That's JAX

Section 3

News from The Jackson Laboratory in Bar Harbor

SECTION 3 OF 4 — THURSDAY, OCTOBER 15, 2009

Designer teams up with Jax Lab

NEW YORK — Donna Karan New York and The Jackson Laboratory had a benefit reception on Sept. 30 at the Donna Karan flagship store in New York City. The evening featured wardrobe stylist Curtis Farnham presenting the 2009 Fall System of Dressing and guest speaker Carol Bult, Ph.D., of The Jackson Laboratory.

Guests enjoyed a special 10-percent discount on purchases, and Donna Karan New York has donated 10 percent of event sales to support research at The Jackson Laboratory.

The reception included a presentation by Professor Bult called "Genes, Cancer and the Future of Personalized Medicine."

ALS walk

BANGOR — At least 200 ALS patients and their families, friends and supporters braved the rain in Bangor's Hayford Park on the morning of Aug. 29, for the second annual Walk to Defeat ALS. The fund-raising event was sponsored by the ALS Association.

Jackson Laboratory associate professor Greg Cox, Ph.D., keynote speaker of the event and an ALS Association grantee, attended with members of his laboratory and family.

According to an event spokesperson, the event raised more than $30,000, a goal the committee hopes to match this year despite the bad weather on walk day.

Members of the committee include Hampden residents Janice Von Brook and her daughter Carol Lamb, both executive administrative assistants at The Jackson Laboratory, and members of the "Fighting for Farmer George" team.

Birth defect study planned

BAR HARBOR — Jackson Laboratory researchers including Professor Leah Rae Donahue, Ph.D., and research scientist Stephen Murray, Ph.D., are part of a new, multi-institutional National Institutes of Health initiative to understand craniofacial birth defects.

The five-year, $2,352,385 grant to The Jackson Laboratory is one of 11 research and technology grants of the new FaceBase Consortium funded by the National Institute of Dental and Craniofacial Research (NIDCR). The initiative will systematically compile the biological instructions to construct the middle region of the human face and precisely define the genetics underlying its common developmental disorders, such as cleft lip and palate. The mid-face includes the nose, upper lip, and the palate, or roof of the mouth.

"Orofacial clefting is one of the most common birth defects in humans, affecting approximately one in 700 live births," says Dr. Donahue, who is director of the Genetic Resource Science at the Laboratory.

Bio info grant

BAR HARBOR — A new $2.1 million National Institutes of Health grant to The Jackson Laboratory will fund construction of space for the institution's expanding bioinformatics and computational biology programs.

Jackson Laboratory bioinformatics and computational biology scientists develop the ever-growing quantity of genetic data into sophisticated tools, available to the worldwide research community, for understanding gene function. To meet the rapidly expanding demand for these data and tools, the laboratory is recruiting four new faculty members over the next five years.

The grant from the National Center for Research Resources will provide space for the new investigators and the additional computing hardware needed to support the increasingly data and computation-intensive research of the entire Jackson Laboratory scientific staff.

The award is part of the federal government's economic stimulus initiative known as the American Recovery and Reinvestment Act of 2009 (ARRA). It brings the lab's share of ARRA funding to more than $5.8 million, including grants for research in cancer, diabetes, HDL cholesterol and neurological diseases.

Nobel Prize winner was lab summer student

BAR HARBOR — An alumnus of The Jackson Laboratory's historic Summer Student Program is a winner of the 2009 Nobel Prize in Physiology or Medicine. Jack W. Szostak, Ph.D., is the third Summer Student Program alumnus to win the Nobel Prize, after laureates David Baltimore and Howard Temin, who were both at the Laboratory in 1955.

Dr. Szostak spent the summer of 1970 at The Jackson Laboratory, when he was an undergraduate at McGill University, studying genes associated with thyroid function under the mentorship of Dr. Chen K. Chai. He is now a professor at Harvard Medical School and Massachusetts General Hospital in Boston, and a Howard Hughes medical investigator.

At the end of that summer of 1970 in Bar Harbor, Dr. Chai, now

Dr. Jack Szostak

professor emeritus of The Jackson Laboratory, described young Jack Szostak in a memo to the director of the Summer Student Program:

> *"The work of Dr. Szostak and his colleagues addressed a set of fundamental questions that had lingered in biology for 40 or 50 years."*
> — Dr. Rick Maser

"I found him very sharp and sensitive in absorbing ideas and doing laboratory work carefully .... As a person, Jack is somewhat shy but he is very friendly. Perhaps, this is partly because he is about two years younger than his classmates. I certainly feel that Jack has a keen interest in science and has a good potential to be a scientist."

Dr. Szostak shares this year's Nobel Prize with Drs. Elizabeth H. Blackburn and Carol W. Greider "for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase." Telomeres, structures on the ends of chromosomes, appear to have an important role in preventing damage to DNA during cell division. Their function, or failure to function, is implicated in aging, cancer and other diseases.

"This award really crystallizes the importance of chromosome and telomere maintenance to human health and disease," said Jax assistant professor Rick Maser, a cancer researcher who investigates the genes involved in telomere erosion and its impact on cancer, degenerative disease, chronic inflammation and aging in humans. "The work of Dr. Szostak and his colleagues addressed a set of fundamental questions that had lingered in biology for 40 or 50 years: How are normal chromosome ends (telomeres) different from those on broken chromosomes? And how do normal telomeres stay intact? It also validates how studies using all manner of experimental organisms can be used to understand ourselves."

For more than 80 years, The Jackson Laboratory's Summer Student Program has offered talented high school and college students the opportunity to conduct an independent biomedical research project under the guidance of a mentor. More than 2,000 students have completed the program and gone on to careers in science, medicine and other fields.

Jackson Laboratory scientist Dr. George Snell won the 1980 Nobel prize for his work in understanding the immune response. Twenty other Nobel prizes are associated with The Jackson Laboratory, through application of genetic principles first developed by Jackson founder Clarence Cook Little or through research using inbred mice developed at the Laboratory. See related story.

Lab awarded patent on variation freeze

BAR HARBOR — The U.S. Patent and Trademark Office has awarded The Jackson Laboratory a patent for a process that effectively prevents random change or "genetic drift" in its inbred mouse colonies.

Thanks to the close match between human and mouse genes, researchers around the world use mouse models to study human biology and diseases. Today more than 4,000 mouse models are available from The Jackson Laboratory, each with a very specific genetic profile.

However, just a few of these models – standard inbred strains – represent the vast majority of mice used in research and are consequently bred in large numbers. Because "evolution happens" even among genetically identical animals, there's always the chance of random new mutations arising over time or place in these mouse colonies, potentially introducing unknown variables into researchers' experiments.

"Some of these mutations will be visible and easy to detect," notes Michael Wiles, Ph.D., senior director of technology transfer and development at the lab. "However, most will be invisible. This means that over time the mouse model will change its genetic consistency, so if you do an experiment now and you do it again in 10 years, you might get different results."

The Jackson Laboratory has rigorous processes in place to detect and screen out the effects of random mutations in its foundation mouse colonies, Dr. Wiles says. The newly patented Genetic Stability Program (GSP), which Dr. Wiles and Jackson colleagues Robert Taft, Ph.D., and Eva Eicher, Ph.D., devised in 2003, literally freezes genetic variation in its tracks, by rebooting the production colonies with frozen embryos or gametes from specially prepared stocks every five generations. The stocks are set up to provide a 25-year supply.

The innovation allows the laboratory to reduce the number of generations in its inbred foundation stocks, thus stopping the accumulation of mutations and revolutionizing the uniformity of the mouse as a research tool.

PHOTO COURTESY TOM WALSH

IT TAKES A LAB ... *April (from left) Fred, Alex, Andrew (in Fred's arms) and Austin Rumill gathered with friends and family Sept. 27 for the formal dedication of the Habitat for Humanity house in Franklin that is now their new home. The project was sponsored by The Jackson Laboratory, where Fred is employed.*

SHAW MEDAL ... *At a gala ceremony in Hong Kong, Jackson Laboratory Professor Emeritus Douglas Coleman, Ph.D., of Lamoine, accepted the Shaw Prize in Life Science and Medicine. Dr. Coleman shares the $1 million prize with Dr. Jeffrey Friedman of Rockefeller University and the Howard Hughes Medical Institute. The researchers were honored for their breakthroughs in understanding the genetic basis of obesity and type 2 diabetes.*
In presenting the award, which is considered "the Nobel of the East," Professor Yuet-Wai Kan of Hong Kong University noted, "The discovery… has changed our concept of obesity from a defect in willpower to a misbalance of hormone signaling."

PHOTOS COURTESY SHAW PRIZE

22 Nobel prizes linked to the lab

BAR HARBOR — Fifteen researchers won Nobel Prizes in Medicine or Physiology for research using inbred mice developed at The Jackson Laboratory. Six others employed genetic principles first developed by C.C. Little, founder of The Jackson Laboratory.

Dr. Michael Festing of the Medical Research Council Laboratory of Molecular Biology Toxicology Unit, University of Leicester, England, traced 17 of the Nobel prizes (those awarded before the year 2000) to The Jackson Laboratory for an essay, "Mighty Mice," he co-authored with Dr. Elizabeth Fisher of the Department of Neurogenetics at Imperial College School of Medicine at St. Mary's, London. Their essay appeared in the journal Nature.

In 1980, Dr. George D. Snell of the Jackson Lab was co-winner of the Nobel Prize for discoveries concerning genetically determined structures on the cell surface that regulate immunological reactions.

The three Nobel laureates of 2007 (Mario Capecchi, Martin Evans and Oliver Smithies) also used Jax mice in their experiments, which opened the door to genetically modifying mice in order to develop new models for human diseases.

In 1994 The Jackson Laboratory's Dr. John Sundberg collaborated with 2008 laureate Harald zur Hausen in sequencing the dog oral papillomavirus; this virus and experiments designed by Dr. Sundberg provided the proof of concept for the recombinant human cervical cancer vaccine.

Other connections include:

1960: Sir Frank Macfarlane Burnet Walter and Eliza Hall at the Institute for Medical Research in Melbourne, Australia won for discovery of acquired immunological tolerance;

1960: Sir Peter Brian Medawar of University College London for discovery of acquired immunological tolerance;

1975: David Baltimore (member, Jackson Laboratory Board of Trustees; alumnus of Jackson Summer Student Program) of the Massachusetts Institute of Technology at Cambridge, Mass. for discoveries concerning the interaction between tumor viruses and the genetic material of the cell;

1975: Howard Martin Temin (alumnus of The Jackson Laboratory's Summer Student Program) of the University of Wisconsin-Madison for discoveries concerning the interaction between tumor viruses and the genetic material of the cell;

1980: Baruj Benacerraf of Harvard Medical School for discoveries concerning genetically determined structures on the cell surface that regulate immunological reactions;

1980: George D. Snell of The Jackson Laboratory for discoveries concerning genetically determined structures on the cell surface that regulate immunological reactions;

1984: César Milstein of Medical Research Council Laboratory of Molecular Biology in Cambridge, England for theories concerning the specificity in development and control of the immune system and the discovery of the principle for production of monoclonal antibodies;

1984: Niels K. Jerne Basel Institute for Immunology in Basel, Switzerland for theories concerning the specificity in development and control of the immune system and the discovery of the principle for production of monoclonal antibodies;

1984: Georges J. F. Köhler Basel of the Institute for Immunology in Basel, Switzerland for theories concerning the specificity in development and control of the immune system and the discovery of the principle for production of monoclonal antibodies;

1986: Stanley Cohen of Vanderbilt University School of Medicine in Nashville, Tenn. for discoveries of growth factors;

1986: Rita Levi-Montalcini of the Institute of Cell Biology of the College of the Consiglio Nazionale delle Richerche in Rome, Italy for discoveries of growth factors;

1987: Susumu Tonegawa of the Massachusetts Institute of Technology in Cambridge, Mass. for discovery of the genetic principle for generation of antibody diversity;

1989: J. Michael Bishop of the University of California School of Medicine in San Francisco for discovery of the cellular origin of retrovirus oncogenes;

1989: Harold E. Varmus (an honorary Jackson Laboratory trustee) of the University of California School of Medicine in San Francisco for discovery of the cellular origin of retrovirus oncogenes;

1996: Peter C. Doherty of St. Jude Children's Research Hospital in Memphis, Tenn. for discoveries concerning the specificity of the cell-mediated immune defense;

1996: Rolf M. Zinkernagel of the Institute of Experimental Immunology at the University of Zurich in Switzerland, for discoveries concerning the specificity of the cell-mediated immune defense;

1997: Stanley B. Prusiner of the University of California School of Medicine in San Francisco for discovery of prions – a new biological principle of infection;

2007: Mario R. Capecchi of Howard Hughes Medical Institute University of Utah in Salt Lake City for discovery of principles for introducing specific gene modifications in mice by the use of embryonic stem cells;

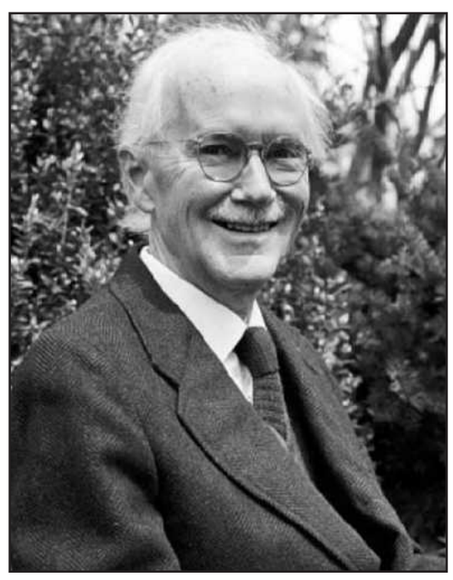
2007: Sir Martin J. Evans of Cardiff University in Cardiff, Wales, for discovery of principles for introducing specific gene modifications in mice by the use of embryonic stem cells;

2007: Oliver Smithies of the University of North Carolina at Chapel Hill for discovery of principles for introducing specific gene modifications in mice by the use of embryonic stem cells;

2008: Harald zur Hausen of the German Cancer Research Centre in Heidelberg, Germany, for discovery of human papilloma viruses causing cervical cancer;

2009: Jack W. Szostak of the Howard Hughes Medical Institute at Harvard Medical School and Massachusetts General Hospital for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase.

Dr. George Snell of the Jackson Laboratory shared the Nobel Prize for Medicine in 1980. He was a resident of Bar Harbor.



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