

# Report to the National Advisory Environmental Health Sciences Council

## Director, NIEHS

11-12 September 2018

### Budget and Legislative Report

	FY 2016 Omnibus Appropriation	FY 2017 Omnibus Appropriation	FY 2018 Omnibus Appropriation	FY 2019 President's Budget Request	FY2019 House Bill	FY2019 Senate Bill
NIEHS	\$ 693,533,000 <sup>a/</sup>	\$ 714,261,000	\$ 751,143,000	\$ 693,199,000	\$ 760,113,000	\$ 775,115,000
NIH (LHHS) <sup>b/</sup>	\$32,084,000,000	\$34,084,000,000	\$37,084,000,000	\$34,588,391,000	\$38,334,000,000	\$39,084,000,000
Common Fund <sup>c/</sup>	\$ 675,639,000	\$ 695,456,000	\$ 600,716,000 <sup>d/</sup>	\$ 598,781,000	\$ 607,739,000	\$ 619,485,000
Superfund	\$ 77,349,000	\$ 77,349,000	\$ 77,349,000	\$ 53,967,000	\$ 80,000,000	\$ 78,349,000
NIEHS/DOE Training <sup>e/</sup>	\$ 10,000,000	\$ 10,000,000	\$ 10,000,000			\$ 10,000,000
Ebola Response (via CDC) <sup>f/</sup>	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000			

a/ Reduced by \$169,000 transfer to the NIH Office of AIDS Research.

b/ Excludes Mandatory Type 1 Diabetes Research and Superfund.

c/ Includes addition of \$12.6 million for the Gabriella Miller Kids First Act pediatric research initiative.

d/ Excludes \$60 million "All of US" funding which the committee moved to the OD.

e/ Appropriations Committee report language supporting the transfer of funds from the U.S. Department of Energy's Defense Environmental Cleanup account to NIEHS for the NIEHS/DOE Nuclear Worker Training Program.

f/ Transfers to NIEHS from 2015 CDC Ebola Emergency Response appropriation (Title VI, Div. G, PL 113-235).

Note: Approximately 13 to 15 percent of the total FY 2019 NIH budget would be designated for high priority research areas.

### FISCAL YEAR 2019 APPROPRIATIONS UPDATE

#### BROAD OVERVIEW

There are 19 days remaining in Fiscal Year 2018. Fiscal Year 2019 commences on October 1, 2018. To date, none of the 12 individual appropriations bills for Fiscal Year 2019 have become law. Enactment of a "continuing resolution" (CR) to fund government operations at Fiscal Year 2018 levels through mid-November or a later date is possible. As of August 23, the House has passed six appropriations bills and the Senate has passed nine appropriations bills—six of which are in common:

1. Defense;
2. Energy and Water Development, and Related Agencies, under which the NIEHS/DOE Nuclear Worker Training Program has been traditionally funded;
3. Financial Services and General Government;
4. Interior, Environment and Related Agencies, under which the NIEHS Superfund-related programs are funded;
5. Legislative Branch; and
6. Military Construction, Veteran Affairs, and Related Agencies.

The table below details each of the 12 annual appropriations bills in alphabetical order and notes the dates on which these bills were passed by the House and the Senate. Also included is the total discretionary funding level proposed by each chamber for each bill. The differences between the two amounts are subject to reconciliation by a conference committee. As of August 23, one “minibus” package of three bills—Energy and Water Development, Military Construction and Veterans Affairs, and Legislative Branch—is in the conference process.

<b>STATUS OF FY2019 APPROPRIATIONS BILLS AS OF AUGUST 23, 2018</b>					
<b>#</b>	<b>Bill</b>	<b>House Passage</b>	<b>House Amount</b>	<b>Senate Passage</b>	<b>Senate Amount</b>
1	Agriculture, Rural Development, Food and Drug Administration, and Related Agencies			Aug. 1, 2018	\$23.2 billion
2	Commerce, Justice, Science, and Related Agencies				
3	Defense	June 28, 2018	\$674.6 billion	Aug. 23, 2018	\$675.6 billion
4	Energy and Water Development, and Related Agencies	June 8, 2018	\$44.7 billion	June 25, 2018	\$43.7 billion
5	Financial Services and General Government	July 19, 2018	\$23.4 billion	Aug. 1, 2018	\$23.7 billion
6	Homeland Security				
7	Interior, Environment, and Related Agencies <i>(funds NIEHS Superfund-related activities)</i>	July 19, 2018	\$35.3 billion	Aug. 1, 2018	\$35.6 billion

8	Labor, Health and Human Services, Education, and Related Agencies <i>(funds NIH)</i>			Aug. 23, 2018	\$179.3 billion
9	Legislative Branch	June 8, 2018	\$3.81 billion	June 25, 2018	\$3.37 billion
10	Military Construction, Veteran Affairs, and Related Agencies	June 8, 2018	\$96.9 billion	June 25, 2018	\$97.1 billion
11	State, Foreign Operations, and Related Programs				
12	Transportation, Housing and Urban Development, and Related Agencies			Aug. 1, 2018	\$71.4 billion

### **NIH BUDGET OVERVIEW**

On June 28, 2018, the Senate Appropriations Committee, by a vote of 30-1, advanced its version of the FY2019 Labor, Health and Human Services, Education and Related Agencies Act. On August 23, 2018, the full Senate, by a vote of 85-7, passed H.R. 6157, the Defense Appropriations Act combined with the Labor, Health and Human Services, Education and Related Agencies Appropriations Act. In total the Senate Labor, Health and Human Services, Education and Related Agencies Appropriations bill proposes \$179.3 billion in base discretionary funding for the various departments and agencies that fall under the bill, which represents an increase of \$2.2 billion above the FY2018 level. Two billion of this increase is allocated to NIH, with approximately \$807 million—or 40%—of it targeted for specific NIH research initiatives. The balance is spread across every NIH Institute and Center in support of their core missions. The total proposed by the Senate for HHS is \$90.1 billion. The total proposed by the Senate for NIH is \$39.1 billion, which represents a \$2 billion or 5.4% increase over the FY2018 enacted level.

On July 11, 2018, the House Appropriations Committee, by a vote of 30-22, advanced its version of this legislation. In total, the House bill proposes \$177.1 billion in base discretionary funding, essentially the same as the FY2018 level and approximately \$2.2 billion less than the Senate proposal. The House bill proposes a total of \$38.3 billion for NIH, which represents an increase of \$1.25 billion above the FY2018 level and approximately \$750 million less than the Senate proposal. Approximately 59% of this House increase is targeted for specific NIH research initiatives. The balance is spread across every NIH Institute and Center. The House Appropriations Committee-reported bill has not been considered to date by the full House of Representatives.

Below is a table detailing how the proposed increases in funding for NIH would be distributed.

**DISTRIBUTION OF PROPOSED FUNDING INCREASES IN FY2019 FOR NIH BUDGET<sup>1</sup>**

Research Initiative	House Bill (H.R. 6470)		Senate Bill (S. 3158; H.R. 6157)	
	Funding	Increase	Funding	Increase
Alzheimer's Research	\$2,250.00	\$401.00	\$2,300.00	\$425.00
Opioids Research			\$500.00	
Cancer Moonshot	\$400.00	\$100.00	\$482.30	\$182.30
BRAIN	\$429.00	\$29.00	\$429.40	\$29.00
All of Us	\$437.00	\$147.00	\$376.00	\$86.00
Universal Flu Vaccine	\$130.00	\$30.00	\$120.00	\$20.00
Combating Antibiotic Resistance	\$528.00	\$15.00	\$550.00	\$37.00
IDEA Awards	\$366.00	\$15.00	\$361.76	\$11.18
Clinical and Translational Science Awards	\$542.77		\$560.03	\$17.26
Regenerative Medicine	\$10.00		\$10.00	
Gabriella Miller Kids First Pediatric Cancer Initiative	\$12.60		\$12.60	
NIH Institutes and Centers	\$513.00		\$1,192.26	

<sup>1</sup> Dollars in thousands.

**NIEHS Budget Overview**

Under the House bills, NIEHS would receive \$760.113 billion for its base budget and \$80 million for its Superfund-related activities. This represents an \$8.970 million and \$2.651 million increase, respectively. Under the Senate bills, NIEHS would receive \$775.115 billion for its base budget and \$78.349 million for its Superfund-related activities. This represents a \$23.972 million and \$1 million increase, respectively. Below is a table outlining these figures.

**DISTRIBUTION OF PROPOSED INCREASES IN FY2019 FOR NIEHS BUDGET<sup>1</sup>**

Budget Line	FY2018 Enacted Amount	House		Senate	
		Proposed Amount	Δ v FY2018	Proposed Amount	Δ v FY2018
NIEHS base budget <sup>2</sup>	\$751.143	\$760.113	\$8.970 (1.19%)	\$775,115	\$23.972 (3.19%)
NIEHS Superfund-related activities <sup>3</sup>	\$77.349	\$80.000	\$2.651 (3.43%)	\$78.349	\$1.000 (1.29%)
NIEHS Total	\$828.492	\$840.113	\$11.621 (1.40%)	\$853.464	\$24.972 (3.01%)

<sup>1</sup> Dollars in thousands.

<sup>2</sup> Funded under the Labor, Health and Human Services, Education, and Related Agencies Appropriations bill.

<sup>3</sup> Funded under the Interior, Environment, and Related Agencies Appropriations bill.

**Senate Appropriations Amendment Filed Requiring NIEHS Report on Short-Chain PFAS**

A bipartisan floor amendment to the Senate Labor, Health and Human Services, Education and Related Agencies Appropriations bill filed by Senator Gary Peters of Michigan, Cory Gardner of Colorado, and Debbie Stabenow of Michigan to require NIEHS to submit a report to Congress within one year about the status and results of research assessing the toxicological effects of short-chain and other alternative perfluoroalkyl and polyfluoroalkyl substances (PFAS) was not considered during debate on the bill.

**CONGRESSIONAL HEARINGS AND BRIEFINGS**

**21st Century Cures Implementation Hearing**

On July 25, 2018, Dr. Francis S. Collins, the NIH Director, accompanied by Dr. Stephanie Devaney, the Deputy Director of the NIH All of US Research Program, and The Honorable Scott Gottlieb, the FDA Commissioner, testified before the House Energy and Commerce Committee’s Subcommittee on Health at a hearing entitled “21st Century Cures Implementation: Updates from FDA and NIH.”

**“Prioritizing Cures: Science and Stewardship at the National Institutes of Health” Hearing**

On August 23, 2018, Dr. Collins, the NIH Director, accompanied by the Directors of NICHD, NIAID, NIA and NCI, testified before the Senate Committee on Health, Education, Labor and Pensions (HELP) about NIH activities. At the hearing, Senator Margaret Wood Hassan of New Hampshire asked Dr. Collins about NIH activities related PFAS. In response, Dr. Collins mentioned NIEHS contributions in this research area.

## **NIEHS PFAS Research Activities Briefing**

On July 12, 2018, Dr. Linda S. Birnbaum, the NIEHS and NTP Director, and Dr. Patrick N. Breyse, Director of the CDC National Center for Environmental Health (NCEH) and the Agency for Toxic Substances and Disease Registry (ATSDR) provided a joint briefing about NIH NIEHS/NTP and CDC NCEH/ATSDR PFAS-related activities to staff for three United States Senators.

## **Friends of NIEHS Informational Briefing on Children's Health**

On October 10, 2018, the Friends of NIEHS plans to sponsor an informational briefing on Capitol Hill for Congressional staff about NIEHS research relating to children's health. This is a widely-attended event open to the public.

## **Science Advances**

*One NIEHS* [NIEHS authors]

- ***Inter-alpha-inhibitor deficiency in the mouse is associated with alterations in anxiety-like behavior, exploration, and social approach.*** Goulding DR [DIR], VD Nikolova, L Mishra, L Zhuo, K Kimata, SJ McBride, SS Moy, GJ Harry [DNTP] and S Garantziotis [DIR]. *Genes Brain Behav* (2018) [In Press]  
<http://dx.doi.org/10.1111/gbb.12505>  
**Theme 1, Goal 4; Theme 2, Goal 5**
- ***Expanding the Concept of Translational Research: Making a Place for Environmental Health Sciences.*** Pettibone KG [DERT], DM Balshaw [DERT], C Dilworth [DERT], CH Drew [DERT], JE Hall [DIR], M Heacock [DERT], AR Latoni [DERT], KA McAllister [DERT], LR O'Fallon [DERT], C Thompson [DERT], NJ Walker [DNTP], MS Wolfe [NTP], DS Wright [DERT] and GW Collman [DERT]. *Environ Health Perspect* (2018) v. 126 (7)  
<http://dx.doi.org/10.1289/ehp3657>  
**Theme 1, Goal 7; Theme 2, Goal 1; Theme 3, Goal 6**

*DNTP*

- ***Exome Sequencing of Fresh-frozen or Formalin-fixed Paraffin-embedded B6C3F1/N Mouse Hepatocellular Carcinomas Arising Either Spontaneously or due to Chronic Chemical Exposure.*** Auerbach SS [DNTP], Xu M [DNTP], Merrick BA [DNTP], Hoenerhoff MJ [DNTP], Phadke D, Taxman DJ, Shah R, Hong HL [DNTP], Ton TV [DNTP], Kovi RC [DNTP], Sills RC [DNTP], Pandiri AR [DNTP]. *Toxicol Pathol.* 2018 Jul 25.  
<https://www.ncbi.nlm.nih.gov/pubmed/30045675>  
**Theme 1, Goal 1**

- **Human and animal evidence of potential transgenerational inheritance of health effects: An evidence map and state-of-the-science evaluation.** Walker VR [DNTP], Boyles AL [DNTP], Pelch KE [DNTP], Holmgren SD [DNTP], Shapiro AJ [DNTP], Blystone CR [DNTP], Devito MJ [DNTP], Newbold RR [DNTP], Blain R [DNTP], Hartman P, Thayer KA [DNTP], Rooney AA [DNTP]. *Environ Int.* 2018 Jun;115:48-69.  
<https://www.ncbi.nlm.nih.gov/pubmed/29549716>

**Theme 1, Goal 4**

- **Disposition and metabolism of the bisphenol analogue, bisphenol S, in Harlan Sprague Dawley rats and B6C3F1/N mice and in vitro in hepatocytes from rats, mice, and humans.** Waidyanatha S [DNTP], Black SR, Snyder RW, Yueh YL, Sutherland V [DNTP], Patel PR, Watson SL, Fennell TR. *Toxicol Appl Pharmacol.* 2018. 351:32-45.  
<https://www.ncbi.nlm.nih.gov/pubmed/29753715>

**Theme 1, Goal 4**

#### DIR

- **Association of Body Mass Index and Age with Subsequent Breast Cancer Risk in Premenopausal Women.** Schoemaker MJ, HB Nichols, LB Wright, MN Brook, ME Jones, KM O'Brien [DIR], HO Adami, L Baglietto, L Bernstein, KA Bertrand, MC Boutron-Ruault, T Braaten, Y Chen, AE Connor, M Dorronsoro, L Dossus, AH Eliassen, GG Giles, SE Hankinson, R Kaaks, TJ Key, VA Kirsh, CM Kitahara, WP Koh, SC Larsson, MS Linet, H Ma, G Masala, MA Merritt, RL Milne, K Overvad, K Ozasa, JR Palmer, PH Peeters, E Riboli, TE Rohan, A Sadakane, M Sund, RM Tamimi, A Trichopoulou, G Ursin, L Vatten, K Visvanathan, E Weiderpass, WC Willett, A Wolk, JM Yuan, A Zeleniuch-Jacquotte, DP Sandler [DIR] and AJ Swerdlow. *JAMA Oncol* (2018)

<http://dx.doi.org/10.1001/jamaoncol.2018.1771>

**Theme 1, Goal 2; Theme 2, Goal 1; Theme 3, Goal 3**

- **EP300-Mediated Lysine 2-Hydroxyisobutyrylation Regulates Glycolysis.** Huang H, S Tang [DIR], M Ji [DIR], Z Tang, M Shimada, X Liu, S Qi, JW Locasale, RG Roeder, Y Zhao and X Li [DIR]. *Mol Cell* (2018) v. 70 (4).

<http://dx.doi.org/10.1016/j.molcel.2018.04.011>

**Theme 1, Goal 1**

- **Spectrally Resolved Fiber Photometry for Multi-Component Analysis of Brain Circuits.** Meng C [DIR], J Zhou [DIR], A Papaneri [DIR], T Peddada [DIR], K Xu [DIR] and G Cui [DIR]. *Neuron* (2018).

<http://dx.doi.org/10.1016/j.neuron.2018.04.012>

**Theme 1, Goal 1**

- **Different Neuronal Activity Patterns Induce Different Gene Expression Programs.** Tyssowski KM, NR DeStefino, JH Cho, CJ Dunn, RG Poston, CE Carty, RD Jones, SM Chang, P Romeo [DIR], MK Wurzelmann [DIR], JM Ward [DIR], ML Andermann, RN Saha, SM Dudek [DIR] and JM Gray. *Neuron* (2018).  
<https://doi.org/10.1016/j.neuron.2018.04.001>  
**Theme 1, Goal 1**
- **Structures of DNA-bound human ligase IV catalytic core reveal insights into substrate binding and catalysis.** Kaminski AM [DIR], PP Tumbale [DIR], MJ Schellenberg [DIR], RS Williams [DIR], JG Williams [DIR], TA Kunkel [DIR], LC Pedersen [DIR] and K Bebenek [DIR]. *Nat Commun* (2018) v. 9 (1).  
<http://dx.doi.org/10.1038/s41467-018-05024-8>  
**Theme 1, Goal 1**
- **Transitions in DNA polymerase beta  $\mu$ s-ms dynamics related to substrate binding and catalysis.** DeRose EF [DIR], TW Kirby [DIR], GA Mueller [DIR], WA Beard [DIR], SH Wilson [DIR] and RE London [DIR]. *Nucleic Acids Res* (2018).  
<http://dx.doi.org/10.1093/nar/gky503>  
**Theme 1, Goal 1**
- **Widespread enhancer activation via ERalpha mediates estrogen response in vivo during uterine development.** Jefferson WN [DIR], HK Kinyamu [DIR], T Wang [DIR], AX Miranda [DIR], E Padilla-Banks [DIR], AA Suen [DIR] and CJ Williams [DIR]. *Nucleic Acids Res* (2018).  
<http://dx.doi.org/10.1093/nar/gky260>  
**Theme 1, Goal 1**
- **Mechanism of APTX nicked DNA sensing and pleiotropic inactivation in neurodegenerative disease.** Tumbale P [DIR], MJ Schellenberg [DIR], GA Mueller [DIR], E Fairweather, M Watson, JN Little [DIR], J Krahn [DIR], I Waddell, RE London [DIR] and RS Williams [DIR]. *EMBO J* (2018).  
<http://dx.doi.org/10.15252/embj.201798875>  
**Theme 1, Goals 1, 2**
- **Epigenome-Wide Tumor DNA Methylation Profiling Identifies Novel Prognostic Biomarkers of Metastatic-Lethal Progression in Men Diagnosed with Clinically Localized Prostate Cancer.** Zhao SS [DIR], MS Geybels, A Leonardson, R Rubicz, S Kolb, QX Yan, B Klotzle, M Bibikova, A Hurtado-Coll, D Troyer, R Lance, DW Lin, JL Wright, EA Ostrander, JB Fan, ZD Feng and JL Stanford. *Clin Cancer Res* (2017) v. 23 (1).  
<http://dx.doi.org/10.1158/1078-0432.Ccr-16-0549>  
**Theme 1, Goals 1, 2**

- **Mitochondrial nicotinamide adenine dinucleotide reduced (NADH) oxidation links the tricarboxylic acid (TCA) cycle with methionine metabolism and nuclear DNA methylation.** Lozoya OA [DIR], I Martinez-Reyes, T Wang [DIR], D Grenet [DIR], P Bushel [DIR], J Li [DIR], N Chandel, RP Woychik [DIR] and JH Santos [DIR]. *PLoS Biol* (2018) v. 16 (4): e2005707.

<https://doi.org/10.1371/journal.pbio.2005707>

**Theme 1, Goal 1**

- **DNA methylation and transcriptome aberrations mediated by ERalpha in mouse seminal vesicles following developmental DES exposure.** Li Y [DIR], KJ Hamilton [DIR], T Wang [DIR], LA Coons [DIR], WN Jefferson [DIR], R Li [DIR], Y Wang [NTP], SA Grimm, JT Ramsey [DIR], L Liu [DIR], KE Gerrish [DIR], CJ Williams [DIR], PA Wade [DIR] and KS Korach [DIR]. *Proc Natl Acad Sci* (2018).

<https://doi.org/10.1073/pnas.1719010115>

**Theme 1, Goal 1**

- **Exposures Related to House Dust Microbiota in a U.S. Farming Population.** Lee MK [DIR], MU Carnes [DIR], N Butz, MA Azcarate-Peril, M Richards, DM Umbach [DIR], PS Thorne, LE Beane Freeman, SD Peddada [DIR] and SJ London [DIR]. *Environ Health Perspect* (2018) v. 126 (6).

<http://dx.doi.org/10.1289/ehp3145>

**Theme 1, Goals 1, 2**

- **Identification of Smoking-Associated Differentially Methylated Regions Using Reduced Representation Bisulfite Sequencing and Cell Type-Specific Enhancer Activation and Gene Expression.** Wan M [DIR], BD Bennett [DIR], GS Pittman [DIR], MR Campbell [DIR], LM Reynolds, DK Porter [DIR], CL Crawl [DIR], X Wang [DIR], D Su [DIR], NA Englert [DIR], IJ Thompson [DIR], Y Liu and DA Bell [DIR]. *Environ Health Perspect* (2018) v. 126 (4).

<http://dx.doi.org/10.1289/ehp2395>

**Theme 1, Goals 1, 2**

## **DETR**

- **Geographic Variability in Liver Disease-Related Mortality Rates in the United States.** Desai AP, P Mohan, AM Roubal, R Bettencourt and R Loomba. *American Journal of Medicine* (2018) v. 131 (7): pp. 728-734.

<http://dx.doi.org/10.1016/j.amjmed.2018.01.047>

**Theme 2, Goal 5**

- **Communicating environmental exposure results and health information in a community-based participatory research study.** Claudio L, J Gilmore, M Roy and B Brenner. *BMC Public Health* (2018) v. 18.  
<http://dx.doi.org/10.1186/s12889-018-5721-1>  
**Theme 2, Goal 2**
- **Endocrine disruption and differential gene expression in sentinel fish on St. Lawrence Island, Alaska: Health implications for indigenous residents.** von Hippel FA, PK Miller, DO Carpenter, D Dillon, L Smayda, I Katsiadaki, TA Titus, P Batzel, JH Postlethwait and CL Buck. *Environ Pollut* (2018) v. 234 pp. 279-287.  
<http://dx.doi.org/10.1016/j.envpol.2017.11.054>  
**Theme 1, Goal 4; Theme 2, Goal 4**
- **Exposure to perfluoroalkyl substances and associations with serum thyroid hormones in a remote population of Alaska Natives.** Byrne SC, Miller P, Seguinot-Medina S, Waghiyi V, Buck CL, von Hippel FA, Carpenter DO. *Environ Res.* 2018 Jun 26;166:537-543.  
<https://www.ncbi.nlm.nih.gov/pubmed/29958161>  
**Theme 1, Goal 4, Theme 2, Goal 4**
- **Childhood perfluoroalkyl substance exposure and executive function in children at 8 years.** Vuong AM, K Yolton, Z Wang, C Xie, GM Webster, X Ye, AM Calafat, JM Braun, KN Dietrich, BP Lanphear and A Chen. *Environ Int* (2018) v. 119 pp. 212-219.  
<http://dx.doi.org/10.1016/j.envint.2018.06.028>  
**Theme 1, Goals 2, 4; Theme 2, Goal 4**
- **Association of exposure to diethylstilbestrol during pregnancy with multigenerational neurodevelopmental deficits.** Kioumourtzoglou MA, BA Coull, EJ O'Reilly, A Ascherio and MG Weisskopf. *JAMA Pediatrics* (2018) v. 172 (7): pp. 670-677.  
<http://dx.doi.org/10.1001/jamapediatrics.2018.0727>  
**Theme 1, Goals 2, 4**
- **Dynamical features in fetal and postnatal zinc-copper metabolic cycles predict the emergence of autism spectrum disorder.** Curtin P, Austin C, Curtin A, Gennings C, Arora M; (for the Emergent Dynamical Systems Group), Tammimies K, Willfors C, Berggren S, Siper P, Rai D, Meyering K, Kolevzon A, Mollon J, David AS, Lewis G, Zammit S, Heilbrun L, Palmer RF, Wright RO, Bölte S, Reichenberg A. *Sci Adv.* 2018 May 30;4(5).  
<https://www.ncbi.nlm.nih.gov/pubmed/29854952>  
**Theme 1, Goals 1, 6**

- ***HiCompare: an R-package for joint normalization and comparison of HI-C datasets.*** Stansfield JC, Cresswell KG, Vladimirov VI, Dozmorov MG. *BMC Bioinformatics*. 2018 Jul 31;19(1):279.  
<https://www.ncbi.nlm.nih.gov/pubmed/30064362>  
**Theme 1, Goal 7**
- ***Oxybenzone Alters Mammary Gland Morphology in Mice Exposed During Pregnancy and Lactation.*** LaPlante CD, Bansal R, Dunphy KA, Jerry DJ, Vandenberg LN. *J Endocr Soc*. 2018 May 22;2(8):903-921.  
<https://www.ncbi.nlm.nih.gov/pubmed/30057971>  
**Theme 1, Goal 2**
- ***Associations of unconventional natural gas development with depression symptoms and disordered sleep in Pennsylvania.*** Casey JA, Wilcox HC, Hirsch AG, Pollak J, Schwartz BS. *Sci Rep*. 2018 Jul 27;8(1):11375.  
<https://www.ncbi.nlm.nih.gov/pubmed/30054553>  
**Theme 2, Goals 4, 5**

## NIEHS News and Highlights

### ***Engagement and Support for the National Academies of Sciences, Engineering, and Medicine (NASEM)***

**A Long and Strong History.** The National Academy of Sciences (NAS) was created in 1863 by Executive Order of President Abraham Lincoln. In the Congressional Charter he stated, “...The Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science....” NIEHS has been one of those federal agencies to call on the NAS to fulfill this mission. But since our founding, the NIEHS has also been called on *by* the National Academies to provide scientific expertise on a broad range of topics in the national interest. Just as the field of environmental health sciences has evolved, so too has the National Academies and our Institute’s relationship with them. A recently launched Environmental Health Matter Initiative seeks to continue this evolution in innovative and exciting ways, so it seems an appropriate time to reflect on where we’ve been to inform where we’re going and how we’ll get there.

The National Research Council was established (under the NAS) in 1916, followed by the National Academy of Engineering in 1964, and the Institutes of Medicine (IOM) in 1970. In 2016, the IOM was renamed the Health and Medicine Division of the newly aggregated National Academies of Science, Engineering, and Medicine (NASEM). The National Academies receive no congressional appropriations but Congress may call on the National Academies by directing federal agencies to request studies. Approximately 70 percent of the funding for the work of the National Academies comes from government. The balance is provided by foundations, other organizations, and through generous gifts from individuals.

The National Academy of Sciences has approximately 2,290 members and 475 foreign associates, each of whom is affiliated with one of 31 disciplinary sections. The National Academy of Medicine has more than 1,800 members and foreign associates. The National Academy of Engineering has more than 2,000 peer-elected members and foreign associates. More than 300 Academy members are Nobel laureates. Each year more than 7,000 experts, including Academy members, serve as volunteers on hundreds of study committees that examine some of society's most pressing issues. The results of their efforts frequently form the basis of public policies for decades to come.

Among NIEHS Directors, three of five have been fellows of the Institute of Medicine:

- David P. Rall – elected to IOM in 1979
- Kenneth Olden – elected to IOM in 1994
- Linda Birnbaum – elected to IOM in 2010

Paul Kotin, the NIEHS's first director, served on a wide range of NAS committees including an oversight committee for the Department of Energy's management of the U.S. nuclear stockpile from 1988 to 1990 (post-retirement)

NASEM is structured into 7 divisions under which there are numerous Boards, Committees, Roundtables, Forums, and other groups. The types of work they do include:

*Consensus Studies and Reviews*

- Produce authoritative reports that provide independent, objective, and nonpartisan scientific and technical advice to inform complex policy problems

*Convening Activities*

- By convening symposia, workshops, meetings, and roundtables, they connect professionals from different sectors and stimulate dialogue on diverse matters

*Communications and Outreach*

- A wide range of communications activities, products, and events are used to convey the messages and disseminate the work

In addition, NASEM conducts the **Gulf Research Program (GULF)**. This effort was begun after the Deepwater Horizon oil spill, and is atypical for a NASEM effort in that it funds grants, fellowships, and other activities including:

- Healthy Ecosystems Initiative.
- Thriving Communities Initiative
- Safer Offshore Energy Systems Initiative
- Capacity Building Initiative

**Building the Knowledge Base.** NIEHS has provided approximately \$14M in funding since 1998-- not counting staff time. Innumerable institute and grantee scientists and staff have participated as experts on a wide range of highly influential activities and reports. These are just a very few of the many examples.

- 1977: Drinking Water and Health
- 1977: Effects of a Polluted Environment: Research and Development Needs
- 1981: IOM Committee for an Ongoing Study of Costs of Environment-Related Health Effects
- 1993: Pesticides in the Diets of Infants and Children

- 1994: Science and Judgment in Risk Assessment
- 1999: Arsenic in Drinking Water
- 2003: Implications of Dioxin in the Food Supply
- 2003: Collaborative Opportunities to Address Clinical Research Workforce Needs for 2010: A Focus on Women and Diversity (result of 1999 NIEHS co-led workshop)
- 2005: Public Health Risks of Disasters
- 2007: Ocean Science Series: Coastal Hazards
- 2008: Committee on the Health Risks of Phthalates
- 2011: Committee on Health Impact Assessment
- 2011: Committee on Ocean Infrastructure
- 2011: Stem Cell Models for Environmental Health
- 2012: Analysis of Cancer Risks in Populations near Nuclear Facilities
- 2014: The National Children's Study 2014: An Assessment
- 2015: Modeling the Health Risks of Climate Change

NIEHS researchers and staff continue to engage regularly on a variety of boards, committees, consensus studies, and review groups. Below are some examples:

- Board on Research Data and Information – Stephanie Holmgren, Acting Director, Office of Data Science
- Institute for Laboratory Animal Research and Journal
  - David Kurtz, Quality Assurance Laboratory
  - Brian Berridge, Associate Director, NTP
- GuLF Research Program – Dale Sandler, Chief, Epidemiology Branch
- Dose Reconstruction Program, Defense Threat Reduction Agency – Clare Weinberg, Chief, Biostatistics & Computational Biology Branch
- Review of the Styrene Assessment in the NTP 12<sup>th</sup> RoC, John Bucher, Senior Scientist, NTP
- Review of the Formaldehyde Assessment in the NTP 12<sup>th</sup> RoC, John Bucher, Senior Scientist, NTP
- Committee to Develop a Scoping Plan to Assess the Hazards of Organohalogen Flame Retardants – John Bucher, Senior Scientist, NTP
- Microbiomes of the Built Environment: A Research Agenda for Microbiology, Human Health, and Buildings – Lisa Chadwick, Program Officer, DERT

**Leadership on Environmental Health Sciences.** NIEHS not only engages but also provides significant leadership to a number of major NASEM activities in the area of environmental health.

Two current activities fall under the Board on Health Sciences Policy and grew out of work of the NRC's Disasters Roundtable and Roundtable on Environmental Health Sciences, Research, and Medicine. These activities dovetail with the work of the Disaster Research Response (DR2) Program, led by NIEHS Senior Medical Advisor, Aubrey Miller, with the Worker Education and Training Program, led by Chip Hughes, and with other NIEHS programs.

- The **Standing Committee on Medical and Public Health Research During Large-Scale Emergency Events** is funded by NIH ICs (NIEHS, NLM, NIAID, NCI, OBSSR, NICHD), as well as the HHS Office of the Assistant Secretary for Preparedness and Response, the National Science

Foundation, and the US Geological Survey. The National Library of Medicine (NLM) helps to lead this activity, the goals of which are to:

- Coordinate with units across NASEM to provide a venue for discussion of issues related to short- and long-term strategic planning and how best to perform medical and public health disaster science research activities during a significant event or disaster
  - Provide a venue for a dialog between the federal, state, and local governments, the private sector, academic community, other research funders, as well as other relevant stakeholders involved in emergency preparedness and emergency response services. It will include experts in state and local public health, epidemiology, environmental health, first responders, emergency medicine, infectious diseases, nursing, emergency management, bioethics, medical countermeasures, state and local government, operations research, mental health, emergency medical services, bio-surveillance, and risk communication
  - Be involved in the planning, development, and oversight of related fast-track ad hoc activities undertaken by separately appointed committees operating under its auspices that will be able to help prioritize scientific research needs during a public health event or in the immediate aftermath of a disaster.
- **The Forum on Medical and Public Health Preparedness for Disasters and Emergencies** convenes public and private sector leaders to improve the nation's preparedness for, response to and recovery from disasters, public health emergencies and emerging threats. The Forum is funded by NIH ICs (NIEHS, NIAID, NLM) and numerous HHS Agencies, NGOs, and State agencies. The Forum fosters discussion to identify barriers and explore solutions to ensure and sustain national security, recovery capacity, and resilience. In August 2017, the Forum convened a workshop titled, Strengthening the Disaster Resilience of the Academic Biomedical Research Community: Protecting the Nation's Investment to examine the effects of Superstorm Sandy and to develop recommendations and guidance to enhance the disaster resilience of the academic biomedical research community. The resulting report outlines the Forum's vision of a resilient academic biomedical research community and how this vision can be achieved, with a focus on the potential actions academic research institutions, individual researchers, and research sponsors can take.
  - **The Roundtable on Environmental Health Sciences, Research, and Medicine** was the brainchild of Sam Wilson, M.D., former Deputy Director and Acting Director of the NIEHS, and current head of the DNA Repair and Nucleic Acid Enzymology Group. The Roundtable was established in 1998 to provide a mechanism for parties interested in environmental health from the academic, industrial, and federal research perspectives to meet and discuss sensitive and difficult environmental health issues of mutual interest in a neutral setting. The Roundtable is located under the Board on Population Health and Public Health Practice within the Health and Medicine Division (formerly IOM) of NASEM. NIEHS provided major funding for this activity through 2018, along with other sponsors such as the Environmental Protection Agency, National Oceanic and Atmospheric Administration, ExxonMobil Foundation, Kresge Foundation, Royal Dutch Shell, United States Geological Survey (DOI), and the Colgate-Palmolive Company. During this period, the Roundtable convened 69 workshops and meetings on topics such as:

- Protecting the Health and Well-being of Communities in a Changing Climate
- The Interplay Between Environmental Chemical Exposures and Obesity (held at NIEHS)
- Principles and Obstacles for Sharing Data from Environmental Health Research
- Environmental Public Health Impacts of Disasters: Hurricane Katrina
- Bringing Public Health into Urban Revitalization
- Understanding the Connections Between Coastal Waters and Ocean Ecosystem Services and Human Health
- The Nexus of Biofuels, Climate Change, and Human Health
- Health Impact Assessment of Shale Gas Extraction
- Global Environmental Health in the 21st Century: From Governmental Regulation to Corporate Social Responsibility

A substantial portion of NIEHS's financial support for the Academies has taken place under the umbrella of the Board on Environmental Studies and Toxicology (BEST). This board was formed under the Division on Earth and Life Studies in February 1986 from the merger of the Board on Toxicology and Environmental Health Hazards (est. 1977) and the Environmental Studies Board (est. 1967). The mission of BEST is to "provide our nation with independent, objective advice and dialog on matters related to the impacts of human activities and environmental exposures on environmental quality and human health."

- The **Committee on Human and Environmental Exposure Science in the 21st Century**, which was co-chaired by NIEHS and EPA, worked to develop a conceptual framework for exposure science and a vision for advancing exposure science in the 21st century. The committee's report, *Exposure Science in the 21<sup>st</sup> Century*, was published in 2012 and describes scientific and technologic advances needed to support the vision and concludes with a discussion of the elements needed to realize it, including research and tool development, transagency coordination, education, and engagement of a broader stakeholder community.
- The **Standing Committee on Emerging Science for Environmental Health Decisions** began as the Committee on Emerging Issues and Data on Environmental Contaminants with a focus on Toxicogenomics (2002-2007). During that time NIEHS commissioned the report: *Applications of Toxicogenomic Technologies to Predictive Toxicology and Risk Assessment*. As the field of toxicogenomics became mainstream technology, the Committee evolved in 2009 to its current iteration with a mission to examine and discuss issues on the use of new science, tools, and research methodologies for environmental health decisions. Workshops convened by the ESEHD committee provide a public venue for communication among government, industry, environmental groups, and the academic community about scientific discoveries and advances in methods and approaches that can be used in the identification, quantification, and control of environmental impacts on human health. The Committee is co-organized by BEST and the Board on Life Sciences within NASEM, and NIEHS remains the sole sponsor. The Committee is made up of representatives from academia, private industry, NGOs, foundations, and other professional groups, and consultation is provided by a government liaison group from agencies such as EPA, CDC, FDA, Army Corps, CPSC, NIST, and others. NIEHS government liaisons include NIEHS Director Linda Birnbaum, Ph.D.; Senior Public Health Advisor John Balbus, M.D., M.P.H.;

Health Science Policy Analyst Kimberly Thigpen Tart, J.D., M.P.H.; and Director, Exposure, Response, and Technology Branch (DERT) David Balshaw, Ph.D. (past). Selected past workshops include:

- Informing Environmental Health Decisions through Data Integration (2018)
- The Promise of Genome Editing Tools to Advance Environmental Health Research (2018)
- Personal Environmental Exposure Measurements (2017)
- Microbiome I (2011) and II (2016)
- Metabolomics as a Tool for Characterizing the Exposome (2016)
- Modeling the Health Risks of Climate Change (2015)
- The Exposome (2010)
- Epigenetics (2009)

Upcoming workshops (all to be held in Washington, DC) include:

- Environmental Pollution and Infectious Disease (Jan 2019)
- Single Cell and Single Molecule Analysis Tools (Feb 2019)
- AI and Machine Learning in EHS (June 2019)

**Supporting Innovation at the National Academies.** The complexity of making decisions on matters involving the impact of the environment on human health is becoming increasingly apparent—from transportation planning to environmental remediation to use of chemicals. At the same time, our scientific ability to address such complex issues is improving. But taking advantage of the scientific advances will require bringing together both multiple disciplines (to further the science) and multiple sectors (to bring knowledge to action) to work across traditional boundaries. To date, there is no institution focused on coordinating such cross-sector and multidisciplinary work. The NIEHS has been working to support NASEM in establishing the **Environmental Health Matters initiative** to catalyze such work and to provide leadership on the big challenges in environmental health. A brief timeline of NIEHS efforts follows:

- 2015: NIEHS staff begin work on concepting a new trans-Academies activity, impetus:
  - Improve participation of key stakeholders
  - Create capacity for consensus committees to act *rapidly*
  - Improve communication and coordination ACROSS academies on grand challenges type problems
- 2016: Environmental Health Work at the National Academies Meeting – selected leaders in EHS incl. co-chairs of Roundtable and ESEHD, NASEM senior staff
  - Identify environmental health community’s leadership needs from the National Academies.
  - Elaborate on environmental health community’s needs for National Academies work across disciplines, sectors and policy spheres.
  - Identify potential options available for the National Academies to meet the articulated needs.
  - Prioritize options and consider options for moving forward

- February 2017 Planning Meeting (similar representation); July 2017: *The Potential Value of an Environmental Health Initiative at The National Academies of Sciences, Engineering, and Medicine: A Summary of Discussions and Ideas* published
- September 2017 – NIEHS funds contract for initial scoping/communications needs, est. Advisory Committee
- December 2017: *Environmental Health Matters: A New Initiative of the National Academies* concept paper published, each of the three Academy presidents commits initial funding (250K) to the initiative
- July 2018: A public meeting, Moving Forward Together: A Public Session of the Environmental Health Matters Initiative explored some of the ways that EHMI can work with a range of stakeholders from various sectors—government, industry, research, foundations, NGOs, and others—to improve environmental health. Speaker presentations shed light on what each sector hopes can be achieved by the initiative, as well as highlighting potential contributions by different groups. This multisector discussion sought to drive progress and identify opportunities for collaboration as the new initiative moves forward.

By combining the forces of all seven program divisions (Health and Medicine, Earth and Life Studies, Transportation Research Board, Behavioral and Social Sciences and Education, Engineering and Physical Sciences, Gulf Research Program, and Policy and Global Affairs). the initiative and associated committee will serve as a focal point for dialog on complex issues that require input from leaders of multiple disciplines and sectors; identify priority topics for and guide the development of ad hoc studies and workshops requiring expertise from multiple disciplines and sectors; serve as a nimble resource for scientific input, including facilitating rapid response activities; facilitate consideration of environmental health in activities involving environmental tradeoffs and sustainability; and develop outreach strategies to engage. For each topic explored by the EHMI, the Committee will create a so-called “Opportunity Landscape” that will describe issues such as:

- What are the scientific questions?
- What interventions are in place now, and where is more needed?
- Where are the opportunities for innovation?
- What are the barriers?
- Who can lead us towards solutions?

The (EHMI) is seeking nominations for full committee members. Nominations can be made by anyone at <http://nas-sites.org/envirohealthmatters/>.

## ***Staff Updates***

### **New Tenure Track Investigators**

- Anne Marie Jukic, Ph.D., has started as a Tenure Track Investigator in the Epidemiology Branch.

- Joseph Rodriguez, Ph.D., has started as a Tenure Track Investigator in the Epigenetic and Stem Cell Biology Laboratory and was selected as a member of the NIH Distinguished Scholars Program.
- Alexandra White, Ph.D., has received DDIR and HR approval to start as a Stadtman Tenure Track investigator in the Epidemiology Branch in January 2019.
- Marcos Morgan, Ph.D., has received DDIR and HR approval to start as a Stadtman Tenure Track investigator in the Reproductive & Developmental Biology Branch in February 2019.

### **Notable Promotions**

- J'Ingrid Mathis was appointed as Chief of the Administrative & Research Services Branch (ARSB) serving DIR and DNTP.
- Core Director appointments have been awarded to:
  - Mario Borgnia, Ph.D. (Molecular Microscopy Consortium)
  - Negin Martin, Ph.D. (Viral Vector)
  - Kevin Gerrish, Ph.D. (Molecular Genomics)
- Min Shi, Ph.D. and Keith Shockley, Ph.D. are now Principal Statisticians with service to DIR and DNTP, respectively.

## **Meetings and Events**

### ***Past Events***

The third annual **NIEHS Global Environmental Health (GEH) Day** took place on June 6 and highlighted research and projects from around the world that translate research into action. Christine McEntee, executive director of the American Geophysical Union (AGU), delivered the keynote address. Panel discussions featured global environmental health fieldwork and efforts to convert research findings into improvements in public health. Organizers rounded out the agenda with a poster session describing new research findings, a roundtable discussion, and networking time. **Theme 3, Goals 3, 4**

Bill Suk and Heather Henry participated in the **Central and Eastern European Conference on Health and the Environment** at the University of Agriculture in Krakow, Poland June 10-14. Dr. Henry, along with colleagues from US EPA, University of Hasselt (Belgium), and University of Arizona, organized a one-day workshop on June 10. This provided in-depth classroom training in human health risk assessment and remediation techniques. Dr. Suk delivered the plenary address on June 11, Advancing Science in Rapidly Changing Environments. Later, Dr. Henry presented Innovation in Coastal and Aquifer Remediation and Monitoring, in a breakout session. Trainees from the US and Central and Eastern European countries organized several networking events. The meeting was successful in meeting its goals to foster collaborative and interdisciplinary work on protecting human and environmental health, and to provide solutions to improve environmental health. The

meeting was partially funded by an NIEHS R13 Grant. **Theme 2 Goals 3, 5; Theme 3, Goal 4**

The **12th annual CounterACT symposium** was held in Westminster, CO, on June 13-15. The symposium was organized by Dr. Carl White's U54 center of Excellence. All CounterACT grantees gave their research update presentations. Sri Nadadur, Program Director for Pulmonary Threat agents of the CounterACT program chaired multiple sessions where pulmonary research program updates by ES grantees was shared. Dr. Nadadur and Dr. White developed and Co-chaired a panel discussion session titled, *Early endgame considerations to foster success in CounterACT*. This session included panelists from FDA, BARDA, Pharma and academia that discussed on challenges in intellectual property and repurposing of drugs for Countermeasures development. **Theme 2, Goal 5; Theme 3, Goal 3**

The NTP hosted a satellite symposium entitled "Pathology Potpourri" at the **Society of Toxicologic Pathology 37<sup>th</sup> Annual Symposium** held in Indianapolis, IN on June 16-21. The objective of the symposium was to provide continuing education on interpreting pathology slides. In addition, NTP staff members were part of the annual symposium's planning committee. The aim of the 2018 symposium was to provide attendees with a broad exposure to the various types of toxicologic injury to the kidney, emerging translational and biomarker science and human relevance. **Theme 1, Goal 1; Theme 2, Goals 1, 6**

NIEHS was a gold sponsor of the **Teratology Society 2018 Annual Meeting** in Clearwater, FL June 23-27. The program included education courses, workshops, cutting-edge scientific symposia and special lectures. Nicole Kleinstreuer, Deputy Director of NICEATM, delivered the Teratology Society and European Teratology Society Exchange lecture with Manon Beekhuijzen, Charles River Laboratory in 's-Hertogenbosch, Netherlands. NIEHS staff chaired symposia on the Epigenetic Effects of Environmental Exposures during Pregnancy and Evaluating the Developmental Reproductive Effects of Botanical Supplements. **Theme 1, Goals 2, 4; Theme 3, Goal 3**

DETR and NTP colleagues attended the **NIDDK-NIEHS Chronic Kidney Diseases in Agricultural Communities workshop** in Bethesda, MD on June 25-26. Bill Suk and Brittany Trottier were a part of the organizing committee for the workshop. Gwen Collman provided opening remarks on behalf of the NIEHS following opening remarks by Robert Star, director of NIDDK Division of Kidney, Urologic, and Hematologic Diseases. Bonnie Joubert was on the organizing committee with NIDDK colleagues. The workshop featured presentations from scientists working in and outside the field of chronic kidney diseases. A major focus, on environmental factors potentially contributing to the epidemic, was discussed as well as in-depth discussions of pathology and etiologic challenges. NIEHS grantees with key talks in the meeting included Drs. Robert Wright, *"outsider perspective; overview of environmental epidemiology and design considerations"*; Ana Navas-Acien, *metals and kidney outcomes in the strong heart study, more in-depth information about metals and*

*biological specimen collection, storage, and analysis; Madeleine Scammel, gaining trust in communities of agricultural workers, beginning an epidemiology field study, preliminary work on her ONES award; and Dianne Rohlman, gaining trust in communities, featured work in Egypt. Theme 2, Goals 2, 4, 5*

Linda Birnbaum, Claudia Thompson, Symma Finn, Liam O'Fallon, and Joan Packerham attended the **3rd Tribal Environmental Summit** in Corvallis, OR on June 25-26. The meeting highlighted Tribal-based research in the Pacific Northwest, Southwestern states, the Arctic and in Western states. Dr. Birnbaum gave a concluding plenary talk, summing up the research presented and her impressions of the primary themes of the meeting. Liam O'Fallon served on a panel discussing research and career opportunities for students and researchers and Symma Finn presented on ways to advance Tribal scientific capacity. The meeting included a poster session with a number of NIEHS grantee projects represented. The meeting, similar to the previous Summits, had a strong focus on young investigators from Tribal communities and several gave talks on behalf of their research teams. **Theme 2, Goals 2, 4, 6; Theme 3, Goal 3**

NIEHS staff and grantees served on various committees and co-chaired various sessions at the **Society for the Study of Reproduction Annual Meeting** held in New Orleans, LA on July 10-13. The meeting's theme was "Pathways to Discovery: Signals for Reproduction, Development, and Longevity." Dr. Kenneth Korach delivered a Presidential Symposium lecture entitled "Nuclear Receptor Signaling in Reproduction and Development." Dr. Humphrey Yao offered his expertise at the Career Consultation Center. **Theme 1, Goals 1, 2; Theme 3, Goal 1**

NIEHS staff engaged with grantees and opened new lines of communication at the **annual Environmental Health Sciences Core Centers** meeting July 16-18 in Davis, California. The NIEHS Core Centers Program funds scientific equipment, facilities, and other resources at research institutions, to be shared among the center's environmental health scientists. The meeting took this collaboration one step further, by providing a forum for researchers from all 20 centers to exchange ideas and leverage resources. Sessions connected epidemiology, toxicology, exposure science, and community engagement to improvements in environmental health. Following the meeting, a community tour and workshop was held. The UCD core center's Community Stakeholder Advisory Committee helped plan a road trip to Stockton and Fresno that offered vivid illustrations of complex environmental health concerns and responses by community organizations. **Theme 2, Goals 2, 4, 6; Theme 3, Goal 3**

The **Workshop on Developing a Data Science Competent EHS Workforce** was held at NIEHS on August 14-15. The workshop brought together experts from relevant research disciplines to examine existing data science and environmental health science (EHS) resources (trainee pipelines, mentors, research), identified how these resources can address EHS-specific training goals in data science, and made recommendations for NIEHS

in data science training. The workshop was organized into three major sessions. The first session was designed to understand the current state of data science in the EHS domain as it relates to training, and through the evaluation of representative scientific 'use cases' (nominated by The Division of Extramural Research and Training (DERT) program branches), current limitations for data science training in EHS were identified. The second session examined existing training resources relevant to the intersection of EHS and data science and related EHS training goals to the accomplishments of BD2K. The final session formulated how to build EHS training in data science and was a discussion with participant input into questions formulated before the workshop and during the planning. **Theme 1, Goal 7; Theme 2, Goal 1; Theme 3, Goal 5**

The theme of the **ISES-ISEE Joint Annual Meeting** held in Ottawa, Canada on August 26-30 was "Addressing Complex Local and Global issues in Environmental Exposure and Health." NIEHS provided grant funding for the meeting. NIEHS staff also chaired sessions and presented their research. The meeting included delegates from around the world and aimed to leverage local and international expertise to address complex issues such as environmental health and exposure methodologies, environmental exposure issues, environmental health issues, and knowledge translation. **Theme 1, Goal 5; Theme 2, Goal 2; Theme 3, Goal 3**

### *Upcoming Events*

- **Children's Environmental Health Symposium**, Dallas TX, September 13-14
- **Environmental Health in Africa: Opportunities to Expand Research Capacity in the H3Africa Consortium**, Kigali Rwanda, September 16
- **Twelfth Meeting of the H3Africa Consortium**, Kigali Rwanda, September 17-21
- **The Monocyte Activation Test for Pyrogen Testing of Medical Devices**, Bethesda MD, September 18-19
- **Environmental Mutagenesis and Genomics Society 49<sup>th</sup> Annual Meeting**, San Antonio TX, September 22-26
- **NIEHS Inflammation Faculty Workshop: Circulating Cell Free DNA: Applications in the Clinical and Toxicology Setting**, NIEHS, September 24-25
- **Triangle Global Health Consortium Annual Meeting – Looking Toward the Future: Innovation for Global Health Impact**, Raleigh NC, September 27
- **3<sup>rd</sup> Annual US DOHaD Society Meeting**, Chapel Hill NC, October 1-2
- **Implementing non-animal approaches to human and veterinary vaccine testing: Achieving scientific and regulatory success for rabies and beyond**, Bethesda MD, October 16-17
- **Artificial Intelligence in Environmental Health Science and Decision Making**, RTP NC, October 18-19
- **Fall 2018 WTP Awardee Meeting and Workshop**, RTP, October 24-25
- **NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers Annual Meeting**, Durham NC, October 23-25

- **Water and Health Conference**, Chapel Hill NC, October 29-November 2
- **NIEHS Science Days**, NIEHS, November 1-2
- **American College of Toxicology Annual Meeting**, West Palm Beach FL, November 4-7
- **Environment and Breast Cancer Transforming Data into Action Community Forum**, Washington DC, November 8
- **Breast Cancer and the Environment Research Program (BCERP) Annual Meeting**, Washington DC, November 8-9
- **APHA Annual Meeting and Expo – Creating the Healthiest Nation: Health Equity Now**, San Diego, November 10-14
- **Falk Lecture**, NIEHS, November 13
- **SOT Contemporary Concepts in Toxicology Conference: Future Tox IV Predictive Developmental and Reproductive Toxicology for Health Children**, Washington DC, November 14-16
- **SRP Annual Meeting**, Sacramento CA, November 28-30
- **AGU Fall Meeting**, Washington DC, December 10-14
- **Partnerships for Environmental Public Health Annual Meeting**, NIEHS, December 13-14
- **Triangle Consortium for Reproductive Biology (TCRB) meeting**, NIEHS, February 9
- **DR2 Arizona Exercise**, Tucson AZ, February 28-March 1

## Awards and Recognition

### *NIEHS*

- The Environmental Factor took home first place in the e-newsletter category at this year's **Blue Pencil and Gold Screen Awards** presented by the National Association of Government Communicators (NACG). The winners were announced June 20 in Ft. Myers, Florida at the association's annual meeting.
- The U.S. Environmental Protection Agency (EPA) annually recognizes outstanding scientific work of its employees with the Scientific Technological Achievement Awards (STAA). An EPA collaboration with NICEATM, "Using Novel Zebrafish Toxicity Assays to Evaluate a Predictive Model of Development Vascular Toxicity," has received a Level III STAA, for projects accomplishing an unusually notable research or technological effort.
- On May 23, the Society for the Study of Reproduction (SSR) announced the election of **Francesco DeMayo, Ph.D.**, head of the NIEHS Reproductive and Developmental Biology Laboratory (RDBL), as vice president-elect. DeMayo will begin a four-year rotation through leadership positions at the SSR annual meeting July 10-13 in New Orleans. After one year as vice president-elect, DeMayo will serve a year as vice president, then president, then past president of the society.
- **NIH Postbac Poster Day** Seven NIEHS-affiliated postbaccalaureate fellows received outstanding poster honors May 2 at the 2018 National Institutes of Health (NIH)

Postbac Poster Day. This year, 772 posters were presented by postbacs from all 27 NIH institutes and centers. Slightly more than 20 percent of them were judged to be outstanding. With a full one-third of NIEHS participants winning awards, institute postbacs clearly performed above average.

- **Verda Agan**, from the University of North Carolina at Chapel Hill (UNC), presented “The Interplay of AR and COUP-TFII in Epithelial Fate Decisions of the Male Reproductive Tract in Mice.” Fei Zhao, Ph.D., Agan’s mentor in the Reproductive Developmental Biology Group.
- **Glaire Delancy**, from North Carolina Central University, presented “Examining Glucocorticoid Receptor Transcriptional Activity in Human Derived Fibroblasts.” Kinyamu, Delancy’s mentor in the Epigenetics and Stem Cell Biology Laboratory
- **Brian Elgart**, from East Carolina University, presented “Plasma Circulating Cell-free DNA Purification for Clinical and Toxicology Studies.” Kevin Gerrish, Ph.D., Elgart’s mentor and director of the Molecular Genomics Core Laboratory
- **Kevin Goslen**, from Appalachian State University (ASU), presented “Characterization of the Essential Las1 HEPN Nuclease in Ribosomal RNA Processing.” Robin Stanley, Ph.D., who heads the Nucleolar Integrity Group
- **Adam Miranda**, from North Carolina State University (NCSU), presented “Neonatal DES Exposure Induces Peptidyl Arginine Deiminase (Padi) Genes through an ER-alpha-Dependent Enhancer.” Wendy Jefferson, Ph.D., who supervised Miranda in the Reproductive and Developmental Biology Laboratory.
- **J. Tyler Ramsey**, from ASU, presented “Steroid Receptor Hormonal Actions of Lavender and Tea Tree Oil Components.” Kenneth Korach, Ph.D., Ramsey’s supervisor in the Reproductive and Developmental Biology Laboratory
- **Andrew Trexler**, from UNC, presented “2,4,6-Tribromophenol Decreases P-Glycoprotein and BCRP Function in Rat Brain Microvessels.” Cannon, Trexler’s mentor in the NCI Toxicokinetics and Toxicology Laboratory
- **NIA-NIEHS Joint Fellowship Program** The first round of this new program has concluded with three proposals awarded based on scientific merit, innovation, and their ability to foster relevant interactions between the two ICs. These investigators will co-mentor a postdoctoral fellow for 2 years, with frequent travel between the RTP and Baltimore campuses to enhance interactions.
  - **Isabel Beerman, Ph.D., NIA and Douglas A. Bell, Ph.D., NIEHS** “Tobacco Smoke Exposure Driving Hematopoietic Stem Cell Aging: The role of epigenetic alterations of AHR and AHRR in dysregulation of HSC.”
  - **Robert M. Brosh, Ph.D., NIA and Fredrick W. Miller, M.D., Ph.D., NIEHS** “Functional Significance of Mutations in Helicase Genes in Patients with Juvenile Dermatomyositis and anti-MDA5 Autoantibodies.”

- **Huaibin Cai, Ph.D., NIA and Guohong Cui, Ph.D., NIEHS**  
“Pathophysiological Study of Fungicide Benomyl in Parkinson’s disease”
- **K99/R00 awards:**
  - **Joonas Jansen, Ph.D.** was recommended for K99/R00 funding from NIEHS and will be mentored by Dr. Sam Wilson in GISBL.
  - **Natalie Saini, Ph.D.** was recommended for K99/R00 funding from NIEHS (pending Council) and will be mentored by Dr. Dmitry Gordenin in GISBL.
  - **Fei Zhao, Ph.D.** was awarded a K99/R00 from NICHD and will be mentored by Dr. Humphrey Yao in RDBL.
- **NIH Director’s Awards**
  - **Mario Borgnia**  
*For successfully establishing the new Cryo-EM core at NIEHS and assembling a Cryo-electron microscopy consortium with Duke University and the University of North Carolina*
  - **GEOHealth Team**  
*For conceptualizing and implementing the Global Environmental and Occupational Health (GEOHealth) program, an ambitious approach to integrating scientific research, training, and outreach through regional hubs*  
Recipients (as part of a trans-NIH team): **Kimberly Gray, Michelle Heacock, Michael Humble, and Srikanth Nadadur**
  - **H3Africa Stage II Team**  
*For exceptional leadership and dedication in implementing Stage II of the Human Heredity and Health in Africa program*  
Recipients (as part of a trans-NIH team): **Bonnie Joubert and Kimberly McAllister**
  - **NIEHS Net Zero Energy Warehouse Team**  
*For extraordinary leadership and innovation in developing the first Net Zero Energy building in HHS*  
Recipients: **Jeffrey Church, Debra Del Corral, Jack Field, Laurie Johnson, Paul Johnson, Kimberly Jones, Robert Levine, Stanford McKenzie, Nancy Powell, Amanda Thompson, Richard Weaver, and Mitch Williams.** Also on the team are members of the NIH Office of Research Facilities: **Kyle Askins, William Blair, Daniel Burk, Gregory Holland, and James Stancil.**
  - **Optimize NIH Team**  
*For outstanding work to communicate and engage stakeholders in the Optimize NIH Phase I implementation of Ethics, Freedom of Information Act, and Committee Management*  
Recipient (as part of a trans-NIH team): **Richard Woychik**
  - **Optimize NIH Subcommittee Team**  
*For exceptional contributions in data gathering and process mapping for Optimize NIH Phase I Implementation of Ethics, Freedom of Information Act, and Committee Management*

Recipients (as part of a trans-NIH team): **Bruce Androphy, Regina Stabile, Jacqualine Stillwell, Mary Wolfe, and Liz McNair**

- **Rapid Disaster Research Program Implementation Team**

*For designing, implementing and evaluating a program which provides rapid funding to meet the public health research needs after disasters*

Recipients: **Janice Allen, Martha Barnes, Christina Drew, Symma Finn, Kimberly Gray, Alfonso Latoni, Pat Mastin, Molly Puente, Leslie Reinlib, James Remington, Laura Thomas, Claudia Thompson, Steven Tuyishime, and Frederick Tyson**

- **The Fellows Award for Research Excellence (FARE)** was started in 1995 to recognize the outstanding scientific research performed by intramural postdoctoral fellows. The award is sponsored by the NIH Fellows Committee, the Scientific Directors, and the NIH Office of Intramural Training & Education, and is funded by the Scientific Directors. Fellows submit an abstract of their research, which is peer reviewed in a blind study section competition. The **2019 NIEHS FARE Winners** are:
  - **Jonathan T. Busada, Ph.D.**  
Mentor: John Cidlowski, Ph.D.  
Endogenous glucocorticoids are required to suppress spontaneous gastric inflammation and spasmolytic polypeptide expressing metaplasia in the mouse  
Study Section: Endocrinology
  - **Helen B. Chin, Ph.D.**  
Mentor: Donna Baird, Ph.D.  
A longitudinal analysis of ovarian growth in girls from birth to 9 months and its association with infant feeding type  
Study Section: Informatics/Computational Biology
  - **Joanne C. Damborsky, Ph.D.**  
Mentor: Jerrel Yakel, Ph.D.  
Cholinergic-GABAergic interactions in the hippocamposeptal pathway  
Study Section: Neuroscience - Cellular, Molecular, Neurotransmission and Ion Channels, and Neurochemistry
  - **Yi Fang, Ph.D.**  
Mentor: Xiaoling Li, Ph.D.  
SIRT1 regulates cardiomyocyte alignment and contraction during maturation in part through deacetylation of ACTN2  
Study Section: Cell Biology - General
  - **Chunfang Gu, Ph.D.**  
Mentor: Stephen Shears, Ph.D.  
PIIP5K regulates serine, glycine and one carbon metabolism: a new cancer therapy target?  
Study Section: Tumor Biology and Metastasis
  - **Hao Hu, Ph.D.**  
Mentor: Masahiko Negishi, Ph.D.

Nuclear Receptor communications: PXR coordinates RORa and HNF4a to regulate the SULT1E1 gene

Study Section: DNA-binding Proteins/Receptors and DNA Repair

○ **Kai Kang, Ph.D.**

Mentor: Leping Li, Ph.D.

CDSeq: a novel deconvolution method to dissect heterogeneity using bulk RNA-seq data

Study Section: Informatics/Computational Biology

○ **Lee F. Langer, Ph.D.**

Mentor: Trevor Archer, Ph.D.

BAF47: A new mechanism for tumor suppression?

Study Section: Chromatin and Chromosomes

○ **Yu-Hua Lo, Ph.D.**

Mentor: Robin Stanley, Ph.D.

ATPase activity of the AAA-protein NVL2 regulates its communication with cofactors during ribosome biogenesis

Study Section: Biochemistry - General, Proteins, and Lipids

○ **Yong-Moon Park, M.D., Ph.D.**

Mentor: Dale Sandler, Ph.D.

Nocturnal light exposure while sleeping and risk of obesity in U.S. women

Study Section: Cultural Social and Behavioral Sciences

○ **Maria G. Petrillo, Ph.D.**

Mentor: John Cidlowski, Ph.D.

Beta-arrestin 1: a novel player in the glucocorticoid receptor activity

Study Section: Signal Transduction - G-protein and Ion Channels

○ **Yufeng Qin, Ph.D.**

Mentor: Paul Wade, Ph.D.

An obesity-associated gut microbiome reprograms the intestinal epigenome and leads to altered colonic gene expression

Study Section: Epigenetics

○ **Prashant Rai, Ph.D.**

Mentor: Michael Fessler, M.D.

Immunity-related GTPase Irgm1 guards against interferonopathy through mitochondrial maintenance

Study Section: Immunology - Autoimmune

○ **Sreenivasa C. Ramaiahgari, Ph.D.**

Mentor: Stephen Ferguson, Ph.D.

Functional characterization of human and rat 3D hepatocyte models and application of high-throughput transcriptomics (S1500+) in toxicology screening

Study Section: Pharmacology and Toxicology/Environmental Health

- **Cynthia J. Sakofsky, Ph.D.**  
Mentor: Dmitry Gordenin, Ph.D.  
Hypermutation associated with bursts of double-strand breaks  
Study Section: Genomics
- **Natale R. Sciolino, Ph.D.**  
Mentor: Patricia Jensen, Ph.D.  
A locus coeruleus to lateral hypothalamus circuit for suppression of feeding  
Study Section: Neuroscience - Integrative, Functional, and Cognitive
- **Sheng Song, Ph.D.**  
Mentor: Jau-Shyong Hong, Ph.D.  
Dysfunction of noradrenergic system induce  $\alpha$ -synucleinopathy and neuronal loss from gut to brain  
Study Section: Neuroscience - Neurodegeneration and Neurological disorders
- **Heather L. Vellers, Ph.D.**  
Mentor: Steven Kleeberger, Ph.D.  
Association between mitochondrial DNA sequence and DNA damage in response to endurance training in mice  
Study Section: Genetics
- **Sing-Wai Wong, Ph.D. candidate**  
Mentor: Jennifer Martinez, Ph.D.  
Unravelling the role of autophagy machinery in osteoclastogenesis  
Study Section: Cell Biology - General
- **Miaofei Xu, Ph.D.**  
Mentor: Arun Pandiri, B.V.Sc. & A.H., M.S., Ph.D., D.A.C.V.P., D.A.B.T.  
Mitochondrial genomic alterations in spontaneous and chemical-induced hepatocellular carcinomas in B6C3F1/N mice  
Study Section: Carcinogenesis
- Kathryn McClelland, Ph.D., visiting fellow in the Reproductive and Developmental Biology laboratory received two awards at the 2018 Society for the Study of Reproduction Annual Meeting: **2018 SSR Trainee Research Finalist**—Poster Presentations and the **2018 Lalor Foundation Merit Award**. Winners of the Lalor Foundation Merit Award are selected on the basis of abstracts submitted for presentation and evaluated by the Awards Committee according to the following criteria: scientific merit, interpretation and impact of the results, and clarity of the abstract. Each of the 20 presenters will receive a Lalor Foundation Merit Award of USD \$500, which was presented at the 2018 Annual Meeting.

### ***Grantees/Others***

- **Deborah Cory-Slechta, Ph.D.** was awarded the **Lifetime Achievement Award in Graduate Education** by the University of Rochester. As a faculty member at the School of Medicine and Dentistry, Dr. Deborah Cory-Slechta holds professorship

positions in the departments of Environmental Medicine, Pediatrics, and Public Health Sciences. A former chair of the Department of Environmental Medicine and principal investigator of the department's National Institute of Environmental Health Sciences Center, Dr. Cory-Slechta has been nationally and internationally recognized for her scientific contributions.

- Former NIEHS predoctoral fellow **Kaitlyn Gam, Ph.D.**, has received the prestigious **Tulane 34 Award**, in large part due to her work on the Gulf Long-term Follow-up (GuLF) STUDY. The goal of the NIEHS-led initiative is to examine the potential health effects of the 2010 Deepwater Horizon oil spill in the Gulf of Mexico. Gam is now transitioning to a postdoctoral fellow position at NIEHS. Gam was honored at a ceremony May 17 at Tulane University. Named for the year in which the university was founded, 1834, Tulane 34 is among the most coveted university-wide student honors given to students. It is presented to only 34 graduates each year.
- **Dr. Mary Lou Guerinot**, lead for project, Arsenic Uptake, Transport, and Storage in Plants, as part of the Dartmouth College P42 Center, was awarded the **2018 Stephen Hales Prize** from the American Society of Plant Biologists. Dr. Guerinot was recognized as a world leader in plant nutrition who has provided outstanding service to the scientific community and as an educator.
- Nano Health Implications Research (NHIR) Consortium grantee **Peter Thorne, Ph.D.**, head of Occupational and Environmental Health at the University of Iowa, will be receiving the **Iowa Regents Award for Faculty Excellence** on September 13. This award is one of Iowa's highest honors for faculty achievement.
- **The K.C. Donnelly Externship Award** was established in memory of Dr. KC Donnelly, a longtime SRP grantee who worked tirelessly to improve our understanding of environmental exposure and genotoxicity of complex chemical mixtures. The award provides outstanding SRP trainees with up to \$10,000 to fund supplies, travel, housing, research, training, and collaboration. Awardees may conduct research activities at other SRP centers, government laboratories, and at state, local, or tribal agencies for up to three months.
  - **Jitka Becanova, Ph.D.**, is a postdoctoral researcher with Rainer Lohmann, Ph.D., at the University of Rhode Island Superfund Research Program (SRP) Center. For her externship, Becanova will travel to Providence, Rhode Island, to work with Robert Hurt, Ph.D., at the Brown University SRP Center. Becanova's research focuses on improving detection of per- and polyfluoroalkyl substances (PFAS) in ocean water, biological samples, soil, and air. During the externship, she will study the sorption behavior of PFAS on advanced graphite-based nanomaterials with the aim of developing a passive sampler for detecting PFAS.
  - **Krisa Camargo** is a pre-doctoral trainee under the mentorship of Anthony Knap, Ph.D., José Sericano, Ph.D., Yina Liu, Ph.D., Thomas J. McDonald, Ph.D., and Weihsueh Chiu, Ph.D., at the Texas A&M University SRP Center. Camargo will travel to Gloucester Point, Virginia, to work with Michael Unger, Ph.D., at the Virginia Institute of Marine Science. Her research focuses on

characterizing and modeling how people are exposed to legacy contaminants within the Galveston Bay and Houston Ship Channel region of Houston, Texas, particularly in the aftermath of Hurricane Harvey. Camargo will expand upon her work to develop a low-cost screening approach for polycyclic aromatic hydrocarbons (PAHs) using Unger's biosensor technology. The proposed screening tool will help prioritize sediment samples that should be analyzed for toxicity.

- **Stephanie Eick** is a Ph.D. candidate at the University of Georgia, working with the Northeastern University SRP Center under the mentorship of José Cordero, M.D. For her externship, Eick will travel to California to work with Craig Steinmaus, M.D., at the University of California, Berkeley SRP Center. Eick's research aims to understanding the link between stress during pregnancy and preterm birth in Puerto Rico. During this externship, she will explore further how socioeconomic status, stress, and potentially harmful chemicals interact to impact human health throughout life, including chronic diseases such as cancer, hypertension, and diabetes.
- **Priyanka Kushwaha, Ph.D.**, is a postdoctoral researcher with Raina Maier, Ph.D., at the University of Arizona SRP Center. For her externship, Kushwaha will travel to La Jolla, California, to work with Julian Schroeder, Ph.D., at the University of California, San Diego SRP Center. Her research focuses on characterizing microbial diversity and understanding how microbes promote plant growth in nutrient-limited soils impacted by mines. The KC Donnelly Externship will allow Kushwaha to expand her work using plant metatranscriptomics, which measures the activity of genes, to better understand molecular mechanisms plants use to respond to environmental stressors such as metals. This research will inform improved strategies to reclaim mine waste sites.
- **Laura Magaña** is a first-year Ph.D. student with the UC Berkeley SRP Center under the guidance of Center Director Martyn Smith, Ph.D., and Luoping Zhang, Ph.D. She will travel to Corvallis, Oregon, to work with Robert Tanguay, Ph.D., at the Oregon State University (OSU) SRP Center. Magaña's research uses animal models to study how formaldehyde, a widespread environmental pollutant, affects human health. Through this externship, she will expand her work by incorporating behavioral and developmental screening tests with zebrafish, a high-throughput platform developed in the Tanguay lab. This multidisciplinary research also will include targeted and global gene expression assays.
- **Anne Nigra** is a doctoral candidate with the Columbia University SRP Center under the mentorship of Center Director Ana Navas-Acien, Ph.D. Nigra will travel to Eagle Butte, South Dakota, to work with Carlyle Ducheneaux at the Cheyenne River Sioux Tribe Department of the Environment and Natural Resources. Nigra's research focuses on characterizing human exposure to metals, including through drinking water and diet, and understanding

environmental contributions to cardiovascular disease. She will expand her research during the externship by collecting and analyzing environmental mercury monitoring data. She also will engage with residents on a community-directed research project.

- **Rishabh Shah** is a second-year Ph.D. student with the University of Kentucky SRP Center under the guidance of J. Zach Hilt, Ph.D., and Thomas Dziubla, Ph.D. For this externship, he will travel to Baltimore, Maryland, to work with Upal Ghosh, Ph.D., at the University of Maryland, Baltimore County. Shah's current research aims to develop cutting-edge crosslinked polymers that can selectively capture polychlorinated biphenyl (PCB) compounds in contaminated water and soil. Shah will expand his work in developing polymers and transfer it toward developing field monitoring approaches during his externship. This work will use Shah's novel polymers to develop field-ready advanced passive samplers for PCBs and methylmercury.
- **Savannah Volkoff** is a doctoral student with the Duke University SRP Center under the mentorship of Claudia Gunsch, Ph.D. For her externship, Volkoff will travel to Baltimore, Maryland, to work with Upal Ghosh, Ph.D., at the University of Maryland, Baltimore County. Volkoff's research is focused on engineering and stimulating microbial biofilms to bioremediate PAHs in historically polluted sites. Through her externship, she will expand on this work to explore the use of activated carbon as a delivery mechanism for biofilms optimized with PAH-degrading microorganisms. This research will help Volkoff scale up her remediation approach to the field.
- **Society for the Study of Reproduction Awards**
  - The **SSR Trainee Mentoring Award** recognizes an SSR member who as a mentor has had significant impact on Trainees within SSR. This year, the Society recognizes **Teresa K. Woodruff, Ph.D.**, Professor of Obstetrics & Gynecology at Northwestern University, with this honor. Dr. Woodruff has been a dedicated member of SSR for 22 years, having published ~20% of her manuscripts in Biology of Reproduction and having served on the SSR Board of Directors, Clinical Outreach Committee, Program Committee, and Nominations Committee. Dr. Woodruff is an exemplary woman in science, and she not only mentors individuals, but she selflessly and fervently mentors our entire field of reproductive science and medicine.
  - **Dr. Zeliann R. Craig**, Assistant Professor in the School of Animal and Comparative Biomedical Sciences and the Physiological Sciences Graduate Interdisciplinary Program at the University of Arizona, received the **2018 Janice Bahr Junior Scientist Travel Award**. In the lab, Dr. Craig's research focuses on understanding environmental exposures influence human fertility. Over the past five years, she has developed a research program aimed at answering two main questions: (1) which environmental

exposures negatively influence female reproductive function and (2) what are the signaling pathways involved in their mechanisms of toxicity.

- **Patricia Hunt, Ph.D.**, Meyer Distinguished Professor in the School Molecular Biosciences in the College of Veterinary Medicine, member of the Center for Reproductive Biology at Washington State University, was awarded the **2018 Carl G. Hartman Award** at this year's Society for the Study of Reproduction Annual Meeting. Her underlying research objective has been to understand how chromosomes are segregated correctly and incorrectly at meiosis. Projects currently funded by the NIH are establishing the impact of estrogenic exposures on both male and female germline cells, building knowledge of how ongoing exposure affects the cells which carry our genetic heritage.