Eck Institute for Global Health
“State of the Institute”
April 20, 2011

Dave Severson, Director
Jeff Schorey, Co-Director
Kathy Taylor, Director of Operations
Joe Bock, Director of Global Health Training
Mary Ann McDowell, Chair Advisory Committee
Kim Bogold, Coordinator
History

• Vector Biology Laboratory - 1957 (Dr. George Craig)

• Parasitology Group - 1969 (Dr. Paul Weinstein)

• Center for Global Health and Infectious Diseases - 1997-2008 (Director: Dr. Frank Collins)

• Eck Institute for Global Health - 2008
Strategic Research Initiative
Genomics, Disease Ecology and Global Health

Our Plan:

- Add key new faculty that expand our depth and breadth
  - Pathobiology (‘09), Genomics (‘09)
  - Bioinformatics (‘09-‘10), Epidemiology (‘10), Disease Ecology (‘10)

- Establish core facilities in Genomics and Bioinformatics
  - Administrative staff, State-of-the-art instrumentation, Seed grants

- Promote graduate studies in Genomics and Bioinformatics

- Provide undergraduate research opportunities

- Enhance interdisciplinary research and training activities

Goal: Promote development of new interdisciplinary research programs in global health that link faculty within the College of Science, College of Engineering, College of Arts & Letters, and the Indiana University School of Medicine-SB
Patricia Champion, Department of Biological Sciences - to identify new factors that are associated with hyper-virulence in mycobacteria.

Jeffrey Feder, Department of Biological Sciences - to identify genetic markers that identify local and regional populations of Wuchereria bancrofti, the parasite the causes filariasis, and sometimes results in a debilitating disease known as elephantiasis.

Jeffrey Feder, Department of Biological Sciences - to use the Bioinformatics Core expertise to assist in interpreting sequencing data for various species of Rhagotletis fly

Paul Huber, Department of Chemistry and Biochemistry - to study the role of small ubiquitin-like modifier (SUMO) proteins during embryogenesis.

Shaun Lee, Department of Biological Sciences - to address how Group A Streptococcus (GAS) is able to resist the effects of its own toxin.

Mary Ann McDowell, Department of Biological Sciences - to further elucidate the regulation of key cellular activities in cells infected by Leishmania spp.

Richard Taylor, Department of Chemistry and Biochemistry - to identify the key steps in the biosynthesis of gephyronic acid, a natural product isolated from a bacteria that has been shown to inhibit growth of yeast and mold, as well as a range of mammalian cell types

Molly Duman Scheel, Indiana University School of Medicine, South Bend - to study the role of Drosophila Deleted in Colorectal Cancer (DCC) gene in signaling pathways that are associated with the induction of cancer.

Andrew Mahon, Department of Biological Sciences - to survey the population genetics of Bythotrephes longimanus - Ponto Caspian spiny water flea - and establish a relationship between patterns of human movement and genetic variation in inland lake populations of B. longimanus.
Holly Goodson, Department of Chemistry and Biochemistry - to develop bioinformatics software that uses the evolutionary information present in protein sequence alignments to specifically identify regions involved in “tuning” protein function.

Amanda Hummon, Department of Chemistry and Biochemistry - to test the hypothesis that microRNAs, miR-143 & miR-145, play a role in the progression of colorectal cancer.

Stuart Jones, Department of Biological Sciences - to link genomic content with physiological characteristics of sixteen freshwater bacteria.

Karen Dahl, Indiana University School of Medicine, South Bend - to identify ARID3B-regulated genes that promote ovarian cancer.

Matthew Champion, Department of Chemistry and Biochemistry - to create a proteomics-compatible database template which incorporates rare and theoretical possibilities from the genome to allow for detection of many novel gene products and the re-assessment of many N and C-terminal protein products of existing genes.
Genomics and Bioinformatics Fellowship Awards for the 2010-11 Academic Year

Nick Geraci, Biological Sciences, (Faculty Advisor: Mary Ann McDowell) - to study *Leishmania major* and *L. donovani*, two protozoan intracellular parasites that are the causative agents of cutaneous and visceral leishmaniasis respectively.

Shawn O’ Neil, Computer Science and Engineering, (Faculty Advisor: Scott Emrich) to develop methods and tools for analysis of population sourced genomic data.

Andrew Rider, Computer Science and Engineering, (Faculty Advisor: Scott Emrich) to study clustering methods for analysis of metagenomic and other data.

Changde Cheng, Biological Sciences, (Faculty Advisor: Nora Besansky) - to study the genetic basis of the extraordinary adaptability of *Anopheles gambiae*, the primary vector of human malaria in Africa.

Michelle Lang, Chemistry and Biochemistry, (Faculty Advisor: Paul Huber) - to study the effect of SUMOylation (Small Ubiquitin like MOnifier) on gene regulation during early development of *Xenopus* embryos.

Richard Kurker, Chemistry and Biochemistry, (Faculty Advisor: Jennifer DuBois) - to study the heme protein chlorite dismutase (Cld), which has adapted to perform the novel biological function of chlorite detoxification into chloride and molecular oxygen.
Travel & Research Grants

- Karen Kajder - Dept. of Civil Engineering and Geological Sciences - Uganda - safe water/transport.

- Laura Larkin & Mary Beauclair - Anthropology - Benin - safe water/wells

- Jonathon Gillig - Biology/Theology - Kenya - Malaria

- Clair Fisher - Psychology - Ghana - Unite for Sight

- Laura Larkin & Mary Beauclair - Anthropology - Benin - safe water/wells

- Marilyn Blasingame - Biology/Russian - Trinidad - Dengue & mosquitoes
New Faculty Members
(total now at ~55 faculty members)

- **COLLEGE OF SCIENCE**
  - Department of Biological Sciences
    - Crislyn D’ Souza Schorey, Ben Ridenhour, Zachary Schafer, Edwin Michael
  - Department of Chemistry & Biochemistry
    - Matthew Champion, Mayland Chang, Amanda Hummon, Marya Lieberman

- **COLLEGE OF ENGINEERING**
  - Department of Chemical and Biomolecular Engineering
    - Paul Bohn, Chia Chang

- **INDIANA UNIVERSITY**
  - School of Medicine
    - Karen Dowden Dahl, Peter Velazquez, Tracy Vargo-Gogola
Katie Washington named 2010 valedictorian

Washington, who earned a 4.0 grade point average, has a minor in Catholic Social Teaching. She has conducted research on lung cancer at the Cold Spring Harbor labs and performed genetic studies in the University’s Eck Institute for Global Health on the mosquito that carries dengue and yellow fever. She is the co-author of a research paper with David Severson, professor of biological sciences.

Washington is currently in a joint M.D./Ph.D program at Johns Hopkins University.
Stephen E. Silliman, professor of civil engineering and geological sciences at the University of Notre Dame, has been named the 2011 Henry Darcy Distinguished Lecturer by the National Ground Water Research and Educational Foundation.

As the 2011 lecturer, Silliman will present a series of lectures on groundwater hydrology to numerous host institutions throughout the 2011 calendar year.

Silliman’s expertise is in groundwater flow and transport in heterogeneous media, stochastic hydrology and water resource development and management in developing countries.
Mary Ann McDowell, associate professor of biological sciences and David Severson, director of the Eck Institute for Global Health, were invited speakers at a workshop on disease vectors in Recife, Brazil titled “Entomol 4 Workshop on Genetics and Molecular Biology of Insect Vectors of Tropical Diseases.”

Several of the speakers have Notre Dame ties—four of the Brazilian scientists spent time here in our department and a faculty member from the University of California—Davis was a graduate student here with Dr. George Craig.

The Entomol Workshop represents a permanent forum for discussion of topics directly or indirectly related to entomology, and molecular ecology of vectors of tropical diseases like dengue, malaria, leishmaniasis, among others. The event fosters scientific collaboration between different research groups participating, contributing to the dissemination of scientific knowledge and therefore to the improvement of human resources in Brazil.
Notre Dame and University of Wyoming scientists genetically engineer silkworms to produce artificial spider silk

A research and development effort by the Malcolm J. Fraser Jr., a Notre Dame professor of biological sciences, the University of Wyoming, and Kraig Biocraft Laboratories, Inc. has succeeded in producing transgenic silkworms capable of spinning artificial spider silks.

Silk fibers have many current and possible future biomedical applications, such as use as fine suture materials, improved wound healing bandages, or natural scaffolds for tendon and ligament repair or replacement. Spider silk-like fibers may also have applications beyond biomedical uses, such as in bulletproof vests, strong and lightweight structural fabrics, a new generation athletic clothing and improved automobile airbags.

[September, 2010]
Notre Dame researcher helps discover "walking" properties of bacteria

WILLIAM G. GILROY • DATE: OCTOBER 07, 2010

Talk about a walk on the wild side: University of Notre Dame researcher Joshua Shrout is co-author of a new paper that shows that bacteria are capable of "standing up" and moving while vertical.

Shrout, assistant professor of civil engineering and geological sciences and a member of Notre Dame's Eck Institute for Global Health, has been studying the surface motility of bacteria since 2004. In 2008, UCLA researcher Gerard Wong suggested that an undergraduate bioengineering senior design group that he was advising track the bacterium Shrout was studying. After some interesting patterns were observed initially, Shrout collected more data to send to Wong’s group and they refined their analysis to allow for identification of very specific patterns by the bacteria, including "walking."

In a paper appearing in today’s edition of the journal Science, Shrout, Wong and other researchers report on their findings.

"The significance of the work is that we show bacteria are capable of 'standing up' and moving while vertical," Shrout said. "The analysis methodology developed by Gerard’s group made this observation possible. They developed a computer program to analyze time-lapse data series, just like those showing plant development that you watched on PBS as a kid, of bacterial motion on surfaces. By tracking thousands of bacteria for minutes to hours, the stand-up walking pattern was observed and verified to occur with some frequency."

Apart from being an extraordinary insight into the behavior of bacteria, the findings have important
Researchers at the University of Notre Dame's Eck Institute for Global Health have coauthored a paper recently published in the journal Science that announces the genome sequencing of *Culex quinquefasciatus*, the southern house mosquito. Additionally, the laboratory of David Severson, professor of biological sciences, has published a paper in *PLoS ONE* that uses the genome sequence to study microsatellite distribution in the mosquito.

*Culex quinquefasciatus* is the primary vector for lymphatic filariasis in some parts of the world and for West Nile virus in the United States. Genomes for *Aedes aegypti*, associated with dengue and yellow fever, and *Anoploes gambiae*, associated with malaria, had been sequenced earlier. Severson's lab, and VectorBase, a leading repository of arthropod genome information for research funded by the National Institutes of Health, participated in the sequencing with researchers from a global network. In addition, VectorBase was involved with a companion Science paper that analyzed the *Culex* immune system.
Helquist Awarded Year-Long Guest Professorship in Sweden

- Paul Helquist has recently been awarded the Tage Erlander Guest Professorship in Chemistry from the National Science Research Council of Sweden. Helquist and his wife Christie will live in Sweden from May 2011 to July 2012. The $325,000 award includes support for graduate students and postdoctoral associates.

[November, 2010]
Good health. It’s a luxury many of us take for granted every day. For health care professionals, this ideal inspires a lifelong commitment to patient-centered care.
George Craig Memorial Lecture Series: Phil Lounibos

Tue Nov 9, 2010 4:00PM - 5:00PM • Calendars: Department Seminars

Phil Lounibos, Professor of Ecology and Behavior at University of Florida, will present a seminar at 4 PM in 283 Galvin Life Science.

The George B. Craig, Jr. Memorial Lecture Series honors Notre Dame faculty member and distinguished scientist George Brownlee Craig, Jr. (1930-1995). A Chicago native, Craig joined the Notre Dame Biology faculty in 1957 after receiving a Bachelor’s degree from Indiana University and Master’s and Ph.D. degrees from the University of Illinois. While at Notre Dame, he established a world-renowned research program in mosquito biology and genetics, serving as advisor to 40 graduate students and 39 postdoctoral fellows, with whom he published more than 500 scientific papers. He was a passionate teacher and mentor to countless undergraduate students. Recipient of numerous awards and honors during his career at Notre Dame, he was honored by the Entomological Society of America in 1975 with its first Distinguished Teaching Award, received the Hoogstrahl Medal from the American Committee for Medical Entomology, and in 1983 became the first Notre Dame faculty member to be elected to the prestigious National Academy of Sciences. This lectureship is funded, in part, by an endowment established from contributions donated in his memory.
New study examines immunity in emerging species of a major mosquito carrier of malaria

WILLIAM G. GILROY • DATE: DECEMBER 21, 2010

In notable back-to-back papers appearing in the prestigious journal Science in October, teams of researchers, one led by Nora Besansky, a professor of biological sciences and a member of the Eck Institute for Global Health at the University of Notre Dame, provided evidence that Anopheles gambiae, which is one of the major mosquito carriers of the malaria parasite in Sub-Saharan Africa, is evolving into two separate species with different traits.

Another significant study appearing in this week's edition of the Proceedings of the National Academy of Sciences (PNAS) and also led by Besansky suggests that the mosquitoes' immune response to malaria parasites, mediated by a gene called "TEP1," is one of the traits that differ between the two forms of Anopheles gambiae.

Both papers have major implications for malaria controls efforts and could eventually lead to new malaria prevention efforts.
Eck Institute researchers have strong presence in prestigious journal Science

December 10, 2010

William G. Gilroy • Date: December 10, 2010

A visible sign of the continuing emergence of the University of Notre Dame as a world-class research university is the increasing number of papers by its researchers that appear in prestigious science journals, such as Nature, Science and the Proceedings of the National Academy of Sciences.

A visible sign of Notre Dame’s emerging leadership role in the field of global health is the fact that in a recent month researchers from its Eck Institute for Global Health had a remarkable four studies published in Science.

“To my knowledge, publication of four papers that involve three different organisms intimately associated with human disease transmission in the prestigious journal Science within a one month span at one institution is unprecedented,” David Severson, director of the Eck Institute said. “I am pleased to note that the Notre Dame researchers contributing to each of these papers are affiliates of the Institute. I can also report that these outstanding efforts reflect the caliber of our faculty and were, in part, significantly enhanced by funding through our Provost's Strategic Research Investment in "Genomics, Disease Ecology and Global Health."

The Eck Institute was established in 2008 and is funded through a $20 million endowment from the estate of alumnus Frank E. Eck, as well as funds from the Strategic Research Investments program.

Originally established as the Vector Biology Program, the Eck Institute for Global Health has engaged in groundbreaking work for more than four decades. The late biologist George B. Craig Jr. and the late biological sciences professor Paul P. Weinstein were Notre Dame pioneers in the field. Craig was one of the world’s foremost experts on mosquitoes and their disease-carrying capabilities. Weinstein, formerly director of the Laboratory of Parasitic Diseases at the National Institutes of Health, founded the Parasitology Research Group at Notre Dame.
Two Eck Institute for Global Health members have been appointed five-year collegiate chairs made possible by the Lilly Endowment:

- **Professor Nora J. Besansky** has been appointed the Rev. John Cardinal O’Hara, C.S.C. Professor of Biological Sciences, and

- **Professor Patricia L. Clark** has been appointed the Rev. John Cardinal O’Hara, C.S.C. Associate Professor of Chemistry and Biochemistry.

These collegiate chairs, supported by a grant from the Lilly Endowment to stimulate the recruitment and retention of intellectual capital here in Indiana, are a testament to their exceptional accomplishments in research, teaching and service.

[December, 2010]
Ten University of Notre Dame faculty members have been named fellows of the American Association for the Advancement of Science (AAAS) in honor of their scientifically or socially distinguished efforts to advance science or its applications.

AAAS, founded in 1848 as a nonprofit association, is the world's largest scientific society and publisher of the prestigious journal Science.

The new Notre Dame AAAS fellows are: Joan Brennecke, Keating-Crawford Professor of Chemical and Nuclear Engineering; Agustin Fuentes, professor of anthropology; Kasturi Haldar, Julius Nieuwland Professor of Biological Sciences and Parsons-Quinn Director of the Center for Rare and Neglected Diseases; Adam Kamat, Raymond and Ginger Gordon Lab of Science in the Engineering Laboratory; David M. Lodge, professor of chemical and biomolecular engineering; Maria Klass, professor of chemical engineering; Nancy Krummel, director of the Notre Dame Accelerator Science and Innovation; Edward Liedtke, professor of chemical and biomolecular engineering; Anthony VandeWoude, professor of chemistry and biochemistry; Paul F. Schneider, Louis C. Fratino, Jr., Professor of Chemistry; Dennis Smith, Emil T. Hofmann Professor of Chemistry; and Ronald W. Winifred Clark, professor of chemical and biomolecular engineering; Edward Liedtke, professor of chemical and biomolecular engineering; Anthony VandeWoude, professor of chemistry and biochemistry; Paul F. Schneider, Louis C. Fratino, Jr., Professor of Chemistry; and Dennis Smith, Emil T. Hofmann Professor of Chemistry.
Malcolm Fraser elected fellow of American Academy of Microbiology

March 15, 2011

Malissa Gebhard • Date: March 15, 2011

Malcolm J. Fraser Jr., professor of biological sciences at the University of Notre Dame, has been elected a fellow of the American Academy of Microbiology, an honorary leadership group within the American Society for Microbiology. The election recognizes Fraser's long record of teaching and innovative research, especially in the fields of virology and transgenic engineering.

Fraser discovered the piggyBac transposon, characterized its function and developed it as a "universal" transgenesis system. The system has been applied in many medically and economically important species that previously lacked efficient transformation systems, including the malaria-causing protozoan parasite, disease-carrying mosquitoes, silk moths, and grain beetles.

The piggyBac system also is used as a tool for transgenesis in mouse and other mammalian systems, and is the preferred method for reprogramming mammalian cells, including human cells, to functional pluripotency, providing a viable alternative to embryonic stem cells. Among other things, the discovery could advance the search for a cure for neurodegenerative diseases such as Niemann-Pick Type C, a deadly genetic children's disease.
Edward Larkin, a biological sciences major from East Lansing, Mich., has been named valedictorian of the 2011 University of Notre Dame graduating class and will present the valedictory address during Commencement ceremonies May 22 (Sunday) at Notre Dame Stadium.

Larkin, who also carries a supplementary major in classical civilization, earned a 4.0 grade point average. He is an active member of the Haiti Working Group at Notre Dame and writes a bi-weekly column for the Observer student newspaper in which he expounds on the intersection of science, technology and society with a special focus on the cultural and social implications of modern scientific advances.

Larkin has been conducting research on cancer cell metastasis in the laboratory of Dr. Cristyn D’Souza-Schorey, an associate professor of biological sciences with an appointment at the Mike and Josie Harper Cancer Research Institute. He participated last year in the prestigious summer undergraduate research program at Cold Spring Harbor laboratory studying developmental neuroscience.
Eck Institute for Global Health Communications

• Let us know when good things happen!
• Indicate EIGH affiliations:
  - Publications & Grants
  - Seminars/Lectures
  - Business cards
    • Logo, web URL, facebook
• Strategic planning for effective communications
• New website launched!
Funding and Administration

Strategic Research Initiative
Genomics, Disease Ecology and Global Health
2008-2010

Frank Eck Family Endowment
Eck Institute for Global Health
1 July 2010
Faculty Advisory Committee

• Mary Ann McDowell, Chair, Biological Sciences
• Nora Besansky, Biological Sciences
• Suzie Bohlson, Indiana University School of Medicine South Bend
• Frank Collins, Biological Sciences
• Mike Ferdig, Biological Sciences
• Malcolm Fraser, Biological Sciences
• Agustin Fuentes, Anthropology
• Jessica Hellmann, Biological Sciences
• Greg Madey, Computer Science & Engineering
• Gerald McKenny, Theology
• Shahriar Mobashery, Chemistry & Biochemistry
• Jeff Schorey, Biological Sciences
Endowment Planning Committees

- **Training and Travel Grants**
  -Kristin Hagar (Chair)
  -Patricia Champion
  -Marya Lieberman
  -Giles Duffield
  -Joseph Bock
  -Kathy Taylor

- **Seminar Speaker Series and Workshops Coordinating Committee**
  -Mary Ann McDowell (Chair)
  -Shaun Lee
  -Rob Stahelin
  -Patricia Clark
  -Frank Collins
  -Kathy Taylor

- **Institutional Partnerships**
  -Dave Severson (Chair)
  -Shahriar Mobashery
  -Nora Besansky
  -Edwin Michael
  -Neil Lobo
  -Kathy Taylor

- **Supplemental Grants**
  -Jeff Schorey (Chair)
  -Joshua Shrout
  -Nitesh Chawla
  -Mike Ferdig
  -Kathy Taylor
Global Health Fellowship Program

- Annual stipend and health insurance with opportunity to renew for a 2nd year
- 
- **Eligibility:**
  - Outstanding University of Notre Dame graduate students
  - Research is directed to questions that impact global health
  - In 3rd, 4th or 5th year for fellowship period

- Academic year 2011-2012 awards:
  - Ling Sun, Aerospace & Mechanical Engineering, Aortic heart disease (Philippe Sucosky)
  - Emmanuel Adu-Gyamfi, Chemistry & Biochemistry, Ebola virus replication (Robert Stahelin)
  - Ellen Flannery, Biological Sciences, mosquito development (Molly Duman-Scheel)
  - Anthony Clemons, Biological Sciences, mosquito development (Molly Duman-Scheel & Dave Severson)
Global Health Training

Joseph Bock, PhD - Director of Global Health Training

- *Director of External Relations and Special Professional Faculty Member, 2007-2010, Kroc Institute for International Peace Studies, University of Notre Dame.*
- *Ph.D. in International Relations, School of International Service, American University, Washington, D.C.*
Master of Science in Global Health
Administered through EIGH
Startup funding provided by Dean Crawford

• One calendar year professional program
• Bridge science-based information with the health needs of the global poor
• Understand the complexity of discovering, developing and implementing solutions in resource-poor settings
• Two semesters of course work
• 6-8 weeks of field experience
• Master’s project/scholarly report

• Fall 2011 Cohort Accepted

• Program will be highlighted in upcoming annual newsletter for Consortium of Universities on Global Health
Eck Institute for Global Health
Awards and Proposals – 1 July 2010 – 31 December 2010

• Awards received
  - 12 awards
  - $4,175,981
  - #2 among ND Centers/Institutes (ND Energy #1)

• Proposals submitted
  - 22 submissions
  - $25,567,583
  - #1 among ND Centers/Institutes
Eck Institute for Global Health Funding

- Frank Eck Family endowment
- **George Craig Memorial Lecture Fund**
- **Office of Research - F&A return**
  - For assuming administrative responsibilities
  - Enhance research support and collaborations
  - Will NOT impact individual faculty F&A returns
  - Important to include EIGH in proposal routing!
The Eck Institute for Global Health Presents:

Paul P. Weinstein Memorial Lecture

101 Jordan Hall
Wednesday - April 27, 3:45-4:45 pm

Reception: 5:00 - 6:00 PM
Jordan Hall of Science

Dyann F. Wirth, PhD
Richard Pearson Strong Professor of Infectious Diseases
Chair, Department of Immunology and Infectious Diseases
Harvard School of Public Health

"From genes to genomes: genetic diversity in malaria, implications for biology and pathogenesis"
Mission Statement

• “The University of Notre Dame Eck Institute for Global Health is a university-wide enterprise that recognizes health as a fundamental human right and endeavors to promote research, training and service to advance health standards for all people, and especially people in low and middle income countries who are disproportionally impacted by preventable diseases.”