Summer 2019



Welcome to the DMC newsletter!

This quarterly newsletter is provided by the Duke Microbiome Center to inform the Duke University community about activities, resources, news, funding and educational opportunities, and recent highlights in the microbiome sciences at Duke and beyond. If you have items you would like for us to include in a future newsletter, or if you would like to add someone to our newsletter listserv to receive future issues, please email Shirley Foster. For further information on the DMC, please visit our website.

Survey reveals broad usage of DNA sequencing to study microbiomes at Duke

This spring, the DMC issued a survey across the Duke campus to evaluate usage of DNA sequencing to analyze microbial communities. Our survey results illustrate that nearly two dozen labs at Duke are performing microbiome research using high-throughput DNA sequencing techniques. About a third of this work is being supported by Duke's

<u>Microbiome Shared Resource</u> and <u>Genomic Analysis and Bioinformatic Core</u>

<u>Facility</u>. A number of investigators are also performing metagenomic DNA shotgun and RNA seq experiments, suggesting that both interest and expertise is present on campus for this cutting-edge sequencing methods.

Lawrence David, Ph.D.

Associate Director, Duke Microbiome Center

DMC announces two Development Grant awards

Earlier this year, the DMC announced a new <u>Development Grant</u> program with the objective to support interdisciplinary and collaborative research projects in the microbiome sciences at Duke University. Following peer review of all submitted applications, the DMC has awarded the following two applications. The next request for applications for the DMC Development Grant program will be issued in spring 2020.

- Drs. <u>Neil Surana</u> and <u>Xiling Shen</u> "Validating organoid models to illuminate mechanisms of host-microbe interactions"
- Drs. <u>Peter Allen</u> and <u>Matthew Kelly</u> "The pancreatic microbiome and cancer progression in cystic precursor lesions of the pancreas"

Funding opportunities through the DMC

The DMC has one active funding opportunity:

DMC Rolling Voucher Program: Duke University has established shared resources that avail state-of-the-art technologies to interrogate microbiome structure and function to Duke investigators. The Duke Microbiome Center offers a rolling voucher program to provide its investigators access to these shared resources, particularly for microbiome projects that are not yet externally funded. Eligibility is limited to Duke Microbiome Center faculty and their trainees, and the maximum budget is \$5,000. There is no deadline for these proposals. For more information, see the program announcement.

Save-the-Date: Symposium on Food Systems, Nutrition, and the Microbiome

The Great Hall at Trent Semans Center, Duke University School of Medicine

November 12 . 2019

Food systems are fundamental to human, animal, and planetary health. The availability and composition of food in turn has shaped the evolution of human and animal physiology and can contribute to diverse metabolic diseases. The microbiome is increasingly appreciated as an integral part of this continuum from agriculture to nutritional physiology. The goal of this symposium is to explore the frontiers of the exciting interactions between food systems, nutrition, and the microbiome, and emerging ethical and policy implications.

Please save the date for this upcoming symposium organized by the Duke Microbiome Center and the following co-sponsors: Duke Sanford World Food Policy Center, Duke Molecular Physiology Institute (DMPI), Integrative Bioinformatics for Investigating and Engineering Microbiomes Training Program (IBIEM), Duke Clinical & Translational Science Institute (CTSI)

Upcoming DMC meetings

DMC Microbiome Lunches: This monthly research-in-progress series is held on third Wednesdays at 12PM, and is open to the entire DMC community. If you would like to present your work in a future DMC Microbiome Lunch, please contact <u>Shirley Foster</u>.

DMC Faculty Meetings: The next DMC faculty meeting will be July 24th, 1PM, in CIEMAS 2240. Future DMC faculty meetings will be 10/23, 1/29, & 4/22, with all meetings at 1PM in CIEMAS 2240 (lunch provided).

Please mark you calendars now!

Core Facility Highlights

The DMC supports and advises several core facilities at Duke that support the microbiome sciences. This includes the <u>Duke Microbiome Shared Resource</u>, the <u>Duke Genomics Analysis and Bioinformatics Shared Resource</u>, and the <u>Duke Gnotobiotic Core</u>. In this newsletter we highlight the Duke Gnotobiotic Core, which is directed by Dr. Jai Tubbs:

The Division of Laboratory Animal Resources (DLAR) <u>Gnotobiotic Core</u>, provides germ-free (GF) and gnotobiotic mice to investigators at Duke University. The core breeds and maintains germ-free C57BL/6 and BALB/c mouse strains, and performs selective colonizations upon request. Rederivation of additional GF mouse strains is available upon request. The gnotobiotic core is intended to provide GF and gnotobiotic animal models to investigators for research study, particularly in the area of microbiome research. The research core contains flexible film isolators and bio-containment cage rack systems to meet the diverse needs of Duke researchers. For information on the gnotobiotic core and services, please email <u>GnotobioticCore@duke.edu</u>.

Upcoming Conferences

For a full list of upcoming microbiome conferences, click here.

Microbiome Funding Opportunities

NCCIH Natural Product Phase II Clinical Trial Cooperative Agreement (U01 Clinical Trial Required) See solicitation for details (see here) 10/8/2019

Biological Technologies Office -- ReVector See solicitation for details (see here) 7/11/2019

Advancing Translational and Clinical Probiotic/Prebiotic and Human

Microbiome Research (R01 Clinical Trial Optional) See solicitation for details

(see here) 6/5/2019

Advancing Mechanistic Probiotic/Prebiotic and Human Microbiome Research (R01) See solicitation for details (see here) 6/5/2019

Age-related Microbiota Changes and their Implications in Chronic Disease Prevention, Treatment and Progression (R01, R21 Clinical Trial Optional) See solicitation for details (see here) 6/5/2019

The Mechanistic Role of the Microbiome in the Pathobiology of Heart, Lung, Blood, and Sleep Diseases (R01 - Clinical Trial Not Allowed) See solicitation for details (see here) 6/5/2019

Role of Gut Microbiome in Regulating Reproduction and Its Impact on Fertility Status in Women Living with and Without HIV (R01, R21 Clinical Trial Optional) See solicitation for details (see here) 6/5/2019

Modulating Intestinal Microbiota to Enhance Protective Immune Responses against Cancer (R01 Clinical Trial Not Allowed) See solicitation for details (see <a href="https://hee.pc/hee.org/learned-new-market-new-

Antimicrobial Stewardship in the Latin America Region Competitive Grant Program Faculty \$250,000 (see here) 7/12/2019

Microbial-based Cancer Therapy -Bugs as Drugs (R01, R21 Clinical Trial Not Allowed) See solicitation for details (see here) 6/5/2019

AHRQ -- Large Research Projects for Combating Antibiotic-Resistant Bacteria (CARB) (R01, R18) Faculty \$2,500,000 (see here) 6/5/2019

Generating New Insights and Mechanistic Understanding of Antibiotic

Resistance Development (R01, R21 Clinical Trial Not Allowed) See solicitation

Recent DMC Publications

Clinton CM; Bain JR; Muehlbauer MJ; O'Neal SK; Hughes BL; Truong T; Pieper CF; McElrath TF; Ferguson KK 112: Urinary metabolomic profiles in pregnancy and association with fetal growth restriction. American Journal of Obstetrics and Gynecology. 1/1/2019 https://scholars.duke.edu/individual/pub1364561

Venkatesh KK; Jackson W; Hughes BL; Laughon MM; Thorp JM; Stamilio DM 568:
Association of chorioamnionitis and its duration with neonatal morbidity and mortality.
American Journal of Obstetrics and Gynecology. 1/1/2019
https://scholars.duke.edu/individual/pub1364560

Lydon EC; Bullard C; Aydin M; Better OM; Mazur A; Nicholson BP; Ko ER; McClain MT; Ginsburg GS; Woods CW A host gene expression approach for identifying triggers of asthma exacerbations. Plos One. 1/1/2019 https://scholars.duke.edu/individual/pub1379694

Chen KH; Liao HL; Bellenger JP; Lutzoni F Differential gene expression associated with fungal trophic shifts along the senescence gradient of the moss Dicranum scoparium. Environmental Microbiology. 1/1/2019 https://scholars.duke.edu/individual/pub1381231

Bonito G; Benucci GMN; Hameed K; Weighill D; Jones P; Chen K-H; Jacobson D; Schadt C; Vilgalys R Fungal-Bacterial Networks in the Populus Rhizobiome Are Impacted by Soil

Properties and Host Genotype. Frontiers in Microbiology. 1/1/2019 https://scholars.duke.edu/individual/pub1379887

Snyder-Mackler N; Voyles T; Tung J Generating RNA Baits for Capture-Based Enrichment. Methods in Molecular Biology. 1/1/2019

https://scholars.duke.edu/individual/pub1376127

Hughes BL Group A Streptococcus puerperal sepsis: an emerging obstetric infection?. Bjog : an International Journal of Obstetrics and Gynaecology. 1/1/2019

https://scholars.duke.edu/individual/pub1353751

Dallas TA; Han BA; Nunn CL; Park AW; Stephens PR; Drake JM Host traits associated with species roles in parasite sharing networks. Oikos. 1/1/2019 https://scholars.duke.edu/individual/pub1350805

Franz KJ; Metzler-Nolte N Introduction: Metals in Medicine. Chemical Reviews. 1/1/2019 https://scholars.duke.edu/individual/pub1368731

Saelens JW; Viswanathan G; Tobin DM Mycobacterial Evolution Intersects With Host Tolerance. Frontiers in Immunology. 1/1/2019

https://scholars.duke.edu/individual/pub1375610

Datkhaeva I; Has P; Fitzgerald K; Hughes BL Outcomes of a Negative Rapid Influenza Diagnostic Test in Pregnant Women. Am J Perinatol. 1/1/2019

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Washburne AD; Silverman JD; Morton JT; Becker DJ; Crowley D; Mukherjee S; David LA; Plowright RK Phylofactorization: a graph partitioning algorithm to identify phylogenetic

scales of ecological data. Ecological Monographs. 1/1/2019 https://scholars.duke.edu/individual/pub1373582

Panzetta ME; Luján AL; Bastidas RJ; Damiani MT; Valdivia RH; Saka HA Ptr/CTL0175 Is Required for the Efficient Recovery of Chlamydia trachomatis From Stress Induced by Gamma-Interferon. Frontiers in Immunology. 1/1/2019

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Luterbach CL; Boshe A; Henderson HI; Cober E; Richter SS; Salata RA; Kalayjian RC; Watkins RR; Hujer AM; Hujer KM The Role of Trimethoprim/Sulfamethoxazole in the Treatment of Infections Caused by Carbapenem-Resistant Enterobacteriaceae. 1/1/2019 https://scholars.duke.edu/individual/pub1364620

Conroy JM; Pabla S; Nesline MK; Glenn ST; Papanicolau-Sengos A; Burgher B; Andreas J; Giamo V; Wang Y; Lenzo FL Next generation sequencing of PD-L1 for predicting response to immune checkpoint inhibitors. 1/24/2019

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Matty MA; Knudsen DR; Walton EM; Beerman RW; Cronan MR; Pyle CJ; Hernandez RE; Tobin DM Potentiation of P2RX7 as a host-directed strategy for control of mycobacterial infection. 1/29/2019 https://scholars.duke.edu/individual/pub1366849

Liao H-L; Bonito G; Rojas JA; Hameed K; Wu S; Schadt CW; Labbe JL; Tuskan G; Martin FM; Grigoriev IV Fungal endophytes of Populus trichocarpa alter host phenotype, gene expression and rhizobiome composition. 1/30/2019 https://scholars.duke.edu/individual/pub1367551

Parker D; Sloane R; Pieper CF; Hall KS; Kraus VB; Kraus WE; Huebner JL; Ilkayeva OR; Bain JR; Newby LK Age-Related Adverse Inflammatory and Metabolic Changes Begin Early in Adulthood. 2/1/2019 https://scholars.duke.edu/individual/pub1316097

Do EK; Zucker NL; Huang ZY; Schechter JC; Kollins SH; Maguire RL; Murphy SK; Hoyo C; Fuemmeler BF Associations between imprinted gene differentially methylated regions, appetitive traits and body mass index in children. 2/1/2019

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White PJ; Newgard CB Branched-chain amino acids in disease. 2/1/2019 https://scholars.duke.edu/individual/pub1367724

Holland TL; Chambers HF; Boucher HW; Corey GR; Coleman R; Castaneda-Ruiz B; Fowler VG Considerations for Clinical Trials of Staphylococcus aureus Bloodstream Infection in Adults. 2/1/2019 https://scholars.duke.edu/individual/pub1350526

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Vijayraghavan S; Kozmin SG; Strope PK; Skelly DA; Lin Z; Kennell J; Magwene PM; Dietrich FS; McCusker JH Mitochondrial Genome Variation Affects Multiple Respiration and Nonrespiration Phenotypes in Saccharomyces cerevisiae. 2/1/2019

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Pérez-Arques C; Navarro-Mendoza MI; Murcia L; Lax C; Martínez-García P; Heitman J; Nicolás FE; Garre V Mucor circinelloides Thrives inside the Phagosome through an Atf-

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Applen Clancey S; Ciccone EJ; Coelho MA; Davis J; Ding L; Betancourt R; Glaubiger S; Lee Y; Holland SM; Gilligan P Cryptococcus deuterogattii VGIIa Infection Associated with Travel to the Pacific Northwest Outbreak Region in an Anti-Granulocyte-Macrophage Colony-Stimulating Factor Autoantibody-Positive Patient in the United States. 2/12/2019 https://scholars.duke.edu/individual/pub1369160

Wango TL; Musiega D; Mundia CN; Altmann J; Alberts SC; Tung J Climate and Land Cover Analysis Suggest No Strong Ecological Barriers to Gene Flow in a Natural Baboon Hybrid Zone 2/15/2019 https://scholars.duke.edu/individual/pub1277601

2017 NIH-wide microbiome workshop writing team 2017 NIH-wide workshop report on "The Human Microbiome: Emerging Themes at the Horizon of the 21st Century".

2/26/2019 https://scholars.duke.edu/individual/pub1375787

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https://scholars.duke.edu/individual/pub1361807

Zhou Y-H Maternal immunisation and neonatal infection of hepatitis A or B virus. 3/1/2019 https://scholars.duke.edu/individual/pub1373324

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Gerhard WA; Gunsch CK Metabarcoding and machine learning analysis of environmental DNA in ballast water arriving to hub ports. 3/1/2019 https://scholars.duke.edu/individual/pub1367007

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Amoroso CR; Kappeler PM; Fichtel C; Nunn CL Water availability, primate ranging behavior, and implications for parasite transmission: an experimental and observational study of wild red-fronted lemurs (Eulemur rufifrons) in a dry deciduous forest 3/1/2019 https://scholars.duke.edu/individual/pub1373162

Amend A; Burgaud G; Cunliffe M; Edgcomb VP; Ettinger CL; Gutiérrez MH; Heitman J; Hom EFY; Ianiri G; Jones AC Fungi in the Marine Environment: Open Questions and Unsolved Problems. 3/5/2019 https://scholars.duke.edu/individual/pub1373410

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Carlson D; Carin L Continuing progress of spike sorting in the era of big data. 3/8/2019 https://scholars.duke.edu/individual/pub1373260

Gray SM; Page LC; Tong J Ghrelin regulation of glucose metabolism. 3/8/2019 https://scholars.duke.edu/individual/pub1373714

Hortle E; Johnson KE; Johansen MD; Nguyen T; Shavit JA; Britton WJ; Tobin DM; Oehlers SH Thrombocyte inhibition restores protective immunity to mycobacterial infection in zebrafish. 3/16/2019 https://scholars.duke.edu/individual/pub1375609

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Katzman DK; Norris ML; Zucker N Avoidant restrictive food intake disorder: First do no harm. 4/1/2019 https://scholars.duke.edu/individual/pub1369116

Grieneisen LE; Charpentier MJE; Alberts SC; Blekhman R; Bradburd G; Tung J; Archie EA Genes, geology and germs: gut microbiota across a primate hybrid zone are explained by site soil properties, not host species. 4/1/2019 https://scholars.duke.edu/individual/pub1381749

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Dohlman AB; Shen X Mapping the microbial interactome: Statistical and experimental approaches for microbiome network inference. 4/1/2019 https://scholars.duke.edu/individual/pub1374826

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Devoto AE; Santini JM; Olm MR; Anantharaman K; Munk P; Tung J; Archie EA; Turnbaugh PJ; Seed KD; Blekhman R Megaphages infect Prevotella and variants are widespread in gut microbiomes. 4/1/2019 https://scholars.duke.edu/individual/pub1367217

Turner NA; Sharma-Kuinkel BK; Maskarinec SA; Eichenberger EM; Shah PP; Carugati M; Holland TL; Fowler VG Methicillin-resistant Staphylococcus aureus: an overview of basic and clinical research. 4/1/2019 https://scholars.duke.edu/individual/pub1368087

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Policelli N; Bruns TD; Vilgalys R; Nuñez MA Suilloid fungi as global drivers of pine invasions. 4/1/2019 https://scholars.duke.edu/individual/pub1369073

Berger M; Oyeyemi D; Olurinde MO; Whitson HE; Weinhold KJ; Woldorff MG; Lipsitz LA; Moretti E; Giattino CM; Roberts KC The INTUIT Study: Investigating Neuroinflammation Underlying Postoperative Cognitive Dysfunction. 4/1/2019 https://scholars.duke.edu/individual/pub1366900

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