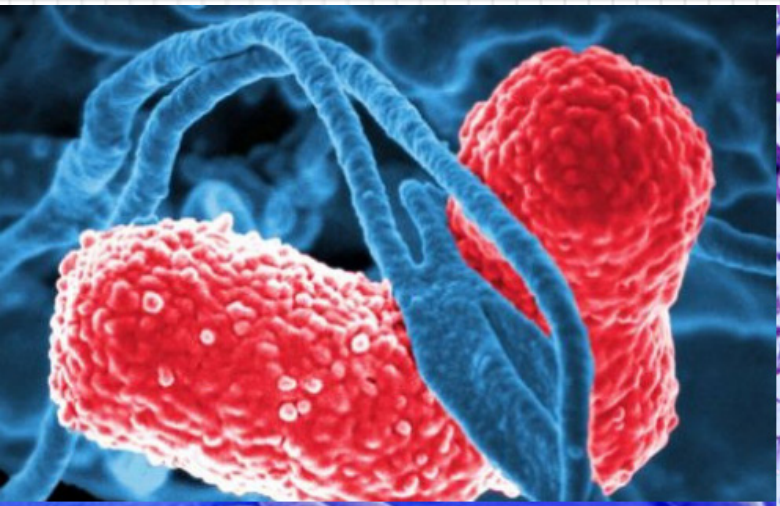
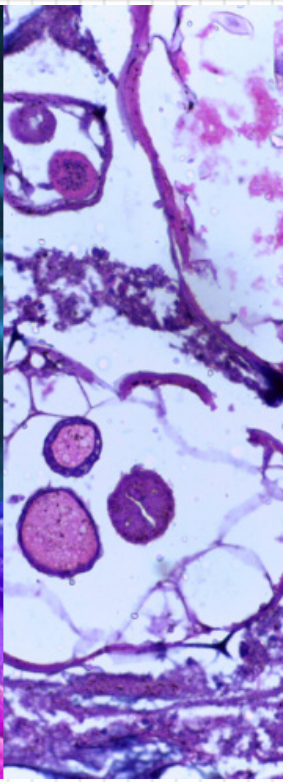
11TH ANNUAL CEND SYMPOSIUM

Molecular Diagnostics,
Antiobiotic Resistance, and
Helminthic Diseases





University of California, Berkeley
January 11, 2019

Henry Wheeler
CEND
Center for Emerging & Neglected Diseases

The Center for Emerging and Neglected Diseases (CEND)

About CEND

The Henry Wheeler Center for Emerging & Neglected Diseases (CEND) was established as a multi-disciplinary research unit in 2008, with the support of a generous donation by Henry H. "Sam" Wheeler, Jr. The mission of CEND is to help the University of California, Berkeley make innovative and substantial contributions to the global response to emerging and neglected infectious diseases. We at CEND believe that by educating potential innovators, connecting researchers from diverse disciplines, and investing in research, we can help the best and brightest minds at UC Berkeley access the resources they need to make meaningful and innovative contributions to our scientific understanding and ability to combat emerging and neglected diseases.

The Symposium

Emerging and neglected diseases are a group of debilitating and often deadly infections. As a group, these diseases are poorly understood and we generally lack effective tools for prevention, control, and treatment. CEND Annual Symposium aims to strengthen connections between San Francisco Bay Area scientists working on infectious diseases of global health importance and the broader global health research, product development, and advocacy communities. The symposium features a dynamic list of invited speakers from around the world, including scientists from developing countries. Each year the event attracts over 400 registrants. Participants include academic researchers from UC Berkeley, UCSF, Stanford, UC Davis as well as representatives from local biotechnology and pharmaceutical companies and global health nonprofits.

WELCOME

Dear Attendees,

It is our great pleasure to welcome you this year to the Annual CEND symposium on Emerging and Neglected Diseases. Now in our 11th year, we look back at previous symposia with pride and I remember many talks from years ago distinctly to this day for their novelty, ability to broaden horizons and put things in perspective. Every time I would be leaving a day of talks and discussions reinvigorated and with a sense of purpose.

We hope to continue this tradition with this year's symposium on Molecular Diagnostics, Helminthic Diseases and Antibiotic Resistance. Diagnostics are fundamental to successful and low-cost treatment. Point-of-Care (POC) diagnostics are critical when no comprehensive network of medical care exists; Antibiotic Resistance is emerging as a major problem, worsened by the decision of some drugmakers to pull out of antibiotic drug development and the seeming inability of policymakers to make sound public health decisions when faced with economical tradeoffs. The specter of going back to pre-penicillin times is looming and coordinated action of both the academic and private sector as well as government bodies is needed to overcome this challenge. Soil-transmitted helminths are responsible for current infections of about a quarter of the world population and with few therapeutic options and resistance developing, research on helminthic diseases is critical. We're excited to feature 3 top-notch speakers for each of these topics and are looking forward to hearing about new ideas and approaches to tackle these important problems.

In addition to the presentations, there will be plenty of opportunity for discussions during the Tech show at lunch, poster session and reception tonight and during coffee breaks. Don't be shy, introduce yourself to whoever is sitting next to you and use the opportunity to exchange ideas and make new connections.

We would like to thank our generous sponsors who make this event possible as a free symposium without registration charges, lowering barriers towards participation of all – Aduro Biotech, Mammoth Biosciences, QB3 and the Department of Molecular and Cell Biology. We would like to thank our speakers, poster presenters and Tech show participants for sharing their time and knowledge with us. Also we are very grateful to our volunteers, facilities and the CEND team without whom this event would not be possible.

With this, we invite you to a day full of exciting talks, discussions and lively exchange!

Sincerely,

Julia Schaletzky, PhD
Executive Director, CEND

Jeffery Cox, PhD
Faculty Director, CEND

Agenda Overview

8:30 - 9 am	Breakfast & Check-in
9:00 - 9:10 am	Welcome Remarks **Julia Schaletzky, CEND Executive Director**
9:10 - 9:45 am	Development and Implementation of In Vitro Diagnostics for Infectious Diseases in Resource Poor Environments **Ranga Sampath, FIND Geneva**
9:45 - 10:20 am	Detecting Pathogens in Seconds - Novel Nanosensor Technology for Accurate, Low-Cost Diagnostics **Lisa Diamond, Pinpoint Science**
10:20 - 10:55 am	Mobile Image and Sensing Technologies for Diagnostics **Aydogan Ozcan, UCLA**
10:55 - 11:15 am	Diagnostics Panel Discussion
11:15 - 12:45 pm	Lunch, Tech Show
12:45 - 1:20 pm	A Systems Approach to Antibiotic Drug Discovery **Eric Brown, McMaster**
1:20 - 1:55 pm	Learning from Bacterial Competition in the Host to Develop Antimicrobials **Manuela Raffatellu, UCSD**
1:55 - 2:30 pm	Optomized Arylomycins are a New Class of Gram-Negative Antibiotics **Peter Smith, Genentech**
2:30 - 2:50 pm	Antimicrobial Panel Discussion
2:50 - 3:20 pm	Coffee Break
3:20 - 3:55 PM	The Anti-Helminthic Vaccines **Peter Hotez, Baylor School of Medicine**
3:55 - 4:30 pm	Discovering New Drugs to Treat Neglected Parasitic Diseases **Judy Sakanari, UCSF**
4:30 - 5:05 pm	Immunologic Underpinnings of Immune Tolerance in Human Filiarial Infections **Thomas Nutman, NIAID**
5:05 - 5:25 pm	Helminthic Diseases Panel Discussion
5:25 - 6:30 pm	Reception and Poster Session

Agenda

9:00 - 9:10 am Welcome Remarks
Julia Schaletzky, CEND Executive Director

9:10 - 9:45 am Development and Implementation of In Vitro Diagnostics for Infectious Diseases in Resource Poor Environments
Ranga Sampath, FIND Geneva

Diagnostics often do not exist, are inaccessible, or cost too much. Despite being pivotal for guiding the best treatment for individual patients; for preventing the spread of disease and antimicrobial resistance; and for enhancing surveillance for early disease detection and monitoring – diagnostics remain under-resourced and overlooked. FIND is a global non-profit organization that drives innovation in the development and delivery of diagnostics to combat major diseases affecting the world's poorest populations. FIND's work bridges R&D to access and overcome scientific barriers to technology development; generating evidence for regulators and policy-makers; addressing market failures; and enabling accelerated uptake and access to diagnostics in low- and middle-income countries (LMICs). FIND is committed to a future in which diagnostics underpin treatment decisions and provide the foundation for disease surveillance, control and prevention. We are the only WHO Collaborating Center in diagnostics, with priorities clearly aligned with the global public health community. We turn complex diagnostic challenges into simple solutions through unique partnerships with the public, private and non-profit sectors on over 70 active projects that cross six priority disease areas. Since 2003, we have been instrumental in the delivery of 21 new diagnostic tools used in 150 LMICs. Over 38 million FIND-supported products have been provided to our target markets since the start of 2015.

9:45 - 10:20 am Detecting Pathogens in Seconds - Novel Nanosensor Technology for Accurate, Low-Cost Diagnostics
Lisa Diamond, Pinpoint Sciences

Pinpoint Science is a local startup with breakthrough nanosensor technology for a new generation of accurate, low-cost handheld diagnostics to detect viral, bacterial, and fungal pathogens in seconds. Specific biomarkers - antigens, antibodies, toxins, nucleic acid sequences - are detected in blood, saliva, urine, or sputum with a low-cost handheld reader, disposable cartridges, and a mobile phone app. The user sees results in 30 seconds, while complete data is securely adapted to EHR and cloud repository. Pinpoint's platform can be readily adapted for any pathogen: influenza, malaria, TB, STDs, Zika, Ebola, and more. Improved performance at lower cost makes this platform optimal for low-resource settings, mass screenings for pandemic treats, and point-of-care diagnosis in hospitals, doctors' offices, field clinics, pharmacies, and at home. This unique technology promises to transform how infectious disease is diagnosed worldwide.

10:20 - 10:55 am Mobile Imaging and Sensing Technologies for Diagnostics
Aydogan Ozcan, UCLA

My research focuses on the use of computation/algorithms to create new optical microscopy, sensing, and diagnostic techniques, significantly improving existing tools for probing micro- and nano-objects while also simplifying the designs of these analysis tools. In this presentation, I will introduce a set of computational microscopes which use lens-free on-chip imaging to replace traditional lenses with holographic reconstruction algorithms. Basically, 3D images of specimens are reconstructed from their "shadows" providing considerably improved field-of-view (FOV) and depth-of-field, thus enabling large sample volumes to be rapidly imaged, even at nanoscale. These new computational microscopes routinely generate >1–2 billion pixels (giga-pixels), where even single viruses can be detected with a FOV that is >100 fold wider than other techniques. The field-of-view of these computational microscopes is equal to the active-area of the sensor-array, easily reaching, for example, >20 mm2 or >10 cm2 by employing state-of-the-art CMOS or CCD imaging chips, respectively. In addition to this remarkable increase in throughput, another major benefit of this technology is that it lends itself to field-portable and cost-effective designs which easily integrate with smartphones to conduct giga-pixel tele-pathology and microscopy even in resource-poor and remote settings where traditional techniques are difficult to implement and sustain, thus opening the door to various telemedicine applications in global health. Some other examples of these smartphone-based biomedical tools that I will describe include imaging flow cytometers, immunochromatographic diagnostic test readers, bacteria/pathogen sensors, blood analyzers for complete blood count, and allergen detectors.

10:55 - 11:15 am **Diagnostics Panel Discussion**

11:15 - 12:45 pm **Lunch, Tech Show**

12:45 - 1:20 pm A Systems Approach to Antiobiotic Drug Discovery
Eric Brown, McMaster University

Antibiotic drug resistance has reached crisis proportions, owing to a dearth of new antibiotics. In the Brown lab, we are developing chemical-genomic approaches with utility in exploring complex biology and enigmatic processes that are essential for bacterial survival. Efforts to date have resulted in new understanding, platforms, chemical probes and lead compounds for antibacterial research. The ultimate goal is to contribute fresh directions for new antibacterial therapies.

1:20 - 1:55 pm Learning from Bacterial Competition in the Host to Develop Antimicrobials
Manuela Raffatellu, UCSD

Infectious diseases have always been a threat to humankind. The antibiotic era, in turn, increased the quality and expectancy of life by tremendously reducing mortality from infection, duration of illness, and spread of disease. In recent years, the alarming increase of antibiotic resistance, compounded by the simultaneous decrease in new antibiotics being developed, together have created serious concerns that this era could be coming to an end. Moreover, current antibiotics also target the beneficial commensal microbes (microbiota) that inhabit our body, sometimes with significant health consequences. The answer to the antibiotic crisis thus involves broad, creative efforts to develop novel treatments for infectious agents. In my talk, I will discuss what we can learn from investigating microbial competition in vivo, and how we can utilize this knowledge to devise new narrow-spectrum therapeutics that target bacterial pathogens while minimizing deleterious effects to the microbiota.

1:55 - 2:35 pm Optomized Arylomycins are a New Class of Gram-Negative Antibodies
Peter Smith, Genentech

Multi-drug resistant Gram-negative bacteria present an urgent and growing threat to global health, yet no novel class of Gram-negative antibiotic has been approved for clinical use in over five decades. Taking inspiration from the successful track record of natural product antibiotics, we have optimized the arylomycin class of natural products, which have weak activity and limited spectrum, into molecules with potent, broad-spectrum activity against Gram-negative bacteria. One such molecule, G0775, inhibits the essential bacterial type I signal peptidase, an unexploited antibiotic target, through an unprecedented molecular mechanism. It circumvents existing antibiotic resistance mechanisms and retains activity against contemporary multidrug-resistant Gram-negative clinical isolates in vitro and in several in vivo infection models. These findings demonstrate that optimized arylomycin analogs such as G0775 could translate into new therapies to address the growing threat of multidrug-resistant Gram-negative infections.

2:30 - 2:50 pm **Antimicrobial Panel Discussion**

2:50 - 3:20 pm **Coffee Break**

3:20 - 3:55 pm The Anti Helminthic Vaccines
Peter Hotez, Baylor School of Medicine

Despite the availability of anthelminthic drugs, the human helminth infections remain the most common afflictions of people living in extreme poverty. The major reasons include low drug efficacies, especially against whipworm and hookworm infections, and sustained transmission due to high rates of post-treatment reinfection. A human hookworm vaccine and two human schistosomiasis vaccines are currently in clinical trials, while an onchocerciasis vaccine and a third schistosomiasis vaccine are expected to soon enter the clinic. The human hookworm vaccine is a bivalent vaccine targeting adult stage Necator americanus blood-feeding with two antigens, Na-GST-1 and Na-APR-1. To date in phase 1 trials it's been both safe and immunogenic. Two Schistosoma mansoni antigens, Sm-TSP-2 and Sm14 have also undergone phase 1 clinical testing for safety and immunogenicity, while Smp80 has undergone extensive testing in non-human primates. The onchocerciasis vaccine is being tested in bovines in Africa. Some of these antigens were discovered through modified reverse vaccinology approaches. For both hookworm and schistosomiasis human infection challenge models are under development. The major challenges to advanced or late-stage development of the anthelminthic vaccines are partly non-scientific hurdles and include, adjuvant access, sustainable funding and business model for licensure, and rising antivaccine forces blocking the introduction of any
new vaccine.

3:55 - 4:30 pm Discovering New Drugs to Treat Neglected Parasitic Diseases
Judy Sakanari, UCSF

Onchocerciasis and lymphatic filariasis are two major neglected diseases caused by parasitic nematodes, that together affect an estimated 145 million people worldwide in mostly poor, developing countries. With river blindness, approximately 1.2 million people are visually impaired and 270,000 people are blinded. To achieve the ultimate goal of onchocerciasis elimination, drugs that cure infections and thus stop transmission of infection and ultimately shorten the time to elimination, are critically needed. In response to this need, we developed a multi-faceted screening funnel to screen compounds and identify potential candidates that kill adult filariae (macrofilaricides). Our team developed in vitro worm assays to phenotypically screen adult Brugia pahangi and to test hits in higher level assays with adult worms and microfilariae of Onchocerca ochengi, O. volvulus L3 and pre-adults worms and Loa loa microfilariae. Candidates are further assessed for efficacy in our in vivo rodent models with B. pahangi or O. ochengi adult worms and counter-screened against L. loa microfilariae to test nematode selectivity and avoid those that rapidly kill L. loa microfilariae and may trigger severe adverse events, including death.

4:30 - 5:05 pm

Immunologic Underpinnings of Immune Tolerance in Human Filarial Infections
Thomas Nutman, NIAID

The immune response to filarial parasites encompasses a complex network of innate and adaptive cells whose interaction with the parasite underlies a spectrum of clinical manifestations. Like other helminth parasites, the filariae collectively share the capacity to downregulate the self-directed host immune response (parasite-specific immunoregulation) that occurs through the induction of adaptive Treg production of IL-10 and parasite antigen-driven antigen presenting cell (APC) dysfunction. How these responses are shaped by the filarial parasites and what the consequences of this immunoregulation mean for modulation of responses to bystander pathogens/antigens (including vaccines) will be discussed.

5:05 - 5:25 pm **Helminthic Diseases Panel Discussion**

5:25 - 6:30 pm **Reception and Poster Session**

Speakers

Rangarajan Sampath
Chief Scientific Officer
FIND Geneva

"Development and Implementation of In Vitro Diagnostics for Infectious Diseases in Resource Poour Environments"

Dr. Rangarajan Sampath joined FIND as its Chief Scientific Officer in September 2017, where he leads the implementation of the organization's R&D and clinical departments, and will contribute to shaping and implementing FIND's portfolio strategies. Dr. Sampath is a recognized leader in the field, with over 200 publications and presentations and over 40 issued patents in infectious disase diagnostics. He was an invited participant at the White House National Forum on Antibiotic Stewardship and was an active member for the AdvamedDx Industry Forum for the global commitment on developing diagnostic tests to fight AMR. Dr. Sampath is currently serving his first of three-year term as a member of the Diagnostics Committee for IDSA. His research interests include antimicrobial strategy development, pathogen discovery, fevers of uknown origin, tropical diseases, epidemiological surveillance and biothreat detection.

Lisa Diamond
Chief Executive Officer,
Co-Founder
Pinpoint Science

"Detecting Pathogens in Seconds - Novel Nanosenor Technology for Accurate, Low-Cost Diagnostics"

Pinpoint Science cofounder and CEO Lisa Diamond leads the SF startup's development and commercialization of breakthrough nanosensor technology for accurate, low-cost handheld detection of viral, bacterial and fungal pathogens in seconds. Diamond has a 40-year record of technology innovation and senior engineering leadership, pioneering development in areas from molecular diagnostics and computational genomics to financial and trading applications, business intelligence and analytics, computer animation, digital video and more. She has collaborated with Dr Nader Pourmand over the last fifteen years to develop novel molecular diagnostics for pathogens including pandemic influenza, human papillomavirus, and drug-resistant TB, and holds two patents for novel molecular diagnostics. Diamond has designed and developed artificial intelligence and internet information technology infrastructures and software for a wide range of organizations. Earlier in her career, Lisa pioneered groundbreaking real-time graphics, animation and digital video applications.

Aydogan Ozcan
Professor
University of California,
Los Angeles

"Mobile Imaging and Sensing Technologies for Diagnostics"

Dr. Ozcan is the Chancellor's Professor at UCLA and an HHMI Professor with the Howard Hughes Medical Institute, leading the Bio- and Nano-Photonics Laboratory at UCLA School of Engineering and is also the Associate Director of the California NanoSystems Institute. Dr. Ozcan is elected Fellow of the National Academy of Inventors (NAI) and holds 38 issued patents and >20 pending patent applications and is also the author of one book and the co-author of >500 peer-reviewed publications in major scientific journals and conferences. Dr. Ozcan is the founder and a member of the Board of Directors of Lucendi Inc. as well as Holomic/Cellmic LLC, which was named a Technology Pioneer by The World Economic Forum in 2015. Dr. Ozcan is also a Fellow with 7 major Foundations and think-tanks, and has received over ten major awards including the Presidential Early Career Award for Scientists and Engineers.

Eric Brown
Professor
McMaster University

"A Systems Approach to Antiobiotic Drug Discovery"

Dr. Eric Brown is a Distinguished University Professor at McMaster University in the Department of Biochemistry and Biomedical Sciences and member of the M.G. DeGroote Institute for Infectious Disease Research. He is a Fellow of the American Academy of Microbiology and has received a number of other awards including the Canadian Society of Microbiologists Murray Award for career achievement, the Canadian Society for Molecular Biosciences Merck Frosst Prize for new investigators and a Canada Research Chair in Microbial Chemical Biology. Brown Lab researchers are searching for the Achilles heels of drug-resistant superbugs. To this end they are using tools of chemical biology and molecular genetics to probe the complex biology that underlies bacterial survival strategies. The goal of these studies is to contribute to fresh directions for new antibacterial therapeutics.

Manuela Raffattellu
Professor
University of California, San Diego

"Learning from Bacterial Competition in the Host to Develop Antimicrobials"

Manuela Raffatellu is a Professor in the Department of Pediatrics at the University of California, San Diego School of Medicine. She received her M.D. at the University of Sassari, Italy, in 2000 and her M.S. in Clinical and Tropical Microbiology at the same institution in 2002. She joined the laboratory of Dr. Andreas Bäumler as a postdoctoral fellow in 2002, first at Texas A&M University and then at the University of California, Davis. She started her own lab at the University of California, Irvine in 2008, where she was promoted to Associate Professor with tenure in 2014. Her research focuses on many aspects of Salmonella interaction with the mucosal immune response and with the intestinal microbiota in the inflamed gut. Her recent efforts aim to design new strategies to reduce Salmonella intestinal colonization without affecting the microbiota composition. She is the recipient of several major awards.

Peter Smith
Scientist, Infectious Disease
Genentech

"Optomized Arylomycins are a New Class of Gram-negative Antibiotics"

Peter Smith joined Genentech in 2014 as Scientist in the Infectious Diseases department. His lab is focused on Gram-negative cell envelope biogenesis and the discovery of novel antibacterials that are active against multi-drug resistant Gram-negative pathogens. Prior to joining Genentech, Peter was a scientific co-founder and lead biologist at RQX Pharmaceuticals, in La Jolla California, where he designed co-discovered two novel classes of type I signal peptidase inhibitors. Peter received his BA in biology and chemistry from Purdue University and his PhD from the Scripps Research Institute in La Jolla, CA.

Peter Hotez
Dean
National School of Tropical Medicine, Baylor College of Medicine

"The Anti-Helminthic Vaccines"

Dr. Hotez is an internationally-recognized physician-scientist in neglected tropical diseases and vaccine development. As head of the Texas Children's CVD, he leads the only product development partnership for developing new vaccines for hookworm infection, schistosomiasis, and Chagas disease, and SARS/MERS, diseases affecting hundreds of millions of children and adults worldwide. In 2006 at the Clinton Global Initiative he co-founded the Global Network for Neglected Tropical Diseases to provide access to essential medicines for hundreds of millions of people. In 2017 he was named by FORTUNE Magazine as one of the 34 most influential people in health care for his work as a major national thought leader on the Zika epidemic. In addition, as both a vaccine scientist and autism Dad he has led national efforts to defend vaccines and to serve as an ardent champion of vaccines going up against a growing national "antivaxx" threat. His newest book, *Vaccines Did Not Cause Rachel's Autism* (Johns Hopkins Press) will be released this fall.

Judy Sakanari
Professor
University of California, San Francisco

"Discovering New Drugs to Treat Neglected Parasitic Diseases"

Dr. Sakanari received her undergraduate degree in Human Physiology and doctoral degree in Parasitology from UC Berkeley. Her postdoctoral work in molecular and biochemical parasitology was conducted in the Dept. of Pathology at UC San Francisco. She is currently Adjunct Professor in the Dept. of Pharmaceutical Chemistry at UCSF and is the Principal Investigator of a large collaborative program to identify drugs for the treatment of two major neglected diseases: river blindness and lymphatic filariasis. These diseases are caused by filarial nematodes that can live for 10-15 years and release millions of larvae over the lifetime of the worms. There is a need for safe, effective drugs that can be used in mass drug administration programs and test and treat settings to eliminate the adult worms and prevent transmission. In addition to her research program, Dr. Sakanari teaches Medical Parasitology in the Dept. of Integrative Biology at UC Berkeley during summer session.

Thomas Nutman
Chief, Laboratory of Parasitic Diseases
National Institute of Allergy and Infectious Diseases

"Immunologic Underpinnings of Immune Tolerance in Human Filarial Infections"

Dr. Nutman received his A.B. from Brown University and his M.D. from the University of Cincinnati College of Medicine. He did an internal medicine residency at New York University (Bellevue) and postdoctoral training in the Laboratory of Parasitic Diseases (LPD). He is board certified in Internal Medicine and Allergy and Immunology. He also holds a diploma/certificate in Tropical Medicine and Travelers' Health. He has been at NIH in the Laboratory of Parasitic Diseases since 1982, where he is currently its Chief. In addition, he is the director of the NIAID International Center for Excellence in Research (ICER) located in Chennai, India, as well as director of the filariasis unit at the NIAID ICER in Mali. He is on numerous advisory committees and editorial boards and holds patents related to parasite diagnosis and vaccine development. He is the author or coauthor of over 550 papers and book chapters and has received multiple awards for his work in tropical medicine and immunology.

Poster List

Anaamika Campeau	Resistome profiling in Gram-negative bacteria to identify selection-averse antimicrobial drug targets
Andrea Anaya Sanchez	Galleria mellonella model as a system for studying infection by methicillin-resistant Staphylococcus aureus lineages and the effect of antimicrobial Photodynamic Therapy
Bret Peterson	Interaction between the 5' UTR and Listeriolysin O ORF down-regulates expression and maximizes virulence
Crystal Jaing	Rapid pathogen diagnosis using the Lawrence Livermore Microbial Detection Array
Julia Rubin	Prevalence of antimicrobial resistance genes in the human gut of a healhty population in a community college
Maria Nguyen	Determining the trigger of anti-phage island excision in Vibrio cholerae
Neha Prasad	A Pooled CRISPRi Screen to Probe Interactions with Pseudomonas Essential Genes
Nicole Jackson	A multiplexed, indirect enzyme-linked immunoassay for the detection and differentiation of E. coli from other Enterobacteriaceae and P. aeruginosa from other glucose non-fermenters
Patti White	Novel affordable point-of-need diagnostic for sickle cell disease and malaria (submitted by Priya Thota)
Tomas Leon	Liver Fluke Transmission in Northeast Thailand: Rain, Reinfection, and Reservoir Hosts
Yuan Hu	Genetic Analysis of Drug Resistant and Persistently Drug-Susceptible Escherichia coli ST95 isolates

CEND FELLOWSHIP OPPORTUNTIES

The Center for Emerging and Neglected Diseases offers several fellowships throughout the year. These opportunities provide not only financial support but also the chance to engage in exciting resarch and gain useful experiences in infectious diseases and global health.

Thomas C. Alber Science & Engineering for Global Health Fellowship

Dr. Tom Alber, Professor of Molecular and Cell Biology and founding Faculty Director of CEND believed that scientists from across the UC Berkeley campus have the potential to make an impact on our understanding of diseases that disproportionately affect the world's poor as evidenced by his own contributions to the tuberculosis and HIV fields in his career as a structural biologist. In Dr. ALber's honor, this fellowship program provides a total of $10,000 and supports short-term reserach experiences at selected sites in developing countries for doctoral and postdoctoral researchers working with CEND-affiliated faculty members.

Irving H. Wiesenfeld and Kathleen L. Miller Graduate Fellowships

The purpose of the Irving H. Wiesenfeld and Kathleen L. Miller Graduate Fellowships is to provide research support to UC Berkeley graduate students of high distinction involved in the study of emerging and neglected infectious diseases, including basic science, discovery of effective treatments, diagnostics, and vaccines, or policy, law, and economics in national or global health. The fellowship can be used to support research expenses, equipment, travel, and scientific or scholarly exchange between UC Berkeley and researchers in disease-endemic countries. Through the fellowship, awards of up to $5,000 will be made to qualified individuals.

Applications for the Alber, Wiesenfeld, and Miller Fellowships will be posted on March 18, 2019.

Minority Health/Health Disparities NIH MHIRT Fellowships and Training Program

The UC Berkeley MHIRT Training Program funds both domestic and international summer research experiences for qualified Berkeley undergraduate and graduate students. The program provides training in infectious disease research, with a focus on diseases that affect communities who face health disparities. The program provides up to $16,000 to support short-term research experiences at selected sites in developing countries for work with CEND-affiliated faculty members.

Applications for the MHIRT program will open in Fall 2019.

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With special thanks to the Wheeler family for your continued support of CEND. Through your contributions and generosity, we continue to conduct meaningful research and provide innovative contributions to the fight against emerging and neglected diseases.

Thank you to our student volunteers who helped make today possible. We are endlessly greatful for your efforts.