation and dephosphorylation of GAL4, a transcriptional activator. Genes and Development 3: 1157-1165.
13. Bhat, J., D. Oh and J.E. Hopper (1990). Analysis of the GAL3 signal transduction pathway activating GAL4 protein dependent transcription in *S. cerevisiae.* Genetics 125:281-291.
14. Bhat, J.P. and J.E. Hopper (1991). The mechanism of inducer formation in *gal3* mutants of the yeast galactose system is independent of normal galactose metabolism and mitochondrial respiratory function. Genetics 128:233-239.
15. Sil, A. K., Xin, P., and Hopper, J. E. (2000). Vectors allowing amplified expression of the *Saccharomyces cerevisiae* Gal4p, Gal80p and Gal3p Transcription Switch: Applications to Galactose-Regulated High-Level Production of Proteins. Protein Expression and Purification 18:202-212. Cell Biol. 19:7828-7840.
16. Peng, G. and. Hopper, J.E.. (2002) Gene Activation by Interaction of an Inhibitor with a Cytoplasmic Signaling Protein Proc. Natl. Acad. Sci. USA. 99:8548-8553.
17. Carrozza,, M.J., John, S., Sil,, A.K., Hopper, J. E. and Workman, J. L. (2002) Gal80 confers specificity on HAT complex interactions with activators: J. Biol. Chem. 277:24648-246-52.
18. Meehan, W.J. Samant, R.S., Hopper, J.E., Carrozza, M.J., Shevde, L.S., Workman, J.L., Eckert, K.E. Verderame, M.F. and Welch, D.R. (2004) Breast Cancer Metastasis Suppressor 1 (BRMS1) Forms Complexes with Retinoblastoma-binding Protein 1 (RBP1) and the mSin3 Histone Deacetylase Complex and Represses Transcription. J.Biol. Chem. 279:1562-1569.
19. Adams, C.A., Kar, S.R., Hopper, J.E., and Fried, M.G. (2004) Self-association of the Amino-terminal Domain of the Yeast TATA-binding Protein. J. Biol. Chem. 279: 1376-1382.
20. Pilauri, V., Bewley, M., Diep, C., and Hopper, J. (2005). Gal80 Dimerization and the Yeast GAL Gene Switch. Genetics 169: 1903-1914.
21. Diep, C., Peng, G., Bewley, M., Pilauri, V., Ropson, I., and Hopper, J**.** (2006) Intragenic Suppression of $Gal3^{C}$ Interaction with Gal80 in the *Saccharomyces cerevisiae GAL* Gene Switch. Genetics 113:229-246.
22. Diep,C., Pilauri, V., Tao, X., Losiewicz, M., Blank, T., and Hopper, J. (2008) Genetic evidence for sites of interaction between the Gal3 and Gal80 proteins of the *Saccharomyces cerevisiae* GAL gene switch, Genetics 178:725-736.

C. Research Support

Ongoing Research Support

RO1 GM27925-23(NIH/GM) James E. Hopper (PI) 4/1/2007-3/31/2011

"**Molecular Basis of Interchromosomal Gene Regulation".**

This study investigates the genetic and molecular mechanisms operating in a model transcriptional switch of the yeast, Saccharomyces cerevisiea. The goal is to determine how the three proteins, Gal3, Gal80 and Gal4 work to regulate galactose-responsive transcription activation of a family of nine target genes.

Completed Research Support

RO1 GM27925-22 (NIH/GM) James E. Hopper (PI) 9/1/79 – Present.

"Molecular Basis of Interchromosomal Gene Regulation".

This study investigates the genetic and molecular mechanisms operating in a model transcriptional switch of the yeast, Saccharomyces cerevisiea. The goal is to determine how the three proteins, Gal3, Gal80 and Gal4 work to regulate galactose-responsive transcription activation of a family of nine target genes.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
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NAME	POSITION TITLE
Jane E. Jackman	Assistant Professor, Department of Biochemistry
eRA COMMONS USER NAME JACKMAN14	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Rochester, Rochester, NY	B.S.	1994	Biochemistry
Duke University, Durham, NC	Ph.D.	2000	Biochemistry
University of Rochester Medical Center, Rochester, NY		2000-2007	Biochemistry

A. Positions and Honors.

Positions and Employment

2007- present	Assistant Professor	The Ohio State University, Department of Biochemistry
2007- present	Faculty Member	Ohio State Biochemistry Program, Molecular Cell and Developmental Biology Graduate Program
2000-2007	Postdoctoral Fellow	University of Rochester Medical Center, Department of Biochemistry and Biophysics

Honors and Awards

James P. Wilmot Cancer Center Training Grant (2003-2005)
National Science Foundation Predoctoral Fellowship (1995-1998)
James B. Duke Graduate Fellowship (1994-1997)
summa cum laude, with Distinction in Research (1994)
Phi Beta Kappa (1993)

B. Selected peer-reviewed publications (in chronological order).

Jackman, JE and Phizicky EM (2008) Identification of critical residues for G_{-1} addition and substrate recognition by $tRNA^{His}$ guanylyltransferase. *Biochemistry 47*, 4817-4825

Jackman JE, Kotelawala L, Grayhack EJ and Phizicky EM (2007) Identification and characterization of modification enzymes by biochemical analysis of the proteome. *Methods Enzymol. 425*, 139-152.

Wilkinson ML, Crary SM, **Jackman JE**, Grayhack EJ and Phizicky EM (2007) The 2'-O-methyltransferase responsible for modification of yeast tRNA at position 4. *RNA 13*, 404-413.

Jackman, JE and Phizicky, EM (2006) $tRNA^{His}$ guanylyltransferase catalyzes a 3'-5' polymerization reaction that is distinct from G_{-1} addition. *Proc. Natl. Acad. Sci. U S A*. *103***,** 8640-8645.

Jackman, JE and Phizicky, EM (2006) $tRNA^{His}$ guanylyltransferase adds G_{-1} to the 5' end of $tRNA^{His}$ by recognition of the anticodon, one of several features unexpectedly shared with tRNA synthetases. *RNA 12***:**1007-14.

Steiger MA, **Jackman JE**, Phizicky EM (2005) Analysis of 2'-phosphotransferase (Tpt1p) from *Saccharomyces cerevisiae*: evidence for a conserved two-step reaction mechanism. *RNA 11*, 99-106.

Hiley SL, **Jackman JE**, Babak T, Trochesset M, Morris QD, Phizicky E, Hughes TR (2005) Detection and discovery of RNA modifications using microarrays. *Nucleic Acids Res 33*, e2.

Jackman JE, Montange RK, Malik HS, Phizicky EM (2003) Identification of the yeast gene encoding the tRNA m^1G methyltransferase responsible for modification at position 9. *RNA 9*, 574-585.

Gu W, **Jackman JE**, Lohan AJ, Gray MW, Phizicky EM (2003) $tRNA^{His}$ maturation: an essential yeast protein catalyzes addition of a guanine nucleotide to the 5' end of $tRNA^{His}$. *Genes Dev 17*, 2889-2901.

McClure CP, Rusche KM, Peariso K, **Jackman JE**, Fierke CA, Penner-Hahn JE (2003) EXAFS studies of the zinc sites of UDP-(3-*O*-acyl)-*N*-acetylglucosamine deacetylase (LpxC). *J Inorg Biochem 94*, 78-85.
Pirrung MC, Tumey LN, Raetz CR, **Jackman JE**, Snehalatha K, McClerren AL, Fierke CA, Gantt SL, Rusche KM (2002) Inhibition of the antibacterial target UDP-(3-*O*-acyl)-*N*-acetylglucosamine deacetylase (LpxC): isoxazoline zinc amidase inhibitors bearing diverse metal binding groups. *J Med Chem 45*, 4359-4370.
Jackman JE, Raetz CR, Fierke CA (2001) Site-directed mutagenesis of the bacterial metalloamidase UDP-(3-*O*-acyl)-*N*-acetylglucosamine deacetylase (LpxC). Identification of the zinc binding site. *Biochemistry 40*, 514-523.
Jackman JE, Fierke CA, Tumey LN, Pirrung M, Uchiyama T, Tahir SH, Hindsgaul O, Raetz CR (2000) Antibacterial agents that target lipid A biosynthesis in gram-negative bacteria. Inhibition of diverse UDP-3-*O*-(R-3-hydroxymyristoyl)-*N*-acetylglucosamine deacetylases by substrate analogs containing zinc binding motifs. *J Biol Chem 275*, 11002-11009.
Jackman JE, Raetz CR, Fierke CA (1999) UDP-3-*O*-(R-3-hydroxymyristoyl)-*N*-acetylglucosamine deacetylase of Escherichia coli is a zinc metalloenzyme. *Biochemistry 38*, 1902-1911.
Ogura T, Inoue K, Tatsuta T, Suzaki T, Karata K, Young K, Su LH, Fierke CA, **Jackman JE**, Raetz CR, Coleman J, Tomoyasu T, Matsuzawa H (1999) Balanced biosynthesis of major membrane components through regulated degradation of the committed enzyme of lipid A biosynthesis by the AAA protease FtsH (HflB) in Escherichia coli. *Mol Microbiol 31*, 833-844.
Wyckoff TJ, Raetz CR, **Jackman JE** (1998) Antibacterial and anti-inflammatory agents that target endotoxin. *Trends Microbiol 6*, 154-159.
Jackman JE, Merz KM, Jr., Fierke CA (1996) Disruption of the active site solvent network in carbonic anhydrase II decreases the efficiency of proton transfer. *Biochemistry 35*, 16421-16428.

C. Research Support

No ongoing or completed research support.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
MAGLIERY, Thomas John	Assistant Professor of Chemistry and Biochemistry
eRA COMMONS USER NAME (credential, e.g., agency login) MAGLIERY1	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Kenyon College, Gambier, OH	A.B.	1996	Chemistry
University of California, Berkeley	Ph.D.	2001	Chemistry
Yale University, New Haven, CT	NIH Postdoc	2001-2005	Molecular Biophysics & Biochemistry

A. Positions and Honors

Positions

2005- Assistant Professor of Chemistry and Biochemistry, The Ohio State University, Columbus, Ohio
2005- Member, Ohio State Biochemistry Program
2005- Member, Biophysics Graduate Program
2006- Member, Chemistry-Biology Interface Training Program

Other Experience and Professional Memberships

1996- Member, American Chemical Society
1996- Member, AAAS
2001- Member, Protein Society
2005- Member, Biophysical Society
2005- 2008 Board of Directors, Sigma Xi, Ohio State Chapter
2008- 2010 Member, Editorial Advisory Board, *Molecular BioSystems*

Honors

1992 Robert Byrd Scholarship
1992 National Merit Scholarship
1991-1996 Kenyon College Honor/Science Scholarship
1994 Robert Tomsich Excellence in Science Award, Kenyon College
1995 Barry Goldwater Scholarship
1995 Phi Beta Kappa
1996 Sigma Xi
1996 Carl Djerassi Award in Chemistry, Kenyon College
1997-2000 NSF Predoctoral Fellowship
2002-2005 NIH Postdoctoral Fellowship, NRSA F32, NIGMS

B. Peer-reviewed publications (in reverse chronological order)

1. Sarkar, M. & Magliery, T.J. (2008) “Re-engineering a split-GFP reassembly screen to examine RING-domain interactions between BARD1 and BRCA1 mutants observed in cancer patients,” Mol. BioSyst. 4: 599-605, doi:10.1039/b802481b.
2. Magliery, T.J. & Regan, L. (2005) “Sequence variation in ligand binding sites in proteins,” BMC Bioinformatics 6: 240.

3. Magliery, T.J. (2005) “Unnatural protein engineering: producing proteins with unnatural amino acids” (review), Med. Chem. Rev. Online 2: 303-323.
4. Magliery, T.J.; Wilson, C.G.M.; Pan, W.; Mishler, D.; Ghosh, I.; Hamilton, A.D. & Regan, L. (2005) “Detecting protein-protein interactions with a green fluorescent protein fragment reassembly trap: scope and mechanism,” J. Am. Chem. Soc. 127: 146-157.
5. Magliery, T.J. & Regan, L. (2004) “Beyond consensus: statistical free energies reveal hidden interactions in the design of a TPR motif,” J. Mol. Biol. 343: 731-745.
6. Magliery, T.J. & Regan, L. (2004) “Combinatorial approaches to protein structure and stability” (review), Eur. J. Biochem. 271: 1595-1608.
7. Magliery, T.J. & Regan, L. (2004) “A cell-based screen for function of the four-helix bundle protein Rop: a new tool for combinatorial experiments in biophysics,” Protein Eng. Des. Select. 17: 77-83.
8. Anthony-Cahill, S.J. & Magliery, T.J. (2002) “Expanding the natural repertoire of protein structure and function” (review), Curr. Pharm. Biotech. 3: 299-315.
9. Anderson, J.C.; Magliery, T.J. & Schultz, P.G. (2002) “Exploring the limits of codon and anticodon size,” Chem. Biol. 9: 237-244.
10. Magliery, T.J.; Anderson, J.C. & Schultz, P.G. (2001) "Expanding the genetic code: selection of efficient suppressors of four-base codons and identification of 'shifty' 4-base codons with a library approach in Escherichia coli," J. Mol. Biol. 307: 755-769.
11. Pastrnak, M.; Magliery, T.J. & Schultz, P.G. (2000) "A new orthogonal suppressor tRNA/aminoacyl-tRNA synthetase pair for evolving an organism with an expanded genetic code," Helv. Chim. Acta 83: 2277-2286.
12. Wang L.; Magliery, T.J.; Liu, D.R. & Schultz, P.G. (2000) "A new functional suppressor tRNA/aminoacyl-tRNA synthetase pair for the in vivo incorporation of unnatural amino acids into proteins," J. Am. Chem. Soc. 122: 5010-5011.
13. Liu, D.R.; Magliery, T.J.; Pastrnak, M. & Schultz, P.G. (1997) “Engineering a tRNA and aminoacyl-tRNA synthetase for the site-specific incorporation of unnatural amino acids into proteins in vivo,” Proc. Natl. Acad. Sci. U.S.A. 94: 10092-10097.
14. Liu, D.R; Magliery, T.J. & Schultz, P.G. (1997) “Characterization of an ‘orthogonal’ suppressor tRNA derived from E. coli tRNA2Gln,” Chem. Biol. 4: 685-691.
15. Magliery, T.J.; Vitellaro, L.K.; Diop, N.K. & Marusak, R.A. (1997) “Fe-EDTA-bisamide and Fe-ADR-925, the iron-bound hydrolysis product of the cardioprotective agent dexrazoxane, cleave DNA via the hydroxyl radical,” Metal Based Drugs 4: 199-205.

C. Research Support

U54 NS058183 0006 Richard Sayre, PI 9/30/2006-5/31/2011
NIH/NINDS
Center for Catalytic Bioscavenger Medical Defense Research (David Lenz, PI)
Subcontract: Engineering and Expression of Organophosphate Hydrolases as Protein Therapeutics: Engineering for Drug-Like Properties, Expression in Microalgae, and Protein Glycosylation
Role: Co-PI

U54 NS058183 0004 Christopher Hadad, PI 9/30/2006-5/31/2011
NIH/NINDS
Center for Catalytic Bioscavenger Medical Defense Research (David Lenz, PI)
Subcontract: Mechanistic, Kinetic, Spectroscopic and Computational Evaluations of OP Hydrolysis Activity of Enzymes
Role: Co-PI

R01 GM083114 Thomas Magliery, PI 8/15/2008-5/31/2013
NIH/NIGMS
Combinatorial biophysics: understanding protein stability with library approaches

Gary E. Means
Associate Professor
The Ohio State University
Department of Biochemistry
484 West 12th Ave
Columbus, OH 43210-1292
tel no. 614 292 0377
fax 614 292 6773
email means.1@osu.edu

Education

B. S. Chemistry 1964 San Jose State College, San Jose, CA

Ph.D. Biochemistry 1968 University of California, Davis, CA
(with R.E. Feeney)

Professional Experience

Postdoctoral, 1968 -70, Virus Laboratory, University of California, Berkeley, CA
(with H. Fraenkel-Conrat)
U.S. Antarctic Research Program, Nov. 1970 - Feb. 1971, McMurdo Sound Antarctica

Postdoctoral, 1971-72, Chemistry Dept., Northwestern University, Evanston, IL
(with M.L. Bender)
Instructor, 1972 -73, Chemistry Dept., Northwestern University, Evanston, IL

Assistant Professor, 1974 -79, Biochemistry Dept., Ohio State University, Columbus, OH

Associate Professor, 1979 -present, Biochemistry Dept., Ohio State University, Columbus, OH

Acting Chairman, 1980 -86, Biochemistry Dept., Ohio State University, Columbus, OH

Research Interests

Protein Chemistry, Chemical Modifications of Proteins, Post-translational Modifications of Proteins, the Chemistry of Nitric Oxide and Nitrosating agents, Serum Albumin, its binding and transport of fatty acids, drugs, etc., its redox chemistry, Enzymes.

Recent Publications

.Chemical Modifications of Proteins: A review. G.E. Means & R.E. Feeney, J. Food Biochemistry 22, 399-426 (1998).

NAD+/NADH recycling by coimmobilized lactate dehydrogenase and glutamate dehydrogenase. M. Le & G.E. Means, Enzyme and Microbial Technol 23, 49-57 (1998).

A kinetic approach to characterize the electrostatic environments of thiol groups in proteins. H. Zhang, M. Le & G.E. Means, Bioorganic Chem 26, 356-364 (1998).

The chemistry of protein functional groups. G.E. Means, H. Zhang & M. Le, in "Protein: a comprehensive treatis, vol. 2, pp. 23-59, (1999) G. Allen, ed., JAI Press, Stamford, CT.

Reactions of acrylamide with glutathione and serum albumin. G.C. Tong, W.K. Cornwell & G.E. Means, Toxicol. Letters 147, 127-131 (2004).

Structural changes accompanying human serum albumin's binding of fatty acids are concerted. Y. Fang, G.C. Tong and G.E. Means, Biochim. Biophy. Acta 1764, 285-291 (2005).

Principal Investigator/Program Director (Last, First, Middle):	Musier-Forsyth, Karin

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Karin Musier-Forsyth	Ohio Eminent Scholar Professor of Chemistry and Biochemistry
eRA COMMONS USER NAME musier	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Eckerd College, St. Petersburg, FL	B.S.	1984	Chemistry
Cornell University, Ithaca, NY	Ph.D.	1989	Biophysical Chemistry
MIT, Boston, MA	Postdoc	1989-92	Protein-RNA

A. Positions and Honors.

Positions and Employment

2007- Professor of Chemistry and Biochemistry and Ohio Eminent Scholar, The Ohio State University
2006 Distinguished McKnight University Professor of Chemistry, University of Minnesota
2003-2006 Merck Professor of Chemistry, University of Minnesota
2003-2006 Professor of Chemistry, University of Minnesota
1998-2003 Associate Professor of Chemistry, University of Minnesota
1996-2006 University of Minnesota, Graduate Faculty Member, Biochemistry, Mol. Biology & Biophysics
1993-2006 University of Minnesota, Graduate Faculty Member, Chemical Physics Program
1992-1998 Assistant Professor of Chemistry, University of Minnesota

Other Professional Experience (past 3 years)

Chartered Member of NIH molecular Genetics A Study Section, 2006-present
Sixth International Retroviral NC Symposium, Sept 20-21, 2007, Amsterdam (scientific committee)
Seventh International Retroviral NC Symposium, Sept, 2009, Minneapolis, MN (co-organizer)
Editorial Advisory Board, Accounts of Chemical Research (2006-2009)
Executive Committee, American Chemical Society Division of Biological Chemistry (2008-2010)

Honors

1984-1987 National Science Foundation Graduate Fellowship
1987-1989 National Institutes of Health Predoctoral Training Grant
1989-1992 American Cancer Society Postdoctoral Fellow, MIT
1992 NIH Shannon Award
1993-1995 McKnight Land-Grant Professorship, University of Minnesota
1995-2000 NIH Research Career Development Award
1996-2001 Camille-Dreyfus Teacher Scholar Award
2001 George W. Taylor Distinguished Research Award, University of Minnesota
2002 Pfizer Award in Enzyme Chemistry, American Chemical Society Biological Division
2003 Merck Professorhip, University of Minnesota
2004 Distinguished Women Scholars Award in Science and Engineering, University of Minnesota
2006 Distinguished McKnight University Professorship, University of Minnesota
2007 Ohio Eminent Scholar in Biological Macromolecular Structure

B. Selected peer-reviewed publications (from 102 total, including 90 research articles and 12 reviews/book chapters)

Probing Nucleation, Reverse Annealing, and Chaperone Function along the Reaction Path of HIV-1 Single Strand Transfer. Yining Zeng, Hsiao-Wei Liu, Christy F. Landes, Yoen Joo Kim, Xiaojing Ma, Yongjin Zhu, Karin Musier-Forsyth, Paul F. Barbara (2007) *Proc. Natl. Acad. Sci. USA,* 104, 12651-12656.

Single Molecule Study of the Inhibition of HIV-1 Transactivation Response Region DNA:DNA Annealing by Argininamide. Christy F. Landes, Yining Zeng, Hsiao-Wei Liu, Karin Musier-Forsyth, Paul F. Barbara

(2007) *J. Am Chem. Soc.,* 129(33), 10181-88.

Deaminase-independent inhibition of HIV-1 reverse transcription by APOBEC3G. Yasumasa Iwatani, Denise S.B. Chan, F. Wang, Kristen Stewart Maynard, Wataru Sugiura, Angela Gronenborn, Ioulia Rouzina, Mark C. Williams, Karin Musier-Forsyth, and Judith G. Levin (2007) *Nucleic Acids Res.,* 35, 7096-7108.

Critical Role of Helix 4 of HIV-1 Capsid C-terminal Domain in Interactions with Human Lysyl-tRNA Synthetase. Brandie J. Kovaleski, Robert Kennedy, Ahmad Khorchid, Lawrence Kleiman, Hiroshi Matsuo, and Karin Musier-Forsyth (2007). *J. Biol. Chem.,* 282, 32274 – 32279

Transfer RNA Modulates The Editing Mechanism Used By Class II Prolyl-tRNA Synthetase. Kathryn E. Splan, Michael Ignatov' and Karin Musier-Forsyth (2008) *J. Biol. Chem.,* 283. 7128-34.

Crystal structure of novel tetrameric form of human lysyl-tRNA synthetase: implications for multi-synthetase complex and new synthetase functions. Min Guo, Michael Ignatov, Karin Musier-Forsyth, Paul Schimmel, and Xiang-Lei Yang (2008) *Proc. Natl. Acad. Sci. USA,* 105, 2331-36

Evolution of Acceptor Stem tRNA Recognition by Class II Prolyl-tRNA Synthetase. Songon An, George Barany, and Karin Musier-Forsyth (2008) *Nucleic Acids Res.,* 36, 2514-2521.

Functional Guanine-Arginine Interaction Between $tRNA^{Pro}$ and Prolyl-tRNA Synthetase that Couples Binding and Catalysis. Brian Burke, Songon An and Karin Musier-Forsyth (2008) *Biochemica Biophysica Acta - Proteins and Proteomics,* 1784, 1222-1225.

Fluorescence Fluctuation Spectroscopy on Viral-Like Particles Reveals Variable Gag Stoichiometry. Yan Chen, Bin Wu, Karin Musier-Forsyth, Louis M. Mansky, and Joachim D. Mueller (2008) *Biophys. J.,* in press.

Retroviral Nucleocapsid Proteins Display Non-equivalent Levels of Nucleic Acid Chaperone Activity. Kristen M. Stewart-Maynard, Margareta Cruceanu, Fei Wang, My-Nuong Vo, Robert J. Gorelick, Mark C. Williams, Ioulia Rouzina, and Karin Musier-Forsyth (2008), *J. Virol.,* 82, 10129-42.

Inability of HIV-1 Produced in Murine Cells to Selectively Incorporate Primer $tRNA^{Lys,3}$. Min Wei, Yilang Yang, Meijuan Niu, Laurie Desfosse, Robert Kennedy, Karin Musier-Forsyth, and Lawrence Kleiman (2008). *J. Virol.,* in press.

C. Research Projects Ongoing During the Last 3 Years:

Ongoing Projects:

National Institutes of Health RO1-GM49928 (years 13-16)
"Class II Aminoacyl-tRNA Synthetase Substrate Recognition"
PI: Karin Musier-Forsyth; project period: 9/01/05-8/31/09
The specific aims of this project are to explore (1) species-specific differences in tRNA recognition by prolyl-tRNA synthetases (ProRS) and histidyl-tRNA synthetases (2) the mechanism of amino acid editing by ProRS, and (3) the hydrolysis activity, substrate specificity, and function of the YbaK/ProX family of proteins.

National Institutes of Health RO1-GM65056 (years 5-9)
"HIV Nucleocapsid Protein Nucleic Acid Chaperone Activity"
PI: Karin Musier-Forsyth; project period: 6/01/06-5/31/2010
The specific aims of this project are (1) To probe the mechanism of HIV-1 NC-mediated TAR RNA/DNA annealing; (2) To probe the general mechanism of HIV-1 NC-mediated strand exchange reactions; and (3) To perform comparative studies with HTLV-1, RSV, and MLV NC proteins.

National Institutes of Health RO1-AI077387 (years 1-5)
"Development of the Gag/LysRS Interaction as a Target for Anti-HIV Therapy"
PI: L. Kleiman; co-investigator: K. Musier-Forsyth project period: 7/01/08-6/31/13

The specific aims of this project are (1) To map the sites of interaction between HIV-1 Gag and human LysRS at high resolution; (2) To identify molecules that inhibit the LysRS/Gag interaction and determine their potential as anti-HIV-1 inhibitors.

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Ottesen, Jennifer	Assistant Professor
eRA COMMONS USER NAME OTTESEN1	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Chicago	B.S.	1991-1995	Chemistry
California Institute of Technology	towards PhD	1995-1999	Chemistry
Massachusetts Institute of Technology	Ph.D.	1999-2001	Biological Chemistry
The Rockefeller University	Postdoctoral	2001-2005	Protein Chemistry

A. Positions and Honors.

1995-1999 Ph.D. student (GRA and GTA) with Prof. Barbara Imperiali, Dept. of Chemistry, California Institute of Technology

1999-2001 Ph.D. student (GRA) with Prof. Barbara Imperiali, Dept. of Chemistry, Massachusetts Institute of Technology

2001-2005 Postdoctoral Fellow with Prof. Tom W. Muir, Laboratory of Synthetic Protein Chemistry, The Rockefeller University

2005-present Assistant Professor, Department of Biochemistry, The Ohio State University

Honors and Awards:

2008 2008 Dean's Award for Undergraduate Research Mentoring in the College of Biological Sciences

2001-2004 Merck Postdoctoral Research Fellowship

1997 Outstanding Graduate Teaching Assistant Service Award

1996-1999 National Science Foundation Graduate Research Fellowship

1991-1995 National Science Scholar

B. Publications.

Ottesen, J.J., Bar-Dagan, M., Giovani, B., Muir, T.W. (2007) An Amalgamation of Solid Phase Peptide Synthesis and Ribosomal Peptide Synthesis. *Biopolymers (Peptide Science)*, 90, 406-414.

Ottesen, J.J., Huse, M., Sekedat, M.D., Muir, T.W. (2004) Semisynthesis of Phosphovariants of Smad2 Reveals a Substrate Preference of the Activated TβRI Kinase. *Biochemistry*, 43, 5698-5706.

Wilson K.A., Kalkum M., **Ottesen J.**, Yuzenkova J., Chait B.T., Landick R., Muir T., Severinov K., Darst S.A. (2004). Structure of Microcin J25, a Peptide Inhibitor of Bacterial RNA Polymerase, is a Lassoed Tail. *J. Am. Chem. Soc.*, 125, 12475-12483.

Cowburn, D., Shekhtman, A., Xu, R., **Ottesen, J.J.**, Muir, T.W. (2004) "Segmental Isotopic Labeling for Structural Biological Applications of NMR," in *Methods in Molecular Biology*, vol 278 (Downing, A.K., ed.) Humana Press Inc, Totowa NJ, pp. 47-56.

Ottesen, J.J., Blaschke, U.K., Cowburn, D., Muir, T.W. (2003) Segmental Isotopic Labeling; Prospects for a New Tool to Study the Structure-Function Relationships in Multi-Domain Proteins. *Biol. Mag. Res*., 20, 35-51.

Ottesen, J.J., Imperiali, B. (2001) Design of a Discretely Folded Mini-Protein Motif with Predominantly β-Structure. *Nat. Struct. Biol.,* 8, 535-539.

Mezo, A.R., **Ottesen, J.J.**, Imperiali, B. (2001) Discovery and Characterization of a Discretely Folded Homotrimeric ββα Peptide. *J. Am. Chem. Soc.*, 123, 1002-1003.

Imperiali, B., **Ottesen, J.J.** (1999) Uniquely Folded Mini-Protein Motifs. *J. Pept. Res.*, 54, 177-184.

Imperiali, B., **Ottesen, J.J.** (1998) Design Strategies for the Construction of Independently Folded Polypeptide Motifs. *Biopolymers*, 47, 23-29. Struthers, M.D.,

Ottesen, J.J., Imperiali, B. (1998) Design and NMR Analyses of Compact, Independently Folded BBA Motifs. *Folding & Design*, 3, 95-104.

C. Research Support.

Current Research Funding

NIH R01 GM083055-01
Role: Co-Investigator, 34% of total costs (34% of $1,425,000)
Principal Investigator: Michael G. Poirier
Title: Characterization of Four Histone H3 Modifications in the DNA-Histone Interface
Duration: 2/2008 – 1/2013
The goal of this project is to understand how modifications buried in the DNA-histone interface at the nucleosome dyad and the entry-exit region function at a molecular level.

Submitted Grants

NSF CAREER
Principal Investigator: Jennifer J. Ottesen
Title: Chemical Tools to Probe Histone H4 Modifications in the Nucleosome Core
Proposed Duration: 3/2009 – 3/2014
Status: Under review

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Poirier, Michael G.	Assistant Professor
eRA COMMONS USER NAME mpoirier	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Truman State University	B.S.	1995	Physics
University of Illinois, Chicago	M.S.	1997	Physics
University of Illinois, Chicago	Ph.D.	2002	Physics/Biophysics
Université Louis Pasteur	Postdoc	2003-2004	Biophysics/Molecular Biology
Northwestern University	Postdoc	2004-2006	Molecular Biology

A. Positions and Honors.

1997-2002 PhD student with Prof. John F. Marko, Department of Physics, University of Illinois, Chicago
2003-2004 Postdoctoral Fellow with Dr. Didier Chatenay, Université Louis Pasteur, Strasbourg, France
2004-2006 Postdoctoral Fellow with Prof. Jonathan Widom, Department of Biochemistry, Molecular Biology and Cell Biology, Northwestern University
2006-present Assistant Professor, Department of Physics, the Ohio State University
2006-present Faculty Member, Ohio State Biochemistry Program, the Ohio State University
2006-present Faculty Member, Biophysics Graduate Program, the Ohio State University
2008-present Adjunct Assistant Professor, Department of Biochemistry, the Ohio State University

Honors and Awards:

Postdoctoral Award from Le Ministre de la Recherche, France, 2002.
Postdoctoral Award from Le Centre National de Recherche Scientifique, France, 2003.
Ruth L. Kirschstein National Research Service Award, National Institutes of Health, USA, 2004.
Burroughs Wellcome Fund Career Award in Basic Biomedical Sciences, USA, 2005.

B. Selected peer-reviewed publications.

Poirier, M. Eroglu, S., Chatenay, D. and Marko, J.F. Reversible and irreversible unfolding of mitotic newt chromosomes by applied force (2000) Mol Biol Cell 11, 269-276.

Poirier, M.G., Nemani, A., Gupta, P., Eroglu, S. and Marko, J.F. Probing chromosome structure with dynamic force relaxation (2001) Phys Rev Lett. 86, 360-363.

Poirier, M.G., Monhait, T. and Marko, J.F. Reversible hypercondensation and decondensation of mitotic chromosomes studied using combined chemical-micromechanical techniques. (2002) J Cell Biochem. 85:422-424.

Poirier, M.G., Eroglu, S. and Marko, J.F. The bending rigidity of mitotic chromosomes (2002) Mol Biol Cell. 13:2170-2179.

Poirier, M.G. and Marko, J.F. Effect of Internal Friction on Biofilament Dynamics (2002) Phys Rev Lett. 88(22):228103.

Sarkar, A., Eroglu, S., **Poirier, M.G.**, Nemani, A., Gupta, P. and Marko, J.F. Dynamics of Chromosome Compaction During Mitosis, Exp Cell Res. (2002) Jul 1;277(1):48-56.

Poirier, M.G. and Marko, J.F. Mitotic chromosomes are chromatin networks without an internal protein scaffold. (2002) Proc Natl Acad Sci USA 99, 15393-15397.

Poirier, M.G. and Marko, J.F. Micromechanics of chromatin and chromosomes. (2003) Biochem Cell Biol. Jun;81(3):209-20.

Poirier, M.G. and Marko, J.F. Micromechanical properties of mitotic chromosomes. (2003) J Musc Res Cell Motil. 23, 409-431.

Poirier, M.G. and Marko, J.F. Micromechanical studies of mitotic chromosomes. (2003) Curr Top Dev Biol. 55:75-141.

Poirier, M.G., Bussiek M., Langowski, J. and Widom, J. (2008) Determining spontaneous access to DNA target sites in folded chromatin fibers with restriction enzyme digestions. J Mol Biol.Jun 13;379(4):772-86.

Shen, H., **Poirier, M.G.**, Allen, M., Widom, J. Storb, U. (2008) The Activation Induced Cytidine Deaminase (AID) Efficiently Targets DNA in Nucleosomes, But Only During Transcription. (Submitted to Immunology)

Fortes, R.A., Bundschuh, R. and **Poirier, M.G.** (2008) The Flexibility of Locally Melted DNA. (submitted to Phys Rev Lett)

Poirier, M.G., Oh, E., Tims, H. and Widom, J. (2008) Quantification of Higher Order Chromatin Structural Fluctuations by Fluorescence Resonance Energy Transfer. (In preparation)

Manohar, M., Edon, A., Mooney, A., **Poirier, M.G.** and Ottesen, J. (2008) Histone Modifications in the Nucleosome Dyad reduce DNA-Histone Binding Affinity. (In preparation)

C. Research Support.

Ongoing Research Support

09/01/2005 - 08/31/2010 **Burroughs Wellcome Fund, Career Award in Basic Biomedical Research**

“A study of DNA accessibility within nucleosome arrays.”
Principal investigator: Michael G Poirier
The goal of this project is to develop a single molecule force and fluorescence microscope to determine how external forces render DNA sites in chromatin accessible.

02/01/2008-03/31/2012 **National Institute of General Medical Sciences R01 GM083055**

“Characterization of Four Histone H3 Modifications in the DNA-Histone Interface.”
Principal investigator: Michael G Poirier
The goal of this project is to investigate the function of post-translational modifications in the DNA-histone interface of the nucleosome with biochemical and biophysical experiments.

07/01/2008-06/30/2010 **American Heart Association Pre-doctoral Fellowship**

“A study of the molecular mechanisms by which histone modifications in the nucleosome dyad symmetry axis function.”
Pre-doctoral funding for a second year graduate student working in my laboratory.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Suo, Zucai	Associate Professor of Biochemistry
eRA COMMONS USER NAME ZSUO03	

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Fudan University, Shanghai, P.R.China	B.S.	1986	Chemistry
Fudan University, Shanghai, P.R.China	M.S.	1989	Physical Chemistry
Pennsylvania State University, Univ. Park, PA. (Advisor: Kenneth A. Johnson)	Ph.D.	1997	Chemistry
Harvard Medical School, Boston, MA (Advisor: Christopher T. Walsh)	Postdoc	1998-2000	Biological Chemistry

A. Professional Positions

10/2007-present Associate Professor, Department of Biochemistry, The Ohio State University.
11/2001-9/2007 Assistant Professor, Department of Biochemistry, The Ohio State University.
7/2000-10/2001 Senior Biochemist, Eli Lilly & Company, Indianapolis, IN 46285.
9/1989-7/1991 Semiconductor Scientist, Shanghai Institute of Technology and Physics, Chinese Academy of Sciences, Shanghai, P.R. China.

B. Honors and Awards

2007 Dean's Award for Excellence in Undergraduate Research Mentoring
2006 Dean's Award for Classroom Teaching for Faculty at The Ohio State University
2005 The National Science Foundation Career Award
1999 Postdoctoral Fellowship from the Jane Coffin Childs Memorial Fund
1997 Award, the 12th Annual Graduate Student Research Exhibition at Pennsylvania State University
1996 Bristol-Meyers Squibb Travel Award

C. Funding Agency Reviewer

2007-present *Ad hoc* member, panel MSFE, the National Institutes of Health
2007 Panel member, the Chemistry Research Instrumentation and Facilities: Departmental Multi-User Instrumentation (CRIF-MU) program, the National Science Foundation (NSF)
2005-present *Ad hoc* reviewer, Division of Molecular & Cellular Biosciences, NSF
2007 *Ad hoc* reviewer, the Commonwealth Universal Research Enhancement (CURE) Program, the Department of Health, Pennsylvania
2004-2005 *Ad hoc* reviewer, the American Chemical Society

D. Patent Applications

2000-2001 Nine Pending Patents on Antiviral Drug Discovery at Eli Lilly & Company
1998 A Potential Combination Chemotherapy against AIDS, Cancer, and Viral Infections

E. Drug Discovered

2001 Discovered an anti-hepatitis C nucleoside analog which is currently evaluated in Phase II clinical trial by Eli Lilly & Company.

F. Selected Publications (*Corresponding Author)

1. Brown, J. A., Newmister, S. A., Fiala, K. A., & **Suo, Z.*** (2008) Mechanism of Double-Base Lesion Bypass Catalyzed by a Y-Family DNA Polymerase, *Nucleic Acids Res.* **36**, 3867-3878.
2. DeCarlo, L., Prakasha Gowda, A. S., **Suo, Z.** and Spratt, T. E.* (2008) Formation of purine-purine mispairs by *Sulfolobus solfataricus* DNA polymerase IV, *Biochemistry* **47**, 8157–8164.

3. Wong, J. H. Y., Fiala, K. A., **Suo, Z.** & Ling, H.* (2008) Snapshots of a Y-family DNA polymerase in replication: substrate-induced conformational transitions and implications for fidelity of Dpo4, *J. Mol. Biol*. **379**, 317-330.
4. Fowler, J. D., Brown, J.A., Johnson, K.A. and **Suo, Z*** (2008) Kinetic Investigation of the Inhibitory Effect of Gemcitabine on DNA Polymerization Catalyzed by Human Mitochondrial DNA Polymerase. *J Biol. Chem.* **283**, 15339-15348.
5. Fiala, K. A., Sherrer, S. M., Brown, J. A., and **Suo, Z.*** (2008) Mechanistic consequences of temperature on DNA polymerization catalyzed by a Y-family DNA polymerase, *Nucleic Acids Research, **36**,* 1990-2001.
6. Fiala, K. A., Hypes, C., and **Suo, Z.*** (2007) Mechanism of Abasic Lesion Bypass Catalyzed by a Y-Family DNA Polymerase, *J. Biol. Chem.* **282**, 8188-8198.
7. Fiala, K. A. and **Suo, Z.*** (2007) Sloppy Bypass of an Abasic Lesion Catalyzed by a Y-Family DNA Polymerase. *J. Biol. Chem.* **282**, 8199-8206.
8. Fiala, K. A., Brown, J. A., Ling, H., Kshetry, A. K., Zhang, J., Taylor, J.-S., Yang, W. and **Suo, Z.*** (2007) Mechanism of Template-Independent Nucleotide Incorporation Catalyzed by a Template-Dependent DNA Polymerase. *J. Mol. Biol*. **365**, 590-602.
10. Brown, J. A., Duym, W. W., Fowler, J. D., and **Suo, Z.*** (2007) Single-Turnover Kinetic Analysis of the Mutagenic Potential of 7,8-Dihydro-8-oxoguanine During Gap-Filling Synthesis Catalyzed by Human DNA Polymerases λ and β, *J. Mol. Biol*. **367**, 1258-1269.
11. Fowler, J. & **Suo, Z.*** (2006) Enzymatic, Structural, and Physiological Properties of Terminal Deoxynucleotidyl Transferase. *Chemical Reviews* **106**, 2092-2110.
12. Fiala, K. A., Duym, W. W., Zhang, J. and **Suo, Z.*** (2006) Upregulation of the Fidelity of Human DNA Polymerase lambda by Its Non-Enzymatic Proline-Rich Domain. *J. Biol. Chem.* **281**, 19038-19044.
13. Duym, W. W., Fiala, K. A., Bhatt N., and **Suo, Z.*** (2006) Kinetic Effect of a Downstream Strand and Its 5'-Terminal Moieties on Single-Nucleotide Gap-Filling Synthesis Catalyzed by Human DNA Polymerase Lambda. *J. Biol. Chem.* **281**, 35649–35655.
17. **Suo, Z.*** (2005) Thioesterase Portability and Peptidyl Carrier Protein Swapping in Yersiniabactin Synthetase from Yersinia pestis. *Biochemistry* **44**, 4926-4938.
18. Roettger, M. P., Fiala, K. A., Sompalli, S., Dong, Y. and **Suo. Z.*** (2004) Pre-Steady state Kinetic Studies of the Fidelity of Human DNA Polymerase Mu. *Biochemistry* **43**, 13827-13838.
19. Fiala, K. A, Abdel-Gawad, W. & **Suo, Z.*** (2004) Pre-Steady-State Kinetic Studies of the Fidelity and Mechanism of Polymerization Catalyzed by Truncated Human DNA Polymerase Lambda. *Biochemistry* **43**, 6751-6762.
21. Fiala, K. A & **Suo, Z.*** (2004) Pre-Steady State Kinetic Studies of the Fidelity of Sulfolobus solfataricus P2 DNA Polymerase IV. *Biochemistry* **43**, 2106-2115
22. Fiala, K. A & **Suo, Z.*** (2004) Mechanism of DNA Polymerization Catalyzed by Sulfolobus solfataricus P2 DNA Polymerase IV. *Biochemistry* **43**, 2116-2125
24. **Suo, Z.**, Tseng, C. and Walsh, C. T.* (2001) Purification, Priming, and Catalytic Acylation of Carrier Protein Domains in the Polyketide Synthase and Nonribosomal Peptidyl Synthetase Modules of the HMWP1 Subunit of Yersiniabactin Synthetase. *Proc. Natl. Acad. Sci. U.S.A.* **98**, 99-104.
25. **Suo, Z**., Chen, H. and Walsh, C. T.* (2000) Acyl CoA Hydrolysis by the HMWP1 Subunit of Yersiniabactin Synthetase: Mutational Evidence for A Cascade of Four Acyl-Enzyme Intermediates during Hydrolytic Editing. *Proc. Natl. Acad. Sci. U.S.A.* **97**, 14188-14193.

G. Research Support

MCB-0447899 The National Science Foundation Career Award 4/15/2005 to 4/14/2010
Role: PI
"Kinetic, Dynamic, and Structure-Function Relationship Studies of a Y-family Polymerase"
Goals: this proposal is to carry out Kinetic, Dynamic, and Structure-Function Relationship Studies of Dpo4, a model Y-family DNA polymerase from *Sulfolobus solfataricus*.

2R01CA040463-22A1 (PI: John-Stephen Taylor) NIH/NCI 9/21/06 to 9/20/2011
Role: Co-PI
"DNA Photolesion Structure-Activity Relationships"
Goals: determine the DNA photoproduct and polymerase structure-activity relationships involved in the deamination and tautomerization bypass mechanisms for the formation of C to T mutations.

1R01GM079403-01A2 NIH/GM 9/14/2007 to 8/31/2012
Role: PI
"Mechanistic and Structure-Function Studies of Human DNA Polymerase Lambda"
Goals: establish kinetic, thermodynamic, and structural bases for the gap-filling fidelity, efficiency, and processivity of human DNA polymerase lambda, a novel X-family enzyme, and elucidate the role of its individual domains both *in vitro* and *in vivo*.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed for Form Page 2.
Follow the sample format on preceding page for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Richard P. Swenson, Ph.D.	Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Gustavus Adolphus College, St. Peter, MN	B.A.	1971	Chemistry
University of Minnesota, Minneapolis, MN	Ph.D.	1979	Biochemistry
University of Michigan, Ann Arbor, MI	Postdoc	1979-82	Flavoenzymes

A. Positions and Honors:

Research Assistant	Dept. of Endocrinology, Mayo Clinic/Foundation	1971-74
Research Asst Professor	Dept. of Biol. Chemistry, University of Michigan	1983-84
Assistant Professor	Dept. of Biochemistry, The Ohio State University	1984-89
Associate Professor	Dept. of Biochemistry, The Ohio State University	1989-99
Professor	Dept. of Biochemistry, The Ohio State University	1999-present
Chair	Dept. of Biochemistry, The Ohio State University	2000-2008

National Institutes of Health Predoctoral Fellow	1975-78
University of Minnesota Graduate School Dissertation Fellowship	1978-79
Bacaner Basic Science Research Award, Minnesota Medical Fdn	1980
Sigma Xi Society	1987-present
Distinguished Undergraduate Research Mentor, Ohio State University	2008

B. Selected Publications (from a total of 63) (chronologically from most recent):

Chen, H-.C. and Swenson, R.P. (2008) “Effect of the Insertion of a Glycine Residue into the Loop Spanning Residues 536 to 541 on the Semiquinone State and Redox Properties of the Flavin Mononucleotide-Binding Domain of Flavocytochrome P450BM-3 from *Bacillus megaterium*”, *Biochemistry* (accepted pending minor revisions).

Yang, K.-Y. and Swenson, R. P. (2007) "Nonresonance Raman Study of the Flavin Cofactor and its Interactions in the Methylotrophic Bacterium W3A1 Electron Transfer Flavoprotein"., Biochemistry 46, 2298-305.

Yang, K.-Y. and Swenson, R. P. (2007) “Modulation of the Redox Properties of the Flavin Cofactor through the Hydrogen-bonding Interactions with the N(5) Atom: Role of Ser254 in the Electron Transfer Flavoprotein from the Methylotrophic Bacterium W3A1.”, Biochemistry 46, 2289-97.

Murray, T.A. and Swenson, R. P. (2003) “Mechanism of Flavin Mononucleotide Cofactor Binding to the *Desulfovibrio vulgaris* Flavodoxin: I. Kinetic Evidence for Allosteric Effects Associated with the Binding of Inorganic Phosphate and the 5’-Phosphate Moiety of the Cofactor.”, *Biochemistry* **42**, 2307-2316.

Murray, T.A., Foster, M. P., and Swenson, R. P. (2003) “Mechanism of Flavin Mononucleotide Cofactor Binding to the *Desulfovibrio vulgaris* Flavodoxin: II. Evidence for Cooperative Conformational Changes Involving Tryptophan 60 in the Interaction between the Phosphate- and Ring-binding Subsites.”, *Biochemistry* **42**, 2317-2327.

Kasim, M. and Swenson, R. P. (2001) "Alanine-Scanning of the 50's Loop in the *Clostridium beijerinckii* Flavodoxin: Evaluation of Additivity and the Importance of Interactions Provided by the Main Chain in the Modulation of the Oxidation-Reduction Potentials", *Biochemistry* **40**, 13548-13555.

Bradley, L. H. and Swenson, R. P. (2001) "Role of Hydrogen Bonding Interactions to N(3)H of the Flavin Mononucleotide Cofactor in the Modulation of the Redox Potentials of the *Clostridium beijerinckii Flavodoxin*", *Biochemistry* **40**, 8686-8695.

Chang, F.C., Bradley, L. H. and Swenson, R. P. (2001) "Evaluation of the Hydrogen Bonding Interactions and Their Effects on the Oxidation-Reduction Potentials for the Riboflavin Complex of the *Desulfovibrio vulgaris* Flavodoxin", *Biochimica et Biophysica Acta*, **1504**, 319-328.

Kasim, M. and Swenson, R. P. (2000) "Conformational Energetics of a Reverse Turn in the *Clostridium beijerinckii* Flavodoxin is Directly Coupled to the Modulation of its Oxidation-Reduction Potentials", *Biochemistry* **39**, 15322-15332.

Bradley, L. H. and Swenson, R. P. (1999) "Role of Glutamate-59 Hydrogen Bonded to N(3)H of the Flavin Mononucleotide Cofactor in the Modulation of the Redox Potentials of the *Clostridium beijerinckii* Flavodoxin. Glutamate-59 is not Responsible for the pH Dependency but Contributes to the Stabilization of the Flavin Semiquinone", *Biochemistry* **38**,12377-12386.

Chang, F. C. and Swenson, R. P. (1999) "The Midpoint Potentials for the Oxidized-Semiquinone Couple for Gly57 Mutants of the *Clostridium beijerinckii* Flavodoxin Correlate with Changes in the Hydrogen Bonding Interaction with the Proton on N(5) of the Reduced Flavin Mononucleotide Cofactor as Measured by NMR Chemical Shift Temperature Dependencies", *Biochemistry* **38**, 7168-7176.

Druhan, L. and Swenson, R. P. (1998) "Role of Methionine 56 in the Control of the Oxidation-Reduction Potentials of the *Clostridium beijerinckii* Flavodoxin: Effects of Substitutions by Aliphatic Amino Acids and Evidence for a Role of Sulfur-Flavin Interactions", *Biochemistry* **37**, 9668-9678.

Feng, Y., and Swenson, R. P. (1997) "Evaluation of the Role of Specific Acidic Amino Acid Residues in Electron Transfer between the Flavodoxin and Cytochrome c3 from *Desulfovibrio vulgaris* [Hildenborough]", *Biochemistry* **36**, 13617-13628.

Chang, F. C. and Swenson, R. P. (1997) " Regulation of Oxidation-Reduction Potentials Through Redox-Linked Ionization in the Y98H Mutant of the *Desulfovibrio vulgaris* [Hildenborough] Flavodoxin: Direct 1H NMR Evidence for the Redox-Dependent Shift in the pKa of Histidine-98", *Biochemistry* **36**, 9013-9021.

Ludwig, M. L., Pattridge, K. A., Metzger, A. L., Dixon, M. M., Eren, M., Feng, Y., and Swenson, R. P. (1997) "Control of Oxidation-Reduction Properties in Flavodoxin from *Clostridium beijerinckii*: The Role of Conformation Changes", *Biochemistry* **36**, 1259-1280.

Zhou, Z. and Swenson, R. P. (1996) "The Cumulative Electrostatic Effect of Aromatic Interactions and the Negative Electrostatic Environment of the Flavin Mononucleotide Binding Site is a Major Determinant of the Reduction Potentials for the Flavodoxin from *Desulfovibrio vulgaris* [Hildenborough]", *Biochemistry* **35**, 15980-15988.

Zhou, Z. and Swenson, R. P. (1996) "Evaluation of the Electrostatic Effect of the 5'-Phosphate of the Flavin Mononucleotide Cofactor on the Oxidation-Reduction Potentials of the Flavodoxin from *Desulfovibrio vulgaris* [Hildenborough]", *Biochemistry* **35**, 12443-12454.

Pollock, J. R., Swenson, R. P., and Stockman, B. J. (1996), "1H and 15N NMR Resonance Assignments and Solution Secondary Structure of Oxidized *Desulfovibrio desulfuricans* Flavodoxin", *J. Biomolecular NMR* **7**, 225-235.

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
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NAME Wang, Peng George	POSITION TITLE
eRA COMMONS USER NAME Wang892	Professor of Biochemistry and Chemistry

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Nankai University, Tianjin, China	B.S.	1984	Chemistry
University of California, Berkeley	Ph.D.	1990	Organic Chemistry
University of California, Berkeley	Postdoctoral	1991-1992	Organic Chemistry
Scripps Research Institute, San Diego	Postdoctoral	1992-1994	Organic/Bioorganic

A. Positions and Honors.

Positions and Employment

1994 - 1997 Assistant Professor, Department of Chemistry, University of Miami
1997 - 2001 Associate Professor, Department of Chemistry, Wayne State University
2001 - 2003 Professor, Department of Chemistry, Wayne State University
2003 - present Professor and Ohio Eminent Scholar in Macromolecular Structure and Function
Professor, Department of Biochemistry, The Ohio State University
Joint Professor (20% appointment), Department of Chemistry, The Ohio State University
Joint Professor, Division of pharmaceutics, College of Pharmacy, The Ohio State University
Member, Experimental Therapeutics Program, The Ohio State University
Comprehensive Cancer Center (OSUCCC)

Other Experience and Professional Memberships

1996 - 1997 Member, Sylvester Cancer Center, University of Miami School of Medicine
1997 Chairman-Elect, American Chemical Society, South Florida Section
1999 - 2003 Reviewer for the NIH special emphasis panel
2000 - present Ad hoc reviewer for Bioorganic & Natural Products Chemistry Study Section (BNP) and the NIH Medicinal Chemistry Study Section (MCHA)
1997 - 2003 Joint Professor, Barbara Ann Karmanos Cancer Institute, the Detroit Medical Center
1999 - 2003 Member, Institute for Drug Design, Wayne State University
Membership, American Chemical Society, American Association for the Advancement of Science, The Society for Glycobiology, American Society for Microbiology, The NITRIC OXIDE Society

Member of Editorial Board

2001 - Medicinal Research Reviews
2002 - Marine Drugs
2002 - Current Organic Chemistry
2003 - Applied and Environmental Microbiology
2005 - Carbohydrate Research
2008 - American Journal of Biomedical Sciences

Honors

1988 NATO Fellowship from NATO Advanced Study Institute
1996 - 2001 NIH First Independent Research Support and Transition (FIRST) Award
1999 Camille Dreyfus Teacher-Scholar Award
2000 Metro Detroit's Creator from Crain's Detroit Business
2002 Horace S. Isbell Award from American Chemical Society, Division of Carbohydrate Chemistry

B. Selected peer-reviewed publications (out of 217 total, in chronological order).

1. Li, Mei; Liu, Xianwei; Shao, Jun; Yi, Wen; Chow, Christine S.; Wang, Peng George "Identification of a New α1,2-Fucosyltransferase (WbwK) Involved in O-Antigen Biosynthesis of *Escherichia coli* O86:B7 and Formation of H-Type 3 Blood Group Antigen" *Biochemistry*, **2008**, in press.
2. Shen, J.; Woodward, R; Kedenburg, J.P.; Liu, X.; Min Chen, M.; Fang, L.; Sun, D.; Wang, P.G. "Novel HDAC Inhibitors through Click Chemistry" *Journal of Medicinal Chemistry*, in press.
3. Zhang, W.; Zheng, X.; Xia, C.; Perali, R. S.; Yao, Q.; Liu, Y.; Zheng, P.; Wang, P.G. "Lactosylceramide as a novel "sugar-capped" CD1d ligand for natural killer T cells: biased cytokine profile and therapeutic activities" *ChemBioChem*, **2008**, *9*, 1423-1430.
4. Cui, H.; Shen, J.; Lu, D.; Zhang, T.; Zhang, W.; Sun, D.; Wang, P.G. "4-Aryl-1,3,2-oxathiazolylium-5-olate: a novel GST inhibitor to release JNK and activate c-Jun for cancer therapy" *Cancer Chemotherapy and Pharmacology* **2008**, *62*, 509-515.
5. Pradhan, P.; Guan, J.; Lu, D.; Wang, P.G.; Lee, L. James; L., Robert J. "A facile microfluidic method for production of liposomes" *Anticancer Research*, **2008**, *28*, 943-948.
6. Shang, P.; Zhang, C.; Xia, C.; Chen, W.; Han, Q.; Wang, P.G.; Zhang, J.; Tian, Z. "Chemical modification of iGb3 increases IFN-γ production by hepatic NKT cells" *International Immunopharmacology* **2008**, *8*, 645-653.
7. Guo, H.; Yi, W.; Song, J. K.; Wang, P.G. "Current understanding on biosynthesis of microbial polysaccharides" *Current Topics in Medicinal Chemistry* **2008**, *8*, 141-151.
8. Su, D. M.; Eguchi, H.; Yi, W.; Li, L.; Wang, P.G.; Xia, C. "Enzymatic Synthesis of Tumor-Associated Carbohydrate Antigen Globo-H Hexasaccharide" *Organic Letters* **2008**, *10*, 1009-1012.
9. Nagy, J. O.; Zhang, Y.; Yi, W.; Liu, X.; Motari, E.; Song, J. C.; Lejeune, J. T.; Wang, P.G. "Glycopolydiacetylene nanoparticles as a chromatic biosensor to detect Shiga-like toxin producing Escherichia coli O157:H7" *Bioorganic & Medicinal Chemistry Letters* **2008**, *18*, 700-703.
10. Yi, W.; Perali, R.S.; Eguchi, H.; Motari, E.; Woodward, R.; Wang, P.G. "Characterization of a Bacterial beta-1,3-Galactosyltransferase with Application in the synthesis of Tumor-Associated T-Antigen Mimics" *Biochemistry*, **2008**, *47*, 1241-1248.

Book edited (2 of 4)

1. Wang, P. G.; and Bertozzi, C. R. "Glycochemistry: Principles, Synthesis, and Applications" Marcel Dekker, Inc. New York, **2001**.
2. Wang, P. G.; and Ichikawa, Y. "Synthesis of Carbohydrates through Biotechnology" ACS Symposium Series for 224th American Chemical Society meeting. **2003**.

C. Research Support.

*Title: "*Chemical Glycobiology on Anthracyclines*"*
Principal Investigator: Peng George Wang, Ph.D.
Co-PI: Professors Duxin Sun, Robert Snapka, Christopher Hadad from the Ohio State University
Agency: NIH-NCI 1R01CA118208 Period: 07/01/06 - 10/31/10
Funding to Peng George Wang: $ 90,250/year (total direct cost/year)
The program investigates the interaction and selectivity of designed anthracyclines in DNA-drug complex in the first step of drug action and in Topoisomerase-DNA-drug complex in the next step of drug action.

*Title: "*NKT Cells Immunotherapy: Targeting Dendritic Cells with Glycolipid Liposomes*"*
Principal Investigator: Peng George Wang, Ph.D.
Co-PI: Professor Robert Lee from the Ohio State University
Agency: NIH-NCI R21CA123195 Period: 08/01/06 - 07/31/08
Funding to Peng George Wang: $133,000 (total direct cost for the entire two years)
This research program combines expertise from three different laboratories at The Ohio State University and an industry partner to work on the first proof of concept for liposomal glycolipid drug delivery to dendritic cells for better harnessing the wide range of immunological functions of natural killer T cells.

Biographical Sketch

Name: Zhengrong Wu

A. Professional Training

Nanjing University	Chemistry	1988-1991
Slippery Rock University of Pennsylvania	Chemistry/Biochemistry	B.S., 1992-1994
University of Maryland Baltimore County	Biochemistry	Ph. D., 1995-1999
NIDDK, National Institutes of Health	Biochemistry/Biophysics	PostDoc, 2000-03

B. Position

2003-present Assistant Professor, Ohio State University

1992-1994 Member of American Chemistry Society.
1996-present Member of AAAS.

C. Publications

1. Zhengrong Wu, Soheila Ebrahimian, Michael E. Zawrotny, Lora D. Thornburg, Gabriela C. Perez-Alvarado, Paul Brothers, Ralph M. Pollack, Michael F. Summers. Solution Structure of 3-Oxo-Δ5-Steroid Isomerase. Science, 276, 415-418, 1997.
2. Roberto N. De Guzman, Zhengrong Wu, Chelsea C. Stalling, Lucia Pappalardo, Philip N. Borer, Michael F. Summers. Structure of the HIV-1 Nucleocapsid Protein Bound to the SL3 Ψ-RNA Recognition Element. Science, 279, 384-388, 1998.
3. Ralph M. Pollack, Lora D. Thornburg, Zhengrong Wu, Michael F. Summers. Mechanistic Insights from the Three-Dimensional Structure of 3-Oxo-Δ5-Steroid Isomerase. Arch. Biochem. Biophys. 370, 9-15, 1999.
4. Gaya K. Amarasinghe, Roberto N. De Guzman, Ryan B. Turner, Kalola Chancellor, Zhengrong Wu, Michael F. Summers. NMR structure of the HIV-1 nucleocapsid protein bound to stem-loop SL2 of the Ψ-RNA packaging signal. Implications for genome recognition. J. Mol. Biol. 301, 491-511, 2000.
5. Philip E. Johnson, Ryan B. Turner, Zhengrong Wu, Lea Hairston, Jianhui Guo, Judith G. Levin, Michael F. Summers. A Mechanism for (+) strand transfer enhancement by the HIV-1 nucleocapsid protein during reverse transcription. Biochemistry, 39, 9084-9091, 2000.
6. Zhengrong Wu, Ad Bax. Measurement of homonuclear residual dipolar couplings based on cross-peak nulling conditions from 2D CT-COSY. J. Magn. Reson. 151, 242-252, 2001.
7. Frank Delaglio, Zhengrong Wu, Ad Bax. Measurement of Homonuclear Proton Couplings from 2D COSY Spectra. J. Magn. Reson. 149, 276-281, 2001.
8. Zhengrong Wu, Nico Tjandra, Ad Bax. Measurement of ^{1}H3'-^{31}P dipolar couplings in a DNA oligonucleotide by constant-time NOESY difference spectroscopy. J. Biomol. NMR. 19, 367-370, 2001.
9. Zhengrong Wu, Akira Ono, Masatsune Kainosho, Ad Bax. H…N hydrogen bond lengths in double stranded DNA from internucleotide dipolar couplings. J. Biomol. NMR. 19, 361-365, 2001.
10. Zhengrong Wu, Nico Tjandra, Ad Bax. ^{31}P Chemical Shift Anisotropy as an Aid in Determining Nucleic Acid Structure in Liquid Crystals. J. Am. Chem. Soc. 123, 3617-3618, 2001.
11. Zhengrong Wu, Ad Bax. Measurement of Longer-Range ^{1}H-^{1}H Dipolar Couplings in Weakly Aligned Proteins. J. Am. Chem. Soc. 124, 6972-6973, 2002.

12. Zhengrong Wu, Frank Delaglio, Nico Tjandra, Victor B. Zhurkin and Ad Bax. Overall structure and sugar dynamics of a DNA dodecamer from homo- and heteronuclear dipolar couplings and ^{31}P chemical shift anisotropy. J. Biomol. NMR, 26, 297-315, 2003.
13. Dana C. Lawrence, Carrie C. Stover, Jennifer Noznitsky, Zhengrong Wu and Michael F. Summers. Structure of the Intact Stem and Bulge of HIV-1 Ψ–RNA Stem Loop SL1. J. Mol. Biol, 326, 529-542, 2003.
14. Jerome Boisbouvier, Zhengrong Wu, Akira Ono, Masatsune Kainosho and Ad Bax. Rotational Diffusion Tensor of Nucleic Acids from ^{13}C NMR Relaxation. J. Biomol. NMR, 27, 133-142, 2003.
15. Erin O'Neil-Cabello, Zhengrong Wu, David L. Bryce, Edward P. Nikonowicz and Ad Bax. Enhanced spectral resolution in RNA HCP spectra for measurement of $^{3}J_{C2',P}$ and $^{3}J_{C4',P}$ couplings and ^{31}P chemical shift changes upon weak alignment. J. Biomol. NMR, 30, 61-70, 2004.
16. Zhengrong Wu, Melissa Maderia, Joseph Barchi, Victor E. Marquez and Ad Bax. Changes in DNA-bending induced by restricting nucleoside ring pucker studied by weak alignment NMR spectroscopy. PNAS, 102, 24-28, 2005.
17. Zhengrong Wu, Frank Delaglio, Keith Wyatt, Graeme Wistow and Ad Bax. Solution structure of gS-crystallin by molecular fragment replacement NMR. Pro. Sci., 14, 3101-3114, 2005.
18. Alexander Grishaev, Zhengrong Wu, Jill Trewhella and Ad Bax. Refinement of Multi-Domain Protein Structures by Combination of Solution Small Angle X-ray Scattering and NMR Data. J. Am. Chem. Soc. 127, 16621-16628, 2005.
19. M. Maderia M, J. Wu, A. Bax, S. Shenoy, B. O'Keefe, V.E. Marquez, and J.J. Barchi: Engineering DNA topology with locked nucleosides: A structural study. Nucleosides, nucleotides & nucleic acids, 24, 687-690 (2005).
20. Hongjie Guo, Kaarina Lokko, Yun Zhang, Wen Yi, Zhengrong Wu, Peng George Wang. Overexpression and characterization of Wzz of Escherichia coli O86:H2. Protein Expression & Purification, 48, 49-55, 2006.
21. R. Sounier, L. Blanchard, Z. Wu and J. Boisbouvier. High accuracy distance measurement between romote methyls in specifically protonated proteins. J. Am. Chem. Soc. 129, 472-473 (2007).
22. Vian Gama, Jose Gomez, Weiyong Sun, Paullette Hayes, Amber Hogue, Zhengrong Wu, Konstantin Leskov, David Boothman, Shigemi Matsuyama. Ku70 interacts with Bax and inhibits Bax-mediated cell death. Manuscript submitted.
23. Soojin Lee, Amber Hogue, Jodie Toward and Zhengrong Wu. Solution structure of Gfi1 zinc finger domain bound to its recognition DNA. Manuscript in preparation.
24. Soojin Lee, Ian Klecker, Jodie Toward and Zhengrong Wu. H/D exchange of gS-crystallin and its mutant opj: implication of cataract formation. Manuscript in preparation.

D. Funding

1) "Structural and functional studies of growth factor independence-1", Leukemia Res. FDN., $99,368(total), 07/07-06/08.
2) "Structural and unfolding studies of γS-crystallin", NIH, $412,500(total), 09/07-08/09.
3) "Structural and functional studies of Gfi-1", NSF, $460,000(total), 09/07-08/10.

BIOGRAPHICAL SKETCH

NAME	POSITION TITLE
Zhong, Dongping	Associate Professor
eRA COMMONS USER NAME	

EDUCATION/TRAINING *(In reverse chronological order, include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
California Institute of Technology, Pasadena, CA	Postdoc	2002	Biophysical Chemistry
California Institute of Technology, Pasadena, CA	Ph.D.	1999	Chemical Physics
Kansas State University, Manhattan, KS	M.S.	1993	Physical Chemistry
Huazhong University of Sci. & Tech., Wuhan, China	M.S.	1988	Laser Physics
Huazhong University of Sci. & Tech., Wuhan, China	B.S.	1985	Laser Physics

A. Positions, Honors and Service

Positions and Employment

2007-present, *Robert Smith* Associate Professor of Physics, Associate Professor of Chemistry and Biochemistry
2002-2007, Assistant Professor, Departments of Physics, Chemistry, and Biochemistry (adjunct)
Member of OSU Biophysics, Biochemistry, and Chemical Physics Programs,
Member of Spectroscopy Institute
Ohio State University

Other Experience

1991-1993, Teaching Assistant and Research Assistant, Chemistry Dept., Kansas State University
1994-1999, Teaching Assistant and Research Assistant, Division of Chemistry, California Institute of Technology

Honors

- *Camille Dreyfus Teacher-Scholar Award,* The Camille and Henry Dreyfus Foundation, 2008
- *Dr. Elizabeth L. Gross Award for Faculty Excellence,* Ohio State University, 2008
- *CAREER Award,* National Science Foundation, 2008
- *Sloan Research Fellowship,* The Alfred P. Sloan Foundation, 2008
- *Robert Smith Endowed Professorship,* Ohio State University, 2007
- *Packard Fellowship,* The David and Lucile Packard Foundation, 2005
- *Milton and Francis Clauser Doctoral Prize,* California Institute of Technology, 1999
- *The Herbert Newby McCoy Award,* California Institute of Technology, 1999

Scholarly or Creative Work (*highlights and commentaries*)

- *Science* **318**, 1351, Editors' Choice (2007)
- *Proceedings of the National Academy of Sciences USA* **104**, issue 47, cover highlight (2007)
- *Journal of Physical Chemistry B* **110**, issue 21, cover (2006)
- *Journal of Physical Chemistry B* **108**, issue 46, cover (2004)
- *Proceedings of the National Academy of Sciences USA* **98**, 387 (2001)
- *Proceedings of the National Academy of Sciences USA* **96**, 4219 (1999)
- *The Press Release of the 1999 Nobel Prize in Chemistry*, Stockholm, Sweden (1999)
- *Photonics Spectra, December*, 88 (1996)
- *Chemical & Engineering News,* April 26, 36 (1996)

Recent Professional Service

- Frequent reviewer for Journals: Biophysics Journal, Biochemistry, Physical Review Letters, PNAS, Chemical Physics Letters, Journal of Physical Chemistry, Journal of American Chemical Society, FEBS Letters, Angewandte Chemie, Journal of Photochemistry and Photobiology, Journal of Biomolecular Structure and Dynamics, Applied Physics Letters, Review of Scientific Instruments, Chemical Physics, ChemPhysChem, Photochemistry and Photobiology, Optical Letters, Journal of Molecular Spectroscopy, Physical Chemistry Chemical Physics, Biomacromolecules, Journal of Medicinal Chemistry
- Referee for Proposals: NIH, NSF, ACS-Petroleum Research Foundation
- Membership of American Chemical Society, American Physical Society, Biophysical Society, American Association for the Advancement of Science

B. Selected peer-reviewed publications since 2007 (in reverse chronological order)

48. Y.-T. Kao, C. Saxena, T.-F. He, L. Guo, L. Wang, A. Sancar and **D. Zhong**, *J. Am. Chem. Soc.* 130, 13132 (2008). Ultrafast dynamics of flavins in five redox states.
47. N. Ozturk, Y.-T. Kao, C.P. Selby, I. H. Kavakli, C.L. Partch, **D. Zhong** and A. Sancar, *Biochemistry*, 47, 10255 (2008). Purification and characterization of Type III photolyase from *Caulobacter crescentus*.
46. Y.-T. Kao, C. Tan, S.-H. Song, N. Ozturk, J. Li, L. Wang, A. Sancar and **D. Zhong**, *J. Am. Chem. Soc.* 130, 7695 (2008). Ultrafast dynamics and anionic active states of flavin in cryptochrome and photolyase.
45. W. Qiu, T. Li, L. Zhang, Y. Yang, Y.-T. Kao, L. Wang and **D. Zhong**, *Chem. Phys*. 350, 154 (2008). Ultrafast quenching of tryptophan fluorescence in proteins: Interresidue and intrahelical electron transfer. (Special issue: Femtochemistry VIII).
44. N. Ozturk, S.-H. Song, S. Ozgur, C.B. Selby, L. Morrison, C. Partch, **D. Zhong**, and A. Sancar, in *Cold Spring Harbor Symposium on Quantitative Biology, Vol. LXXII, Clocks and Rhythms*, B. Stillman, D. Stewart, Eds., Cold Spring Harbor Laboratory Press: New York (2008), p119-131. Structure and function of animal cryptochromes.
43. L. Zhang, L. Wang, Y.-T. Kao, W. Qiu, Y. Yang, O. Okobiah and **D. Zhong**, *Proc. Natl. Acad. Sci. USA* 104, 18461-18466 (2007). Mapping hydration dynamics around a protein surface.
42. S.-H. Song, N. Ozturk, T.R. Denaro, N. Ozlem, Y.-T. Kao, H. Zhu, **D. Zhong**, S.M. Reppert and A. Sancar, *J. Biol. Chem.* 282, 17608-17612 (2007). Formation and function of flavin anion radical in cryptochrome 1 blue-light photoreceptor of Monarch Butterfly.
41. Y.-T. Kao, C. Saxena, L. Wang, A. Sancar and **D. Zhong**, *Cell Biochem. Biophys.* 48, 32-44 (2007). (Invited review). Femtochemistry in enzyme catalysis: DNA photolyase.
40. **D. Zhong**, *Curr. Opin. Chem. Biol.* 11, 174-181 (2007). (Invited review). Ultrafast catalytic processes in enzymes.
39. W. Qiu, L. Wang, W. Lu, A. Boechler, D. A. R. Sanders and **D. Zhong**, *Proc. Natl. Acad. Sci. USA* 104, 5366-5371 (2007). Dissection of complex protein dynamics in *human* thioredoxin.
38. T. Li, A.A. Hassanali, Y.-T. Kao, **D. Zhong** and S. J. Singer, *J. Am. Chem. Soc.* 129, 3376-3382 (2007). Hydration dynamics and time scales of coupled water-protein fluctuations.

C. Current Research Support

1. The Camille and Henry Dreyfus Foundation, Camille Dreyfus Teacher-Scholar Award, 04/23/2008-04/24/2013, $**75,000**. sole PI: Dongping Zhong. Ultrafast functional dynamics of biomolecules.
2. The Alfred Sloan Foundation, Sloan Research Fellowship, BR-4847, 07/01/2008-09/15/2010, **$50,000**. sole PI: Dongping Zhong. Ultrafast protein dynamics.
3. National Science Foundation, CHE-0748358 (CAREER award), 09/01/2008-08/31/2013, **$650,000**. sole PI: Dongping Zhong. Ultrafast hydration dynamics and molecular recognition.
4. National Institute of Health, GM074813, 02/01/2007-1/31/2012, **$1,425,000**. PI: Dongping Zhong (Co-PI: Sherwin Singer). Functional dynamics and molecular mechanism of photolyase.
5. National Institute of Health, GM031082, 05/01/2006-04/30/2010, $2,752,000. PI: Aziz Sancar (Univ. of North Carolina), co-PI: Dongping Zhong (my share **$490,000**). Photolyase/cryptochrome family, DNA repair/circadian clock.
6. The David and Lucile Packard Foundation, Packard Fellowship, PFG#2005-29106, 11/01/2005- 10/31/2010, **$725,000,** sole PI: Dongping Zhong. Ultrafast functional dynamics of biomolecules.