HUDSONALPHA FOUNDATION

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HUDSONALPHA INSTITUTE FOR INVIEW

Thank You

Collaboration. Innovation. Vision.

2017 Stewardship Report

Shank You

Jogether, we are changing lives, and creating a healthier, more sustainable world.

Dear Friends,

Science and creation take time: In ten years, a limestone stalactite in a cave grows just one-tenth of one centimeter.

When we opened the doors at HudsonAlpha ten years ago this April, we knew it would take time for us to establish ourselves as world leaders in genomics, to make important scientific discoveries, to change the way science education is delivered to students, and to grow Alabama's life science community.

We knew we needed to build the right team of brilliant, creative scientists focused on discovery. We knew Huntsville had fostered a strong entrepreneurial spirit that supported our unique vision.

What we didn't know was how many amazing accomplishments we would be able to share in such a short time.

HudsonAlpha is celebrating a Decade of Discovery in 2018. In just ten years, we have made tremendous strides in genomic research, education, patient care, and economic development.

To cite just a few numbers:

- Our scientists have published more than 550 research papers highlighting new genomic findings, including the discoveries of many genetic variations that cause disease
- We opened the world's first stand-alone genomic medicine clinic
- Our education team has impacted the lives of 3 million learners worldwide
- The economic impact of HudsonAlpha in Alabama has exceeded \$1.8 billion dollars

All of HudsonAlpha's accomplishments in this decade would take many pages to list. These accomplishments have one thing in common. We could not have made these discoveries, saved lives, taught children and teachers, without your support.

This stewardship report highlights some of our most important and poignant stories from 2017. Thank you for being part of our journey. We can't wait to see what the next decade holds for HudsonAlpha!

Rick and Jim

Richard Myers, PhD HudsonAlpha president and science director

Jim Hudson HudsonAlpha co-founder and chairman of the board

Paul Propst Center for Precision Medicine

The newest addition to the HudsonAlpha campus is just months away from completion. An official "topping-off ceremony" will be held in mid-February at the Paul Propst Center for Genomic Medicine, located at 800 Hudson Way.



Huntsville businessman and philanthropist William "Bill" Propst made a significant donation to Hudson-Alpha, and the center is named in honor and memory of his father Paul.

The two-story, 100,000 square foot building is modeled after the flagship building at 601 Genome Way, and will house HudsonAlpha's educational outreach team as well as research labs and associate life science companies.

"HudsonAlpha has really become a destination for students and teachers, as we offer many different educational field trips, teacher training and programs for lifelong learners," said Neil Lamb, PhD, vice president for educational outreach. "I'm so excited about this new space, as it sets the stage for us to serve more people both in Alabama and globally, and create new learning opportunities in genetics and genomics."

"What you are doing is so important for our students," said Governor Kay Ivey during a recent visit to HudsonAlpha. The new building is a testament to HudsonAlpha's growth and contributions to the life sciences, as well as its importance to North Alabama and beyond.

"In our first decade, we've already had a \$1.8 billion economic impact," noted co-founder Jim Hudson. "Dollars invested in discoveries at HudsonAlpha are translating to improved health and global sustainability - and also positively impact our state financially."

With the opening of the Paul Propst Center for Precision Medicine, the HudsonAlpha Foundation has launched a campaign, opening opportunities to leave your legacy through named spaces in the building.

Loretta Spencer, former mayor of Huntsville, is a longtime supporter of HudsonAlpha who made a new gift for a media wall in the Paul Propst Center for Precision Medicine. The media wall is a storytelling area that will showcase HudsonAlpha through films, photography, and animation.

"I was so honored to be a part of this project," said Spencer. We are so lucky to have the quality of individuals here in Huntsville."

The Paul Propst Center for Precision Medicine is scheduled to open in fall 2018. Many naming opportunities exist at HudsonAlpha, not only in the new building but also at 601 Genome Way and the Smith Family Clinic for Genomic Medicine.

To learn more, visit hudsonalpha.org/naming-opportunities Neurological Diseases

memory and mobility fund

Nearly six million Americans are living with neurodegenerative diseases. Alzheimer, Parkinson, ALS, Huntington and dementia are debilitating diseases that are innerconnected. HudsonAlpha Institute for Biotechnology launched the Memory and Mobility Project to explore the genetic causes of these diseases. What we learn about one of these diseases may impact our understanding of others.



Alzheimer and dementia are cruel diseases affecting more than five million Americans. They devastate families and rob loved ones of their memories. That is why HudsonAlpha established the Impacting Alzheimer project.

With our scientists' expertise and unparalleled experience, along with our cutting-edge technology, HudsonAlpha is uniquely positioned to conduct this groundbreaking research and make significant headway in the fight against Alzheimer disease.

This project is critical, allowing HudsonAlpha scientists to explore the possibilities of finding cures and treatments for Alzheimer Disease in three distinct ways:

• **Identifying new causes:** To better understand why certain individuals are at higher risk of developing this devastating disease.

• **Early detection:** To allow those at risk to begin promising new treatments before damage is widespread.

• **Discovering new therapeutic approaches:** To provide greater chances of success at battling this disease. The treatment tools currently available are not enough.

"We have an unprecedented opportunity to make new genomic discoveries in Alzheimer disease and dementia, which in turn will inform us about other neurodegenerative diseases," said Rick Myers, PhD, president and science director for HudsonAlpha.

Thanks to support from the Alpha Foundation and many other contributors, HudsonAlpha has nearly reached its fundraising goal for the Impacting Alzhemier project.

Impacting ALS: Finding discoveries and helping patients

HudsonAlpha receives \$40,000 grant for ALS sequencing project

HudsonAlpha Institute for Biotechnology has been awarded a \$40,000 grant from the Crestwood ALS Care Clinic, a National ALS Association Treatment Center of Excellence in Huntsville, Ala.

ALS (amyotrophic lateral sclerosis), also known as Lou Gehrig's disease, is a progressive neurodegenerative disease that affects nerve cells in the brain and the spinal cord.

In this collaborative project, called Impacting ALS, HudsonAlpha scientists will conduct genomic sequencing and analysis of ALS patients to better understand the underlying cause of the disease.

In the beginning stages, the project will enroll patients that are currently being treated at the Crestwood ALS Care Clinic, where physicians and researchers will collaborate to return and discuss results with families.

"Crestwood has had a strong clinical relationship with the ALS chapter, our patients, and physicians and staff who really go above and beyond to take care of patients, but this project is the next step," said Pam Hudson, MD, CEO of Crestwood Medical Center. "We need to get to the cause of the disease, and not solely focus on the treatment."

"HudsonAlpha collaborates with institutions all over the world. It is especially exciting to be working on a project like this in Huntsville," said Rick Myers, PhD, HudsonAlpha president and science director, "so we appreciate Crestwood's support and look forward to making even more advances in ALS."

The \$40,000 grant from the Crestwood ALS Care Clinic will be used to launch the Impacting ALS project, which will start enrolling patients in March. Additional gifts are being accepted and will be used to enroll even more patients who are battling ALS.

 Donate to the Impacting ALS project at hudsonalpha.org/donate.

Impacting Huntington Disease

HudsonAlpha Institute for Biotechnology and CHDI Foundation have announced a research collaboration to study the gene regulatory network controlling the expression of the huntingtin (HTT) gene that, when mutated, causes Huntington disease, a genetic neurodegenerative disorder characterized by the progressive breakdown of nerve cells in the brain. Rick Myers, PhD, president and science director at HudsonAlpha, is leading the project along with senior scientist Brian Roberts.

Partesotti-Siniard Memorial Fund established at HudsonAlpha

In 2011, Rebecca Partesotti died from suicide after a years-long battle with depression. Rebecca's parents Susan and Larry Partesotti, her sister Mollie Partesotti; along with Susan's brother (Rebecca's uncle) Tommy Siniard, his wife Susan Siniard and sister Paula Siniard Tally (Rebecca's aunt) established the Partesotti-Siniard Memorial Fund for Psychiatric Research in her honor at HudsonAlpha Institute for Biotechnology.

> To learn more about establishing a named fund at HudsonAlpha, visit hudsonalpha.org/named-funds.

> > 1015

Cancer

Ovarian Cancer

Annually, more than 20,000 women are diagnosed with ovarian cancer. Of those, the disease is fatal to more than half. HudsonAlpha Institute for Biotechnology is attacking ovarian cancer in numerous ways in an effort to lower those numbers and save lives.

"Ovarian cancer is difficult to detect early and challenging to treat. Utilizing genetics and genomics to identify new screening mechanisms and therapies will ultimately enhance our ability to better care for patients, and save lives," said Rick Myers, PhD, HudsonAlpha president and science director.

This work is all part of HudsonAlpha's Breakthrough Breast and Ovarian Cancer team, led by Sara Cooper, PhD, faculty investigator. This group of scientists is committed to the goal of using genomic science and HudsonAlpha's state-of-the-art technology to find new breakthroughs in breast and ovarian cancers. Through collaborations with scientists around the nation, this team is working to find biomarkers that lead to earlier, more accurate diagnoses and new pathways for more effective and targeted treatments.

Breast and ovarian cancers are complicated diseases but through the power of genomic research and medicine, HudsonAlpha is working to find answers that make a difference. Each day HudsonAlpha's scientists strive to find new breakthroughs that will bring health, healing, and hope to our mothers, wives, sisters, and daughters.



HudsonAlpha expands Information is Power program

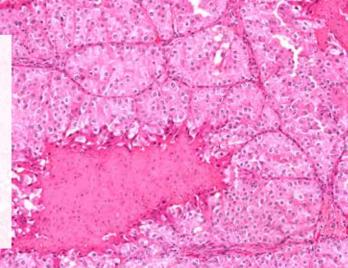
HudsonAlpha Institute for Biotechnology announced the continuation and expansion of the *Information is Power* program. Information is Power, a collaboration between HudsonAlpha and Kailos Genetics, offers free and reduced cost genetic cancer risk testing for men and women between 28 and 32, in North Alabama. Thanks to Redstone Federal Credit Union (RFCU) for sponsoring this community initiative once again.

"Taking this test could be a very important milestone in caring for yourself," said Joseph Newberry, president and CEO of RFCU. "Redstone is proud to help support HudsonAlpha with *Information is Power* and knows this past year has made a positive impact throughout our communities.

> To learn more or to get a test kit, visit hudsonalpha.org/information-is-power

Boeing/American Cancer Society awards collaborative kidney cancer project

The Boeing Company and the Boeing Employee Community Fund Board of Alabama have committed \$100,000 to support a collaborative kidney cancer research project being conducted in partnership with the American Cancer Society, HudsonAlpha Institute for Biotechnology and the University of Alabama at Birmingham (UAB). The project hopes to improve detection tools and treatment options for patients.



Tie the Ribbons event breaks fundraising record

At the 9th annual Tie the Ribbons event, the Huntsville community pulled together and raised nearly \$200,000 for breast and ovarian cancer research at HudsonAlpha. The event hosted 1300 people - we are grateful for the continued support.



Hope grows on the HudsonAlpha campus

Thanks to the generosity of Pam and Joe Alexander, HudsonAlpha Institute for Biotechnology celebrated the opening of the Hope Grows Garden: Breast and Ovarian Cancer with a dedication ceremony. With radiant blooms, the garden was designed to pay tribute to those who are battling or have battled breast and ovarian cancers as well as those who are working diligently to find new discoveries for these diseases. The Hope Grows Garden is located in the first turn of the double helix pathway in McMillian park on the HudsonAlpha campus.

The Hope Grows Garden offers an opportunity to pay tribute to a loved one, acknowledge a milestone or honor a staff member or physician. Paving stones, available in various sizes, can be engraved to reflect the grateful, caring spirit of those whose lives have been touched. All gifts benefit HudsonAlpha's fund for areas of greatest need.

To order pavers, visit hudsonalpha.org/hopegrows-garden-pavers



Solving the puzzle of pancreatic cancer

Pancreatic cancer only has a 20 percent survival rate in the first year, but HudsonAlpha is working to put the pieces of the puzzle together. Patients have different gene expressions providing critical tumor information - these signatures can make the difference for survival. Using various techniques, HudsonAlpha identified gene expression signatures associated with patient survival in pancreatic cancer.

> "Using our findings, we can make a prediction and say they do look like those patients we've seen in the past who don't survive very long or do they look like the patients who've survived for a long time," said HudsonAlpha faculty member, Sara Cooper, PhD.

Genomic sequencing for St. Jude

HudsonAlpha is helping in the fight against pediatric cancers through whole genome sequencing for patients at St. Jude Children's Research Hospital and beyond. Through the NIH's Gabriela Miller Kids First Research Program, HudsonAlpha's Genomic Services Lab, under the direction of Shawn Levy, PhD, faculty investigator, is sequencing pediatric cancer and structural birth defect patient samples from St. Jude.

Susan G. Komen Foundation grant

Thanks to the Susan G. Komen Breast Cancer Foundation for their five-year nearly one million dollar grant to help advance breast cancer research.

Jogether, we can do more!

Genomic Medicine



Smith Family Clinic celebrates two-year anniversary

Since opening in 2015, the Smith Family Clinic for Genomic Medicine has seen many children and adults from around the world who are struggling with an undiagnosed or misdiagnosed disease.

"What makes this clinic unique is not only our focus on undiagnosed disease – but also that we sequence the whole genome, rather than just part of the genome," said David Bick, MD, medical director at Smith Family Clinic. "Sequencing the whole genome gives us a much larger data set, and we know by experience that many disease-causing variants aren't identified by sequencing the exome or panels of genes alone.

To learn more, visit smithfamilyclinic.org



The HudsonAlpha Foundation established a patient assistance fund, named the Hero Fund, thanks to an anonymous donation. The Hero Fund helps patients at the Smith Family Clinic who need, but cannot afford, access to genomic medicine. One such patient is Jim Wall of Huntsville, Ala. Jim has struggled with back problems, balance problems and swallowing issues for more than 20 years, but just ignored the symptoms and accepted them as a part of life. After two decades of unexplained symptoms and appointments with countless specialists and clinics, Jim finally had a complete answer thanks to the clinic and The Hero Fund.

To learn more or donate to the Hero Fund, visit hudsonalpha.org/hero

Jan Smith Naming

The conference and training room at the Smith Family Clinic for Genomic Medicine has been named in honor of Jan Smith, supporter of the HudsonAlpha Foundation and the research being done at HudsonAlpha Institute for Biotechnology.

Smith, founder of Huntsville technical solutions company S3, Inc., supports many Huntsville community organizations with her philanthropy. This new gift supports genomic medicine at the Smith Family Clinic.

> "There are not a lot of things that you can contribute to that you feel will improve people's lives," said Smith. "There are lots of things that I do in the community that add joy and serenity or excitement, but adding quality of life is here at the clinic and HudsonAlpha."

Dynetics Naming

A visiting-physicians office at the Smith Family Clinic for Genomic Medicine has been named in honor of Dynetics, supporter of the HudsonAlpha Foundation.

Headquartered in Huntsville, Ala., Dynetics, provides high-tech products and services in an ethical, responsive, and cost-effective fashion to the national security, satellite, launch, automotive, cybersecurity, and critical infrastructure sectors.

"We have watched this whole thing happen," said David King, Dynetics chief executive officer. "We are very excited about what is going on at HudsonAlpha and the Smith Family Clinic. It has already had a huge impact on the state of Alabama and we are thankful that this team is here in our community. We have been looking for the right thing to do and we found it."

Double Helix Dash benefits childhood genetic disorders research

The unique race winds through the double helix path at McMillian Park on the HudsonAlpha campus in Huntsville. The 2017 Double Helix Dash was a huge success - many thanks to everyone that participated! The Double Helix Dash is presented by HudsonAlpha and the Huntsville Track Club.

For more information, visit doublehelixdash.org

A diagnosis for Tiana



Spring Benefit

Genomic medicine is changing lives. HudsonAlpha is leveraging the power of the human genome - your DNA - to transform the way we think about healthcare...and to transform our own health. Thanks to everyone who attended the 2017 HudsonAlpha Foundation Spring Benefit which supported the genomic medicine program at HudsonAlpha.



HudsonAlpha awarded \$10M NIH grant for newborns

HudsonAlpha in collaboration with the University of Alabama at Birmingham (UAB) School of Medicine and the University of Mississippi Medical Center, has been awarded a four-year, \$10 million grant from the National Institutes of Health (NIH) to investigate how genome sequencing can help with the diagnosis and care of babies with birth defects and genetic disorders. The project is being led by HudsonAlpha Faculty Investigator Greg Cooper, PhD, together with HudsonAlpha Faculty Investigator Greg Barsh, MD, PhD; and Bruce Korf, MD, PhD, professor and chair of the UAB Department of Genetics. Just before her second birthday, Tiana Vega's parents started searching for the cause of her developmental delays. It was evident that Tiana had unexplained developmental delays, so she, and her parents, were perfect candidates for the CSER (Clinical Sequencing Exploratory Research) project at HudsonAlpha Institute for Biotechnology.

With the help of HudsonAlpha Faculty Investigator, Greg Cooper, PhD and his team, Tiana received whole genome sequencing and analysis which lead to a diagnosis of Rett Syndrome.

"HudsonAlpha was familiar to us, but I never actually thought that it would be a part of something personal to our family," said Tiana's mom Victor. "It's going to be a hard road, but we are thankful for the support and resources available right here in Huntsville, like HudsonAlpha."

In just two years, CSER has provided answers to more than 150 families in Alabama.

Thanks to HudsonAlpha's diligent team, Tiana has a diagnosis and is getting the help she needs. The HudsonAlpha Foundation Hope for Children Initiative allows our team to help children with physical disabilities or developmental delay.

 To support pediatric genomics, visit hudsonalpha.org/hope-for-children

Education



Boeing grants HudsonAlpha \$71,000 for STEM workforce development program

HudsonAlpha Institute for Biotechnology received a three-year, \$71,000 Boeing charitable grant to fund its Launching Aspiring Biotechnology Scientists (LABS) program.

"We aspire to be a top performer in every area of our business, and that includes leading in the communities where our employees and their families live and work," said Dennis Muilenburg, Boeing chairman, president and chief executive officer.

Established in 2014, LABS equips students from disadvantaged and underrepresented populations with the basic skills and knowledge that are essential in the STEM workforce.

The award is one of Boeing's "Our Future: Tomorrow's Innovators" grants, which target increased STEM diversity, proficiency and interest among K-12 students. Anchored by local and regional employee-engagement activities, Boeing charitable grants are geared toward developing tomorrow's innovators through investment in the skills required in today's modern workplace.

"Every student is going to enter into a world where science is important," said Neil Lamb, PhD, vice president for Educational Outreach at Hudson-Alpha."Thanks to Boeing's continued support, we can provide the necessary tools to help them navigate through that world."

Discovering Alabama: students team with HudsonAlpha in honor of the bicentennial

Plant detectives are spreading across Alabama, searching for the hidden treasures of the state's rich plant biodiversity through a newly launched program led by HudsonAlpha Institute for Biotechnology.

HudsonAlpha's Bicentennial Barcoding project is a citizen science effort that is bringing together Alabama high school students and partners from their community to genetically catalog Alabama's native plant diversity. At the end of the project, student groups from 29 schools will have collected and catalogued more than 1,500 samples from around the state.

Bicentennial Barcoding is a collaboration between HudsonAlpha Institute for Biotechnology and the Alabama Bicentennial, which supports, creates and executes events that commemorate the state's history.

The project is made possible by The Caring Foundation of Blue Cross and Blue Shield of Alabama, the Lyndhurst Foundation, Vulcan Materials Company Foundation and other philanthropic donations. Thank you to community partners, including the Poarch Band of Creek Indians and additional support from AMSTI.





Academy graduates gain new skills, build strong relationships with peers

Pipettes, petri dishes and plasmid DNA are no match for high school students who completed HudsonAlpha's Biotech Academy. The four-week summer learning experience is designed to provide a strong foundation in research lab skills as well as an introduction to the latest discoveries in genetics, genomics and biotechnology.

Now in its fifth year, the program is possible thanks to the ongoing support and generosity of Jean Wessel Templeton to HudsonAlpha Educational Outreach.

At the Academy, students learn basic molecular biology techniques; discover how to identify plant and animal species based on their DNA sequence; study the concepts of genetic engineering by producing and purifying red fluorescent protein; and delve into the emerging field of synthetic biology. Additionally, Academy participants visit research labs and associate companies at HudsonAlpha to explore

To support HudsonAlpha Educational Outreach, visit hudsonalpha.org/donate

the various careers and professions available in the field of biotechnology, exposing them to world-class scientists and cutting-edge technology.

"Biotech Academy is one of those programs that really allows students to jump into the lab and gain valuable experience that will serve them well for their careers," said Neil Lamb, PhD, vice president for Educational Outreach.

> "To maintain our country's leadership role in science, we need to continue to focus on education," said Templeton. "Here in Huntsville, we have done remarkable work in space and defense. Now we are doing amazing things in the field of biotechnology. The education group of HudsonAlpha is training future generations of researchers and entrepreneurs who, I believe, will continue the work of those currently blazing this important path toward improved human health and quality of life."

Agriscience

Jeeding and Jueling the Gyorld

Working to improve cotton yields worldwide

HudsonAlpha's Genome Sequencing Center is currently working to sequence the genome of an important variety of cotton. HudsonAlpha scientists and their collaborators have made publicly available a significantly improved high-quality genome sequence of Upland cotton (Gossypium hirsutum). This sequence of the species making up greater than 90% of the world's spinnable cotton fiber builds upon previous genome sequences published in the past five years.

Cotton is a major crop, with an annual economic impact of more than \$21 billion in the US and \$500 billion worldwide. Thank you to the National Science Foundation Plant Genome and Cotton Incorporated for supporting this important work that will improve the sustainability and economic value from the basic research to the farm and consumer.

HudsonAlpha and collaborators expand sorghum research program

The HudsonAlpha Genome Sequencing Center will apply their expertise in plant genome sequencing and analysis to sorghum. The project, funded by a \$6.1 million grant to the Donald Danforth Plant Science Center from the Bill & Melinda Gates Foundation, aims to optimize breeding strategies for improving the yield and stress tolerance of sorghum, a critical source of nutrition for millions of people living in sub-Saharan Africa.

> "It's a pleasure to work with the Danforth Center on such an important project with potential for worldwide impact," said Jeremy Schmutz, a faculty investigator at HudsonAlpha who leads the Institute's work on the project. "We look forward to applying our plant genome sequencing and analysis tools to optimize sorghum, a critical crop for the socioeconomic stability and food security of people living in sub-Saharan Africa."



Researching more efficient biofuels

Identifying better biofuel options is a priority of the Genome Sequencing Center (GSC). Researchers are currently analyzing the natural genetic mechanisms of switchgrass, a native prairie grass, to learn how it adapts to its local environment.

HudsonAlpha's team will collect and sequence the genes of hundreds of switchgrass samples to study how genes and a host of environmental factors – including the soil, the bacterial communities that live on the plant and in the soil, weather and the size and growth rate of each plant – affect the plant and its potential as a biofuel.

Understanding how different factors affect one another ultimately will allow scientists to identify ways to improve switchgrass as an alternative energy source.



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2017

In 2017, over 1,500 individuals, corporations and foundations supported HudsonAlpha with their generosity. Gifts of all levels enabled us to continue building momentum, making incredible progress in our mission. Donors who make annual gifts of \$1,000 and above are included in the Genome Circle, HudsonAlpha's major giving program. All Genome Circle members are also recognized for their generosity on the Giving Wall in the atrium of HudsonAlpha's main building.

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