

MICROSCOOP



Department of Microbiology & Immunology Newsletter

SUMMER 2014

BioMaryland LIFE Prize Awarded to Dr. Eduardo Davila

By Sabina Kaczanowska

The LIFE (Leading Innovative Faculty Entrepreneurs) award is presented annually to two university researchers whose work demonstrates great potential for translation into the clinic and commercial application. The \$50,000 grant is funded by the BioMaryland Center in conjunction with the University of Maryland, Baltimore and Johns Hopkins University. Dr. Eduardo Davila is an associate professor in the M&I Department whose research focuses on improving T cell-based therapies for the treatment of cancer. The project that won over the judges was his Anti-Tag Chimeric Antigen Receptor (AT-CAR) technology, which creates a universal immunotherapy platform that can be applied to virtually any type of cancer. T cells are genetically engineered to express a chimeric antigen receptor (CAR) that is specific for a tag on labelled antibodies. The receptor also contains intracellular domains that initiate signaling events for T cell activation. By combining the specificity of antibodies to target tumor antigens with the killing capability of T cells, this immunotherapeutic strategy is designed to find and fight cancer cells within the body. This therapy can be personalized by using labelled antibodies specific to an individual patient's cancer to direct the antitumor immune response. In addition to the BioMaryland LIFE award, Dr. Davila's research on AT-CAR also received an award from the Maryland Innovation Initiative to further advance this exciting technology for development into the commercial sector.



This is the second year in a row that an M&I faculty member has been awarded with this honor; last year's recipient was Dr. Mark Shirtliff for his work in *Staphylococcus aureus* vaccine development.

TAKE ME OUT TO THE BALL GAME

By: Rebecca Pelc

On May 14, 2014, the MMI Department was able to take advantage of our close **proximity** to Camden Yards. Twenty-eight students, post-docs, staff, and faculty enjoyed group tickets to the third game in a three game series between the Baltimore Orioles and Detroit tigers. While the day was overcast, the rain held off so that hot dogs and Natty Bohs could be relished all afternoon. Despite a fifth inning rally, the O's could not hold off the Tigers, falling 5-7.

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The BioPark has a BioBLAST!

By Jeticia Sistrunk

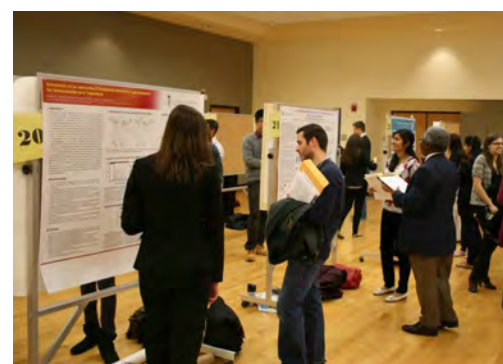
On April 25th, the BioPark hosted the 3rd annual BioBLAST event, which featured a day of science learning and activities for over 100 local middle school students. The event allowed students to learn and participate in hands-on science workshops intended to inspire them to pursue careers in science and technology. Students from the James McHenry Elementary/Middle School, Booker T. Washington Middle School, and Southwest Baltimore Charter School engaged in learning activities hosted by faculty, students, and staff from various BioPark organizations including the Institute for Genome Sciences. A microbiome activity co-hosted by MMI students Jeticia Sistrunk and Kyle Tretina titled "Our Microbial Selves" introduced students to the human microbiome. Students learned about good and bad bacteria and how they can impact the human body. They were then exposed to sampling methods and the inherent challenges of studies such as the Human Microbiome Project as demonstrated by a sampling activity using backpacks containing different proportions of multi-colored pom-poms. Second year student Kyle Tretina said of the event, "the students were amazed to hear about the microbes that reside in and on our bodies, and they asked a lot of really great questions". Groups of students were able to attend two hands-on sessions throughout the morning, as well as an exciting interactive show by Mad Science hosted in the BioPark II auditorium.

2014 Graduate Research Conference

By: Rebecca Pelc

The 36th annual Graduate Research Conference (GRC) took place on Monday, March 24, 2014 in the SMC Campus Center. Organized by the Graduate Student Association, GRC is a forum for students to present their work in a mini-conference format. As in years past, the Microbiology Department was well represented in oral presentations, posters, and judges. Participants enjoyed a catered lunch accompanied by the keynote talk from Dr. Andrew Maynard of the University Of Michigan School Of Public Health who discussed the importance of science communication.

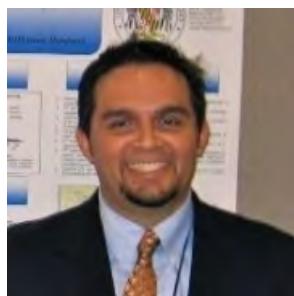
This year's GRC harkened a new era, with the festivities finishing off with the first ever Candidacy Ceremony to recognize those doctoral students who have been admitted to candidacy. Following awards, students ventured to Camden Pub for a social. Bringing home awards this year for their posters were Bre-Onna Delaine from the Barry lab and Kelsey Gregg from the Ernst lab. Congrats to all our participants!



2014 Graduate Research Conference

Graduate update: Interview with Former MMI Student, Victor Ayala

By: Kyle Tretina



1) What was the title of your thesis dissertation and who was your mentor while at UMB? *The title of my thesis dissertation was "Bordetella pertussis Infection Exacerbates Influenza Virus Infection through Pertussis Toxin-Mediated Modulation of Host Immunity". I worked in the lab of Dr. Nicholas Carbonetti for my graduate research.*

2) Please give me a very brief summary of your educational background. *I obtained my Bachelor of Science in Biology degree from the University of Puerto Rico, Río Piedras, PR. After my undergraduate studies, I moved to Maryland and went to work for a Biotech company, ABL, Inc., in Rockville, MD. While working there I obtained my Master of Science in Biotechnology from the Johns Hopkins University Zanvyl Krieger School of Arts and Sciences. In Sept. 2005, I started my PhD graduate program in Microbiology and Immunology at the University of Maryland Baltimore and defended my thesis in 2011.*

3) Where are you now, and what are you doing there? *I am currently working at the Frederick National Laboratory for Cancer Research as a post-doctoral fellow with the AIDS and Cancer Virus Program in the Laboratory of Dr. Claes Ohlen. Our groups' main interest is retroviral immunology with the goal of better understanding the anti-viral T-cell response during HIV infection and it's potential for controlling virus replication. To this end, we adoptively transfer antigen specific T cells into rhesus macaques infected with Simian Immunodeficiency Virus (SIV) as a model for HIV and evaluate virus transmission, virus replication, preservation of CD4+ T cells, and the homing and persistence of transferred cells. We can examine several antiviral functions by transducing the effector cells with specific genes for homing, antigen specificity and persistence prior to transfer. I am working on several different projects within the lab and team.*

To read more of Victor's interview, turn to page 8



From the **Antony Lab**:
Steve Goding and his wife, Amy, welcomed Hope Goding on May 22nd at 10:41am, 7lbs 3oz, 20 inches long. Congratulations!

Mark your calendars!

The annual MMI Picnic will be on
**August 22nd at Centennial Park, 10000
Route 108, Ellicott City MD 21043 in
Pavilion D beginning at Noon!** Sign-ups
for food, set-up, etc. will begin in August
and will be on-line. Stay tuned!

MMI represented at ASM Maryland Branch Meeting

by Jeticia Sisstrunk

The final ASM Maryland Branch meeting of the year was held here on campus at the BioPark II building on May 28th. The evening began with dinner and a well-attended poster session featuring students and scientists throughout the local area. A presentation of the J. Howard Brown award for outstanding undergraduate student and top three graduate students was presented in the Discovery auditorium. Two MMI students took home graduate student awards for their abstracts including Jeticia Sisstrunk, who won 3rd place, and Alison Scott, who won the 1st place award and gave an oral presentation of her research. The meeting also saw MMI professor and chair Dr. James Kaper ushered in as the newly elected ASM Maryland Branch president beginning in the fall.



Student Recruitment 2014

By: Kyle Tretina

Student recruitment activities were very successful this year, with a few changes to the typical routine. Prospective students had a game night of Apples to Apples with some current students, and the next morning started the day with the smiling faces of Dr. Dudley Strickland and Dr. Nicholas Carbonetti for a welcome and program orientation. In between lab visits and interviews throughout the day, potential recruits received a top-notch tour of campus, including a few interesting historical anecdotes about the campus and a first-hand experience of qualifying exam study sessions at the student center. In addition to the happy hour with faculty and students, one addition to the recruitment activities included a GPILS-wide social mixer and trivia night, an animated night of high-powered fun after a day of interviews. Interviewees also received a tour of Baltimore on the last day.



The Microbiome Journal, which is co-edited by **Dr. Jacques Ravel** is now indexed in PubMed.



Gold Lectureship 2014

By: Kelsey Gregg

Ulrich von Andrian, M.D., Ph.D. braved the mid-April snow to share his pioneering work on NK cell memory, immune cell interactions, migration, the immune response to lymph-borne infections as the endowed 2014 Gold Lecturer on April 16th. Dr. von Adrian is currently a senior investigator in the department of Microbiology & Immunobiology at Harvard Medical School and the Mallinckrodt Professor of Immunopathology. He currently has two RO1s and three PO1s in addition to a variety of other funding sources and awards. He is known for advancing intravital microscopy techniques and his many fruitful collaborations.

Story continues on page 7



New Faculty Spotlight: J. Stephen Dumler, MD

By Sabina Kaczanowska



Dr. Dumler is a native Baltimorean with a very impressive resume who has recently joined the faculty of the School of Medicine with a primary appointment in Pathology and secondary appointment in Microbiology and Immunology. He received his undergraduate degree in Medical Technology as well as his MD here at the University of Maryland School of Medicine, after which he worked as a lab technician under the mentorship of Dr. Abdu Azad. He completed his residency in pathology at Johns Hopkins University and his post-doctoral fellowship with Dr. David Walker at the University of Texas Medical Branch, Galveston. Most recently, he moved his lab from Johns Hopkins University to continue his research here at the University of

Maryland. Dr. Dumler's focus is on vector-borne diseases, specifically Rickettsia and Anaplasma, and how these obligate intracellular pathogens modulate host transcription programs to create a more suitable environment for survival and replication. He is also interested in immune-mediated pathology in response to Anaplasma infection. In addition to his research endeavors, Dr. Dumler will also serve as a clinical microbiologist in the Pathology department. Dr. Dumler has done extensive work abroad, most notably he contributed to the establishment of an American-style medical school during his sabbatical in Malaysia, studied the infectious agents responsible for acute febrile disease in Malaysia and Nicaragua, as well as his involvement in the Partnership for the Rapid Elimination of Trachoma (PRET) project in Africa funded by the Bill & Melinda Gates Foundation. He believes in the importance of studying medically relevant concepts that can be translated into the clinic and have an impact on human health. In his spare time, Dr. Dumler enjoys jazz and classical music, loves to cook, and is an avid wine collector. We are excited to have him join our M&I family so please make him feel welcome!

Spring 2014 Graduates

By: Stephanie Lehman

This year we had two Spring 2014 graduates, Erin Harberts and Vidhya Vijakumar!

Erin Harberts successfully defended her thesis, "TLR4/MyD88 Signaling Activates Ultraviolet Irradiation-Induced Apoptosis: Outcomes and Consequences." Erin completed her dissertation research in the lab of Dr. Anthony A. Gaspari and was supported by the T32 Signaling Pathways in Innate Immunity Training Grant. She was the recipient of numerous awards, including the Trainee Abstract Award from the American Association of Immunologists and the Albert M. Kligman Travel Fellowship Award from the Society for Investigative Dermatology. She plans to spend the summer completing a publication, teaching as adjunct faculty at CCBC and Loyola and loving her new daughter Anna. Advice: "Research should be fun, even though some experiments don't work, remember that you came to grad school because you enjoy working in the lab! Let the data guide the project and make

Story continues on page 7

Dr. James Kaper takes new role as Senior Associate Dean for Academic Affairs

By: Alexandria Reinhart



By now, most of us in the department have heard that Dr. Kaper is moving up in the ranks as the new Senior Associate Dean for Academic Affairs. I had an opportunity to sit down with him and inquire about this promotion.

What does your position as Senior Associate Dean entail?

In my new position as Senior Associate Dean for Academic Affairs, I oversee all educational activities for medical students, graduate students, postdocs, and as well as faculty promotion, appointments and tenure (APT) issues for the whole school of medicine. I report directly to the dean on these issues. On the organizational chart, I oversee GPILS, the offices of medical student education, medical student research, admissions, student affairs, MSTP, and the office of academic administration (which deals with faculty APT issues). Fortunately there are highly competent individuals running each of these offices and so I mainly try to stay out of their way and I don't have daily responsibilities. So that's why it's only a part time, not a full time position.

Will you remain chair of the M&I department?

I will remain as chair of the department. What will suffer is my own research but I was cutting back on that anyway.

Since you're cutting back on research, are you aiming for more administrative work?

My highest ambition was chair of the department; I never planned to be a senior associate dean. But there was a sudden void in the SOM Academic Affairs leadership that needed to be filled, and I have extensive experience with various educational areas and a strong training and mentoring legacy (graduate students, postdocs).

What benefits do you see as you take this new position for the students?

Although the Director of GPILS has always been a PhD (Dr. Strickland and Dr. McCarthy before him), they've always reported to a senior associate dean who was an MD with no experience training graduate students. Now GPILS reports to a PhD who has extensive experience in training graduate students. Certainly we have many MD colleagues who are wonderful researchers and mentors but the graduate students should feel better represented with a senior SOM leader who was once in their shoes.

Any further aspirations?

No – I'm not looking to expand this role. I want to do academic affairs, part time, and remain chair of this department. I'm not looking for a deanship.

Will you be vacating your office?

No – I have an office on the 14th floor, but that will only be used for a few meetings. I'll be spending most of my time in HSFI, door open to students and faculty.

Spring 2014 Graduate

Vidhya Vijakumar succeeded in defending her thesis, "Functions and role of the serine proteases autotransporters of Enterobacteriaceae (SPATEs): beyond good and evil." She completed her dissertation in the lab of Dr. James Nataro and was funded by his NIH grant. She received a student travel grant from the American Society for Microbiology for 2014 and is currently holding a post-doctoral position in Dr. Colin Stine's lab at UMB. She is looking forward to getting married on July 11th to Angad Sachdeva who is studying electrical engineering at UVA. Advice: "Don't give up! The end of this long journey is totally worth it! Also, focus on smart work, not just hardwork!"



Erin Harberts had a baby! **Anna Maureen**, born March 25th at 2:56pm, 7lbs 7.8oz, 20 inches long, healthy and strong.

Goidl Lectureship 2014 continued

Dr. von Andrian began meeting with professors in a car on his way to UMB from the airport before having breakfast with graduate students. The students appreciated Dr. von Adrian's friendliness and expert advice on their projects' directions. He then spoke with a few more faculty members before his talk at noon on "Adaptive NK cells: the mystery of NK cell Memory." In this talk he described his work discovering the importance of NK cells in the delayed type hypersensitivity response and NK cell memory. Dr. von Andrian took questions during lunch and then gave an hour and a half lecture in the Nursing School auditorium for The Edmond Goidl Immunology Lecture & Dr. Aaron I. Grollman Visiting Professorship in Basic Medical Sciences Symposium. The talk was entitled "Not Always as Expected: Innate and Adaptive Immunity to Viral Infections," where he presented on a variety of topics accompanied by gorgeous 3-D intravital microscopy. Topics included antigen trafficking to lymph nodes, the migratory behavior of naive, effector and memory T cells, and the importance of subcapsular sinus macrophages against fatal viral infections, a topic that should be familiar to those who recently have taken Basic Immunology. Another reception followed, before Dr. Von Andrian's short and productive visit came to a close and he returned to Boston.



Two more bundles of joy arrived! Dr. Patricia Marques delivered Liam and Shawn on January 30th, 2014.



From the **Bavoil Lab**: on October 29th 2013, Valerie Huse, GPILS-Mol Med, defended her PhD thesis titled "Functional Analysis of the Polymorphic Membrane Protein Family of Chlamydia"

From the **Hassel Lab**, Tiha Long defended her thesis and has moved to a postdoc at the University of Chicago with Jerrold Turner working on tight junction proteins in the GI tract.

Teresa Lee completed her clinical training and matched at Jefferson University in Philadelphia for her residency training.

Victor Ayala's Interview continued.....

4) What kind of activities were you involved in while you were at the University of Maryland?

I have good memories of my time in the Department of Microbiology and Immunology at UMB. The program always had a great sense of community, which made participating in extracurricular activities fun and easy. I also had the fortune of working with great colleagues, and my class was a good bunch that got together outside of school often. In the lab, my mentor encouraged all his students to present their work at various conferences including the American Society for Microbiology which I took advantage of many times to share my work and meet other research groups. Traveling outside of the state was always pretty exciting. Within the program, I participated in many extracurricular activities including the Bacterial Pathogenesis Journal club, Immunology Journal Club, PROMISE, and the Meyerhoff Scholars program. I also enjoyed the non-science activities in our group including playing soccer, distance running, helping with the Christmas party, serving as a student liaison during admission's orientation and helping students prepare for qualifying exams. The best activity though had to be celebrating when one of us finished their studies at Camden Pub.

5) Are there any other recent accomplishments or other things that you would like to be included?

I am grateful to all the people at the University of Maryland, Baltimore who helped me throughout my graduate studies for the education and training I received while there. I could not be doing the work I am currently doing without their help. I encourage all current students to be active in the department and take advantage of all the opportunities afforded them to help. You never know how the experience will help you in the future.

Grants

Dr. Patrik Bavoil received a grant for his work entitled: Eco-Pathogenomics of Sexually Transmitted Infections (EPSTI). 09/14 to 09/19. Total costs 10,978,841. Patrik Bavoil (UMB-School of Dentistry) & Jacques Ravel (UMB-Institute for Genome Science, IGS), co-Principal Investigators; Dennis Ko & Raphael Valdivia (Duke U), Garry Myers (UMB-IGS), Larry Forney (U Idaho), Mishka Terplan & Katrina Mark (UMB-SOM), Alison Criss (U Virginia), Thomas Urban (Duke U), David Wilson (U New South Wales, Australia), Rebecca Brotman (UMB-IGS), Pawel Gajer (UMB-IGS), Khalil Ghanem (Johns Hopkins U) and David Shoham (Loyola Chicago U), co-investigators. At the March study section, the application received an impact score of 23, ranking 3rd best of 12 submitted, with a projected 5 to be funded.

Dr. Greg Carey won a 2014 UMB Global Health Inter-professional Faculty Grant (\$10,000) related to his project entitled: "A Proposal to Obtain an Inter-professional Assessment of Health, Research and Service Need and Collaborative Opportunities for UMB in The Gambia." He will lead a team of inter-professional students to the Gambia in early June, 2014. The students won travel awards and were then teamed with faculty who had won inter-professional (IP) grants. Dr. Carey's project is an IP survey that will seek the public need in the Gambia and outline ways that UMB can help empower the Gambians to address these needs. They will also establish collaborations and partnerships with institutes such as the University of Gambia, the Teaching Hospital Of Gambia and the Gambian Medical Research Center. Dr. Carey will present his B cell lymphoma research as well as lecture on B and T cell immunity and lymphoma development as he teaches two graduate and one dental immunology courses. The inter-professional students will operate in the realms of need and

capacity analysis and mapping and both service and teaching opportunities. It promises to be an incredible learning experience. All IPE teams will present their work in the near future.

Dr. Ashaf Fouad received a grant from the American Association of Endodontists Foundation (2014–2020): Regeneration of Pulp-Dentin Development in Teeth with Necrotic Pulp and Immature Roots, a multi-center study in three dental schools: Total Award: \$1.7 million.

Dr. Ashaf Fouad received a patent: Coherence Gated Doppler Motion Sensor and Medical Applications. Cha-Min Tang, Chia-Pin Liang, Yu Chen, **Ashraf Fouad** and Joseph Schmitt. Application number 13/962,450, filed on 8/8/2013 and published on 2/13/2014. Publication No. US-2014-0043618-A1.

Pragnesh Mistry received a 2014 AAI Trainee Abstract Travel Award and STEMCELL Technologies AAI Travel Award.

Dr. Kamal Moudgil received an R21 from the NIH/ National Institute of Allergy and Infectious Diseases for his work entitled "Defining glomerulus-homing peptides for targeted drug delivery in lupus nephritis", in collaboration with Dr. Violeta Rus, Division of Rheumatology, Department of Medicine, SOM.

Dr. Jacques Ravel received a 4-year, \$947,148.00 grant from the National Institute of General Medical Sciences, NIH, for a research entitled "Modeling diversity and stability of vaginal microbial communities", in collaboration with the University of Florida.

Dr. Jacques Ravel received a 2-year, \$421,902 grant from the National Institute of Allergy and Infectious Diseases, NIH, for the research entitled "Vaginal microbiota, immune responses and vulvo-vaginal symptoms during menopause" in collabora-

tion with Rebecca Brotman, Ph.D, MPH, Assistant Professor, Department of Epidemiology & Public Health, and the Institute for Genome Sciences.

Dr. Jacques Ravel received a 5-year, \$2,698,000 RO1 grant from the National Institute for Nursing Research at NIH to study "Influence of Modifiable Factors on the Vaginal Microbiota and Preterm Birth". The grant was awarded in partnership with Mary Regan, Ph.D., RN, Assistant Professor, School of Nursing, University of Maryland Baltimore.

Dr. Jacques Ravel received a 5-year, \$2,650,000 RO1 grant from the National Institute for Nursing Research at NIH to study "Revealing the role of the cervico-vaginal microbiome in spontaneous preterm birth" The grant was awarded in partnership with Michal Elovitz, MD, Professor, University of Pennsylvania.

Dr. Jacques Ravel received a 2-year, \$230,250 grant from the National Institute of Health, for a research entitled "Bacteriophage-Host Dynamics as a Factor in the Etiology of Bacterial Vaginosis," in collaboration with the University of Delaware.

Dr. Frank Robb received a grant for his work entitled "Metabolic Reconstruction of *Desulforudis audaxviator*, A Subsurface Sentinel Species" from the Sloan Foundation.

Dr. Hervé Tettelin received a grant from the Cystic Fibrosis Foundation for his work entitled: "Human functional genomics of mycobacterial infections in cystic fibrosis."



Presentations

Dr. Patrik Bavoil was invited to give the following seminars:

04/23/14 China Agriculture University, Beijing, China, "Type III secretion function highlights the evolutionary relatedness and the pathogenic divergence of *Chlamydia trachomatis* and *Chlamydia psittaci*"

04/28/14 Dept. of Microbiology, School of Life Sciences, Fudan University, Shanghai, China, "The Essential Role of Type III Secretion in Developmental Uniformity and Pathogenic Divergence among the Chlamydiaceae"

05/02/14 Dept. of Biochemistry & Microbiology, School of Life Sciences, Rutgers University, New Brunswick, NJ, "The Essential Role of Type III Secretion in Developmental Uniformity and Pathogenic Divergence among the Chlamydiaceae"

Pragnesh Mistry, graduate student, Department of Microbiology and Immunology, presented "Inhibition of TLR2 signaling by small molecule inhibitors targeting a novel putative pocket within the TLR2 TIR domain" at the 2014 IMMUNOLOGY AAI 2014 meeting in Pittsburgh, Pennsylvania.

Dr. Mark Shirliff was invited to give the following seminars:

"Biofilm: The Science and Disruptive Technologies" AAOS/ORS Musculoskeletal Infection: Where are we in 2014? Research Symposium. Chicago, IL. May 9-10, 2014.

"*Staphylococcus aureus* biofilms: A platform for studying pathogenesis" The 23rd Annual Philadelphia Infection & Immunity Forum, American Society for Microbiology, Eastern Pennsylvania Branch. Philadelphia, PA. May 9, 2014.

"MRSA: Host immune response and vaccine development" Department of Microbiology and Immunology, Montana State University, Bozeman, MT. April 9, 2014.

"Immune Control of Biofilms" Uniformed Services University. Washington, D.C. February 7, 2014.

"Infection Treatment and Prevention: Possible Means of Controlling and Minimizing Biofilm Formation" in Session: Infection in Arthroplasty: The Basic Science of Bacterial Biofilms in Its Pathogenesis, Diagnosis, Treatment, and Prevention. American Academy of Orthopedic Surgeons Annual Meeting. New Orleans, LA. March 13, 2014.

"*Staphylococcus aureus* biofilms as a platform for the vaccine development and novel diagnostics" Regional Biofilm Symposium at Drexel University College of Medicine and Hahnemann University Hospital, Philadelphia, PA. December 17, 2013.

"*Staphylococcus aureus*: The Dirty, Slimy Killer" Dean's Lecture Series, University of Southern Florida. Tampa, FL. November 15, 2013.

"Animal models of biofilm infection" Eurobiofilms. September 9-12, 2013. Ghent, Belgium.

"Considering the biofilm mode of growth in *Staphylococcus aureus* vaccine development" Pfizer Vaccine Research. Pearl River, NJ. August 8, 2013.

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