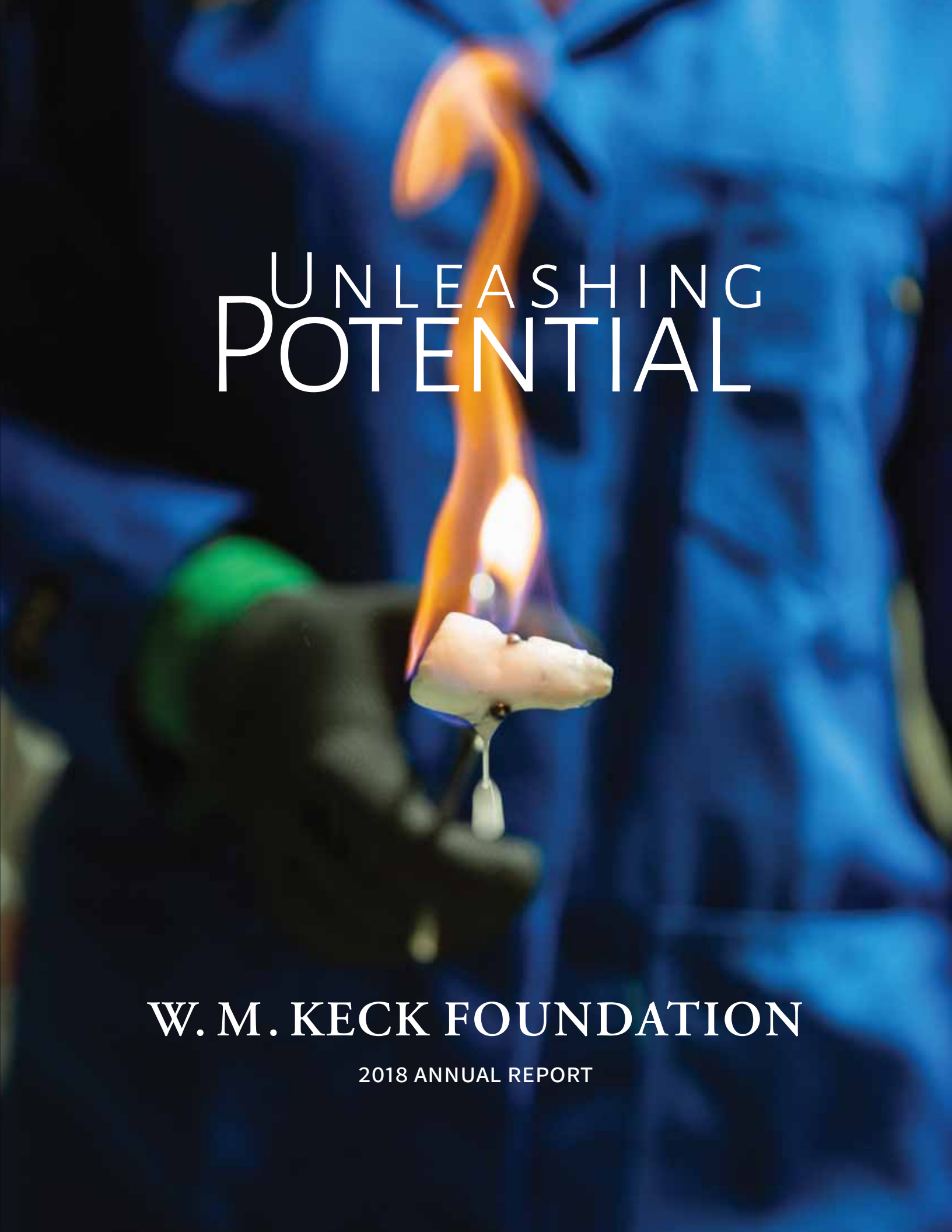

Unleashing Potential

W. M. KECK FOUNDATION

2018 ANNUAL REPORT

▲

Cover: A burning snowball. Water drips during methane hydrate combustion.

W. M. KECK FOUNDATION

2018 ANNUAL REPORT

CHAIRMAN'S MESSAGE

In this year's annual report, we have gathered stories that exemplify the W. M. Keck Foundation's goal of unleashing potential at the front end of basic scientific and medical research. For instance, you will note in our story about the *Acomys* (an African spiny mouse) that traditional government sources of funding weren't available to jump-start this early research. But we placed our bets with two laboratories, one at the University of Florida and another at Seattle Children's Research Institute, that have shown extremely promising results. These scientists are now providing important baselines for the study of mammalian skin and organ regeneration. In our stories about developing an undergraduate engineering program at Benedictine College and an early learning center in an area of need in Los Angeles, you will also get a feel for the double wins of making grants that unleash the potential of young children and college students and at the same time proliferate great ideas and methods beyond the specifically funded projects.

With our larger grants, we continue to focus on endeavors with the potential for high impact on a field or region. We recently made a $20 million grant to the University of California, Los Angeles (UCLA) to boost both cutting-edge work in the biomedical field and the health of citizens in Los Angeles. With UCLA's senior biomedical leadership, we designed the gift to fund competitive biomedical research grants and to support the renovation of the W. M. Keck Court at the UCLA Medical Plaza, one of Southern California's busiest outpatient centers. As one of the premier providers of modern medicine to the Los Angeles area and the nation, UCLA is home to leading scientists. We hope our biomedical research grants will push forward the work of promising early career investigators before government funding is available to them and will also accelerate the advances of senior scientists. The other portion of our gift will enhance the patient experience in the renovated W. M. Keck Court and provide resources to meet the needs of disadvantaged patients who require complex care. This gift brings our giving to UCLA to $55 million and our giving to the University of California campuses to more than $165 million. Our relationship with UCLA and the University of California has been a source of great pride for both institutions, and we are excited to continue this partnership with UCLA. In particular, I want to thank Dr. James Economou, our Senior Medical Advisor and UCLA's Beaumont Distinguished Professor of Surgery, for the depth of scientific expertise he is giving to this partnership and for his friendship.

As Southern California is our backyard, we joined the California Wildfire relief efforts after the unprecedented destruction, loss of life and enormous challenges facing survivors through grants totaling $1 million to Direct Relief

and the California Community Foundation's California Wildfire Relief Fund.

In 2018, we again faced a family loss when my cousin, Howard Keck, Jr., passed away. Howard served on our Board for almost 47 years, and he faithfully served on our Executive, Audit and Science and Engineering Committees. We continue to bring along the fourth generation of W. M. Keck's family with the election to our Board of my nephew, Matt Day, Jr., and my son, Jon Day, who is also joining our Executive Committee along with my nephew, Brian Finch.

We continue our tradition of seeking advice from scientific leaders with the addition of Dr. Edward Stolper as a Director and Member of the Executive Committee and the Science and Engineering Committee. In addition to being a Professor at the California Institute of Technology, as well as its past Provost and Interim President, Ed has been a vivid historian, preserving the long relationship between our institutions that began in the 1930s when my grandfather sought help for Superior Oil from Caltech's geologists.

Dr. Stolper is filling the Senior Scientific Advisor shoes of Dr. Thomas Everhart who continues on our Board and Committees. Not only are we grateful to Tom for continuing to lend his broad knowledge of science and philanthropy, but we truly appreciate his many years advising our Board and staff as Senior Scientific Advisor after he became President Emeritus at the California Institute of Technology in 1997.

The W. M. Keck Foundation's endowment closed 2018 with total assets of $1.17 billion, after distributing approximately $54 million in grants during the year. As with many institutions, we had a very positive first three quarters but were affected by the sharp market downturn in the last quarter. I am pleased that as of March 31, 2019, total assets had returned to $1.28 billion. Despite the tumultuous end to 2018, I am optimistic the Foundation will continue to achieve positive results, both financially and in the realms of science, medicine and our community.

Of course, this work would not continue without our dedicated professional staff. I, along with our Board, truly enjoy working with them to support pioneering discoveries in science, engineering and medicine and organizations that enrich the lives of children, youth and families.

Robert Day
Chairman and Chief Executive Officer
W. M. Keck Foundation

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1954 – 1964

Howard B. Keck
Chairman and CEO
1964 – 1994

Robert A. Day
Chairman and CEO
1995 – Present

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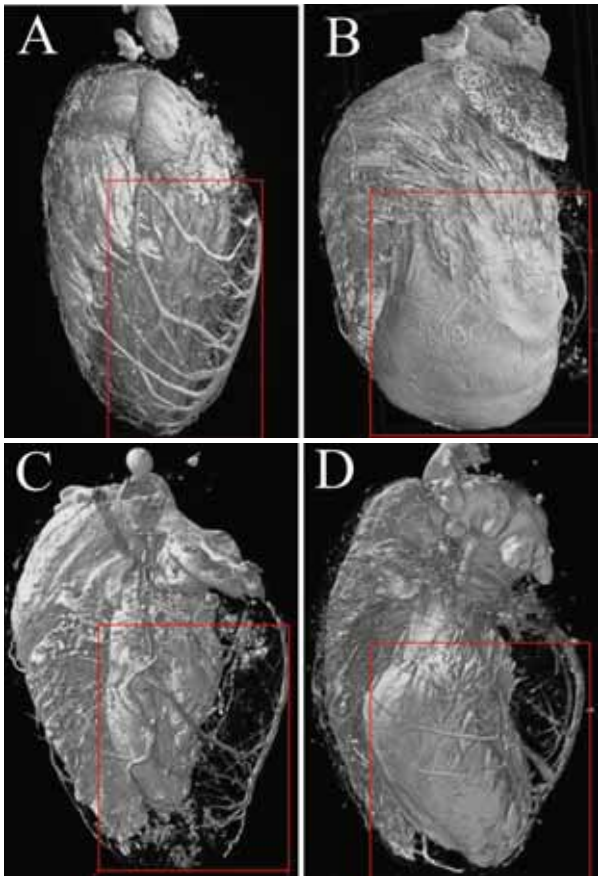
Los Angeles, California

Acomys: A Spokesmodel for Mammalian Regeneration

SEATTLE CHILDREN'S RESEARCH INSTITUTE & UNIVERSITY OF FLORIDA

A flat worm, if cut in half, can become two worms. Salamanders can regrow a lost tail or replace a cut off limb. But regeneration of damaged tissues is much more limited in mammals. Mammals cannot regenerate whole limbs or most internal organs. Because of scarring, we have thought mammalian regeneration of skin following a wound is not perfect. However, scientists are studying a remarkable animal that is beginning to reveal how mammals can regenerate skin with little or no scarring. First described in the scientific literature in 1803, the spiny mouse of the genus *Acomys* inhabits arid environments and rocky outcroppings throughout Africa, as well as the middle East and southwest Asia. Like all small rodents, *Acomys* has evolved ways to foil predators. One such defense mechanism is its ability to shed its skin (even its outer layers down to the muscle) when caught. Even more amazing, spiny mice proceed to regenerate their skin with associated hairs, glands and even smooth muscles without signs of scarring. Scientists have been studying regeneration of tissues in worms and salamanders, but these organisms are much further removed from humans evolutionarily; and their mechanisms for regeneration may be less applicable to human physiology. The *Acomys*, being a mammal, is much closer. Using this organism seemed like a sure bet for investigating this phenomenon; but traditional government funding sources were not interested until more work was done to demonstrate the feasibility of studying *Acomys*.



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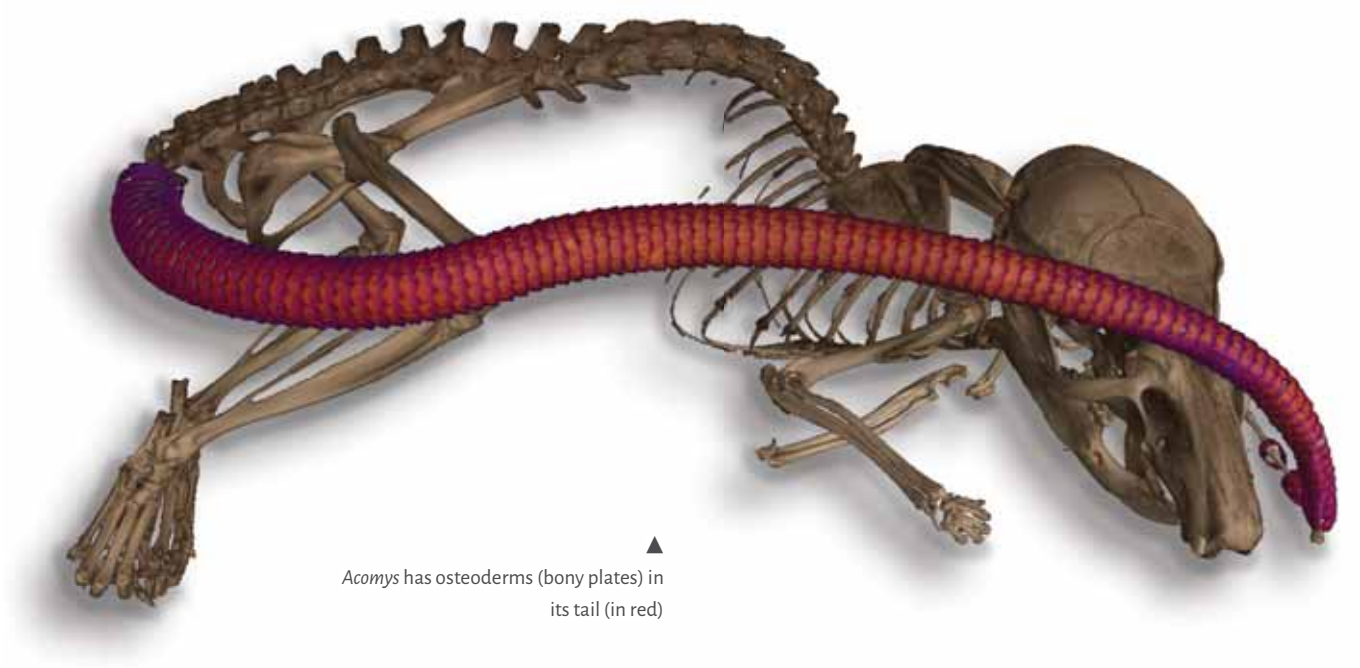
(A) Microcomputed tomography image of a mouse heart vasculature after sham treatment

(B) Mouse, after myocardial infarction (MI)

(C) *Acomys* sham treatment

(D) *Acomys* after MI

To jump-start this research, the Keck Foundation invested in 2013 and 2015 in two research groups that were pioneering the development of the *Acomys* into a model organism for regeneration. Malcolm Maden, at the University of Florida, and Mark Majesky and Kathleen Millen, at Seattle Children's Research Institute, are taking on the daunting task of developing optimal conditions for raising the spiny mice to keep them healthy and reproducing. Paul Wakeknight in the Millen lab has even become known as the *Acomys* whisperer. Once breeding colonies were established, the researchers turned to understanding the mechanisms that enable the *Acomys*' scar-free skin regeneration. Using this new mammalian model to understand the nature of scar-free regeneration could result in new

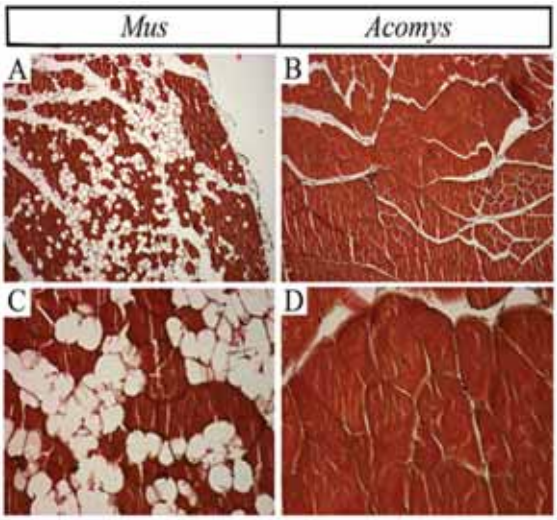


▲
Acomys has osteoderms (bony plates) in its tail (in red)

biological scaffolding technologies for regenerative medicine. In addition, the researchers are sequencing the *Acomys* genome so that scientists can generate transgenic animals to allow researchers to test hypotheses about gene function in regenerative wound repair.

A natural comparison animal for *Acomys* studies is the lab mouse (genus *Mus*) which shows none of *Acomys'* regenerative powers. With their Keck grant, Maden and his colleagues demonstrated that, during scar-free healing, *Acomys* displays only a moderate immune response compared to *Mus,* which has a strong inflammatory response. Also, the matrix of collagen and other biomolecules that forms the structural support for cells in healing tissues is like that of fetal tissue in *Acomys*, but not in *Mus*. Genes representing many regulatory biochemical pathways are different in the two species after injury.

In later work, Maden's group showed that the *Acomys* regenerates not only skin but also the muscles of the heart after a heart attack. In humans and the laboratory mouse, after a myocardial infarction, heart muscle cells at the site of blood flow restriction die, while fibroblasts proliferate locally and lay down scar tissue, known as fibrosis. In contrast, normal heart cells proliferate in the *Acomys* after such injury and new blood vessels quickly develop. Fibrosis is associated with a number of other pathologies besides heart attack damage. These include chronic kidney disease, lung and burn scarring and spinal cord injuries. Both the Maden lab and the Majesky-Millen labs are researching various aspects of *Acomys'* responses to these injuries.

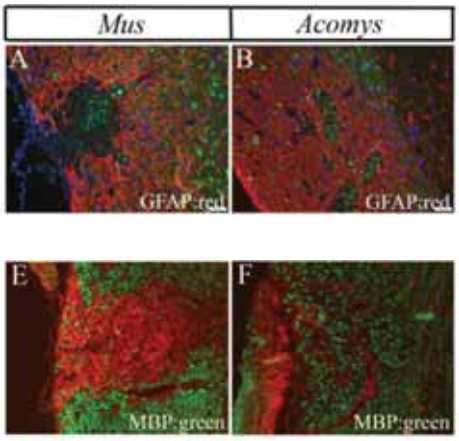


▲
(A) Mouse muscle injured by cardiotoxin showing muscle breakdown and replacement by fat
(B) *Acomys* muscle with the same type of injury showing the muscle has regenerated
(C) Higher magnification of image A
(D) Higher magnification of image B

One critical way to prove that specific genes and their protein products are responsible for the absence of fibrosis is to engineer these *Acomys* genes into fibrosis prone genomes such as *Mus* and human cells and also into *Mus* animals. The Majesky-Millen labs are successfully developing the methods to accomplish this goal. Using these techniques, they are investigating a molecular pathway called Hippo/YAP that they have identified as central to *Acomys* regeneration. A key pathway in developmental biology, Hippo/YAP regulates organ size and tissue maintenance, and its deregulation can lead to cancer. These studies resulted in a proof of principle that *Acomys'* responses to injury can be replicated in fibrosis-producing genomes and that at least some of the pathways implicated in the response are relatively recent gene adaptations that were naturally selected. Such research tools will help investigators identify drug candidates to prevent or even reverse fibrosis.

With such stunning results coming from just two institutions, there is no doubt that the little spiny mouse, *Acomys*, may soon reveal how humans, as well as other mammals, can overcome injury to both external and internal organs in a way that restores them to full function.

▼
Acomys



Spinal cord injury site after four weeks. Astrocytes in red indicating scar formation and a neuronal marker in green in mouse **(Left)** and *Acomys* **(Right)** cord. Collagen IV (red) and myelin basic protein (red) staining suggest there are myelinated axons within the damage site in *Acomys* and more collagenous scarring material in mouse.

Tufts University

Improving Limb Regeneration in Adult Frogs

The repair of damaged limbs in humans is of paramount importance; yet the induction of limb regeneration in adult vertebrates remains an unsolved problem. Tufts University investigators Michael Levin and David Kaplan are studying methods to promote limb regeneration in the adult frog. They have developed a wearable bioreactor containing a silk-based material that can be applied to amputated frog limbs to deliver compounds encouraging tissue growth. They discovered that delivery of the hormone progesterone for only 24 hours following hind-limb amputation in adult frogs induced prolonged regeneration over a nine-month period into paddle-like structures, which are now even developing finger-like structures. In contrast, amputated limbs regenerated into rudimentary spikes in untreated animals (Figures). The composition of the regenerated tissue in the treated animals also resembled that of normal tissue, unlike the growths in untreated frogs. In follow-up experiments with mice, the investigators succeeded at inducing regeneration of amputated digit tips. They are currently working on optimizing the bioreactor and delivery of regeneration-promoting factors and on fully characterizing the structure and composition of the regenerated tissue. The team's studies have led them to believe that the regeneration cascade is controlled by specific trigger points that kick start the process and maintain it longer-term. They plan to use their wearable bioreactor to identify the master regulators of regeneration and exploit them in efforts to regenerate larger amputated extremities in mice.

Hind-limbs of adult frogs spontaneously regenerate into cartilaginous 'spikes'

In both figures, the amputation plane is indicated with a dashed line

Treatment of the amputation site with progesterone leads to the formation of a paddle-like structure

Clean Power at the Bottom of the Ocean

University of California, Irvine

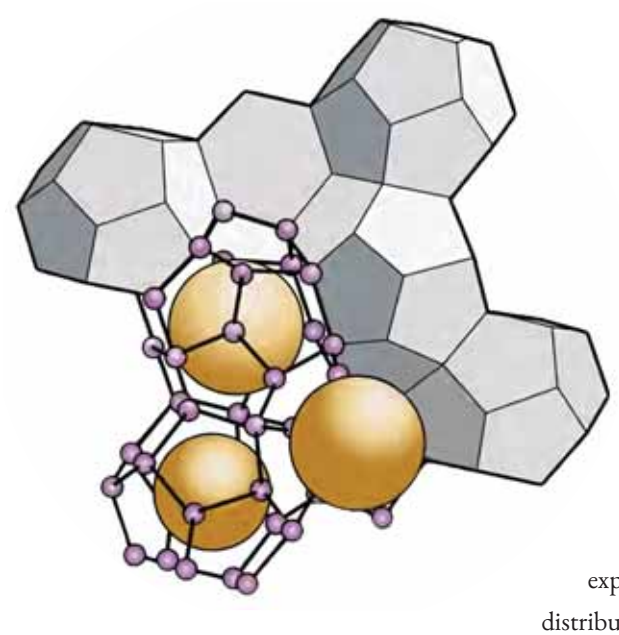
Imagine a power station that produces inexpensive energy with no pollution and lies at the bottom of the ocean. It sounds like the stuff of science fiction, but this was the guiding vision of a research project at the University of California, Irvine (UCI), funded by the Keck Foundation in 2012. With this award, Derek Dunn-Rankin and Peter Taborek, with project scientists Sunny Karnani and Yu-Chien (Alice) Chien, built the W. M. Keck Deep Ocean Power Science Laboratory, a unique facility that can recreate the pressures found at the bottom of the sea.

Figure 1 ▲
A burning snowball. Water drips during methane hydrate combustion

The visionary power station would be fueled using methane from hydrate clathrates, a form of ice that burns (Figure 1). As ice composed of methane hydrates (MH) melts, it releases over 160 times its volume of methane gas, making these fiery snowballs an attractive energy source. This drives global interest and research in using MH as an inexpensive, clean-burning fuel, especially in countries that need to import fossil fuels. The primary byproducts of combustion are water and carbon dioxide (CO_2).

Clathrates are a class of materials that trap one substance inside the matrix of another. In hydrate clathrates, water molecules freeze into a crystal with an open framework that can trap small molecules such as methane (CH_3 or natural gas) and CO_2 (Figure 2). Methane hydrates are naturally occurring forms of ice, found in abundance throughout the world's oceans and underground in permafrost (Figure 3). In fact, the world-wide volume of MH is comparable to all other fossil fuels combined. However, methane hydrates are a problem as they can form spontaneously in natural gas pipelines, where they interfere with valves and flow sensors and can block the flow of gas.

The Keck Deep Power Science Lab has focused on the formation of MH and their combustion at extreme pressures. To standardize the MH samples, they were grown in the laboratory. Surprisingly, the researchers found that adding sodium dodecyl sulfate, a common surfactant used in many home cleaning products, enhanced the growth rate by a factor of 100. Without surfactant, water forms a shell of normal ice, which is denser than the clathrate structure and slows the uptake of methane. The addition of a surfactant causes the MH to grow with a highly branched structure that looks like frost. This high surface area can more readily absorb methane. Conversely, the addition of salt significantly suppresses the formation of MH and is commonly used to prevent their formation in natural gas pipelines.



▲ **Figure 2**
Clathrate hydrate has a special chemical structure trapping methane in a crystallized water cage

So, how does a MH burn? Much like a candle. Once ignited, heat from the flame melts a bit of the ice, coating it in a liquid film. Methane and water vapor escape the liquid film, forming a second layer that feeds the flame, while excess liquid water drips from the bottom of the MH as it burns (Figure 4). For combustion to continue, most of the water from the hydrate must drain away. Unlike a candle, much of the heat of the burning methane is absorbed by the vaporization of water. The UCI group developed a test stand to investigate the behavior of water-laden methane flames. Not surprisingly, they found that the higher the water content, the lower the flame temperature. Importantly, their experiments measured the temperature profile of the flame and the distribution of hydroxide (OH), a reaction intermediate, in the flame. Their results matched theoretical predictions.

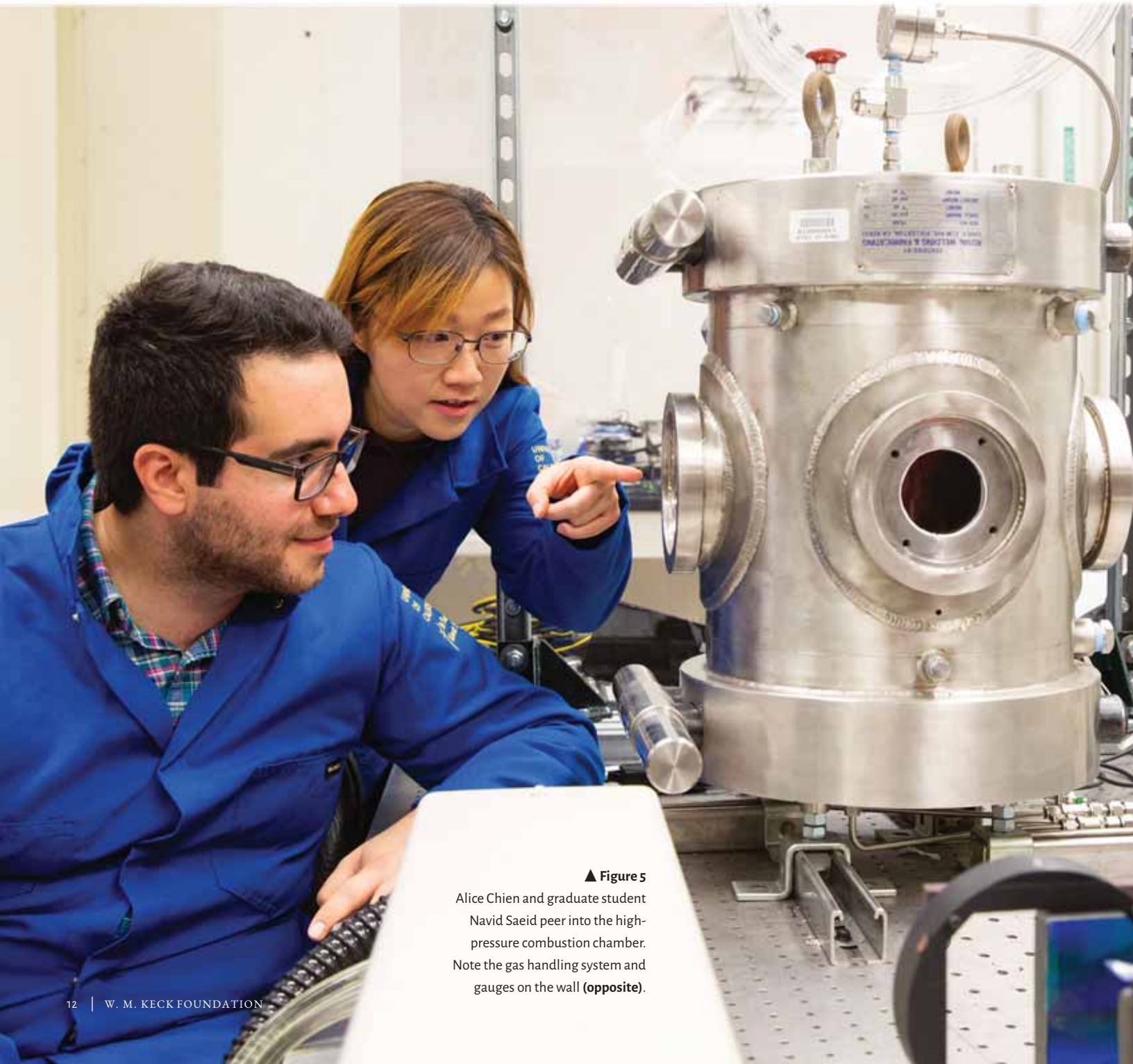
The team is now applying what it has learned about water-laden methane flames to the combustion of MH under pressure. Methane clathrates are found in the oceans at depths with pressures of 100-200 atmospheres, a new regime in combustion science. These enormous pressures necessitated the construction of a heavy-walled combustion chamber, which took several years to produce. The chamber has optical access for measurements and visual inspection of the combustion process (Figure 5). As part of the diagnostic system, the team developed a novel optical temperature sensor that can be moved through the flame to determine its temperature profile. The team also purchased a femtosecond laser to holographically image the combustion process.

The new research frontier of the Deep Power Sciences Lab is the sequestration of CO_2. Initial experiments worked with a two-step process of first burning MH, then refreezing the water released during combustion in a gas stream of CO_2 to form carbon dioxide hydrates. Just like the MH, the CO_2 hydrates contain over 160 times their volume of CO_2 gas and form a stable ice at the pressures and temperatures of the deep ocean. The CO_2 hydrate could safely be returned to the ocean floor as the only waste product of power generation. The UCI team is now pursuing a new strategy – direct replacement of methane with CO_2 without melting the MH. If successful, liberation of methane without first melting the MH would be a huge win for power generation on two fronts. First, the substantial amount of heat lost to the melting of MH and vaporization of water could instead be used to generate power. Second, the amount of water in the methane flame would be greatly reduced, leading to a much hotter flame, which is more efficient for power production.

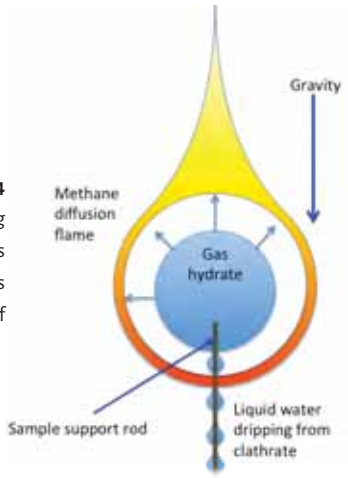
▲ **Figure 3**
Chunks of methane hydrate clathrate in a sample from the Gulf of Mexico

It turns out that CO_2 hydrates are thermodynamically more favorable than MH, so nature is on their side. However, natural exchange is too slow to be practical. The team is exploring ways to speed up the process by increasing the surface area of the MH exposed to CO_2 and exploring different pressure and temperature regimes.

The scientific community questioned whether a deep power science laboratory like the one proposed by UCI could be built. We are pleased to have taken the risk to fund the Dunn-Rankin and Taborek team, which has not only successfully built the laboratory but continues to bring this cutting-edge science to the forefront while also engaging many students in the field of MH and combustion science.



▲ Figure 5
Alice Chien and graduate student Navid Saeid peer into the high-pressure combustion chamber. Note the gas handling system and gauges on the wall **(opposite)**.



▶ **Figure 4**
Schematic of a burning sphere of MH. Water coats the surface with the excess dripping off

▲
(Above) One of the six domes atop Mount Wilson that house the telescopes of the CHARA Array interferometer

(Right) Images of five stars based on observations with the CHARA Array

▲
Gazing out the dome of one of the six telescopes that make up the CHARA Array

Georgia State University

Enhancing Data and Imaging Capabilities

Over twenty years ago, Georgia State University began building the Center for High Angular Resolution Astronomy (CHARA) Array of telescopes atop Mount Wilson in Southern California. Mount Wilson is a geographically modest but historically important peak for the field of astronomy. Easily visible from the offices of the Keck Foundation in downtown Los Angeles, the summit is home to many record-breaking telescopes, including the CHARA Array, which has the highest resolution of any optical or infrared system ever built, allowing unprecedented views of the stars.

The CHARA Array began as an optical interferometric array of five one-meter telescopes whose five beams of light can be combined to provide the equivalent angular resolution of a single, giant telescope 330 meters in diameter. A Keck Foundation grant in 1998 enabled construction of a sixth telescope that provided data and imaging capability growth of over 50% – at an overall increase in cost of just 13% – a powerful example of leveraged funds.

The Array has proved spectacularly successful at studying stars "up close." Most telescopes see stars as points of light from which much can be measured and learned; but they collect almost no information about these stars' shapes and surface properties. Without interferometers and their high angular resolution, we have only our Sun to study for such important details. CHARA has also provided surprise after surprise about the diverse types and behaviors of stars in our neighborhood of the galaxy, including extremely fast rotators (with distorted shapes), as well as the first resolved images of binary star systems that reveal exotic aspects of their creation and destruction.

More recently, the CHARA Array has installed adaptive optical systems that use mirrors capable of changing shape many hundreds of times per second so they can correct for the image distortions introduced by the atmosphere.

Leveraging Distance Learning to Educate Engineers on Campus

Benedictine College

It is expensive to start an undergraduate engineering program on campus from scratch. Yet student demand and a robust job market for engineers in the 2000s placed this goal front and center for Benedictine College, a liberal arts college in Atchison, Kansas.

For decades, Benedictine had considered starting an on-campus program but was stymied by the high cost. In 2007, Benedictine came up with an alternative after another advisory board convened to explore the engineering program's feasibility. A chemical engineering faculty member at the University of North Dakota (UND), Darrin Muggli, heard about Benedictine's efforts. He visited the small campus to make a presentation about UND's distance education programs, which at the time included the only accredited online engineering program in the country. By 2009, Dr. Muggli had moved south and was leading the effort to bring an engineering program to Benedictine students. Benedictine and Dr. Muggli developed a model that uses distance education to establish engineering programs rapidly and economically at four-year institutions that would otherwise not have the resources to do so.

▼

(Below) Distillation column built by students for the chemical engineering separations lab

(Bottom Left) Student makes modifications to the distillation column

▶
Student-built concrete crusher for civil engineering laboratory class

The plan was for students (with guidance from Benedictine faculty mentors) to take online courses from UND while Benedictine continued to steadily recruit additional engineering students and faculty on campus. Students would then graduate with a liberal arts degree from Benedictine and an engineering degree from UND.

▼
(Below) Student-built hydraulic pump cart with computer control of flow, pressure, or pump speed
(Middle) Student adjusts the pump speed of a hydraulics cart to power an open-channel flume
(Bottom) Student captivated by the "hydraulic jump" generated in the flume.

Benedictine launched its program in 2009 and received a 2010 Keck Foundation grant, along with strong support from local alumni and regional industry. The National Science Foundation pushed the project forward with funding for curriculum development and laboratory equipment. The Foundation made a second grant in 2015 to further solidify the engineering program by funding curricular enhancements based on project-based learning.

While a key component in establishing engineering programs is the acquisition of laboratory equipment, the budget can be high. One of the highest impacts on the feasibility of Benedictine's implementation plan was its decision to develop student projects for building laboratory equipment, which not only saved money ($160,000 vs. a $390,000 purchase price) and resulted in equipment better suited to educational needs, but most importantly provided students with excellent hands-on and project management experience.

Examples of student-designed and -built equipment include a cyclone dust collector, a fluidized bed, and a concrete crusher. The latter involved the development of a new servo-controlled pressure system that enables a specified loading profile that students use to verify their concrete designs in the civil engineering concrete lab.

Some of the projects are more mundane, such as building a cart that allows the heliarc welder and associated gas cylinder to be safely moved around the shop while keeping the appurtenant peripherals from getting lost. And not all projects work out the first time around, such as a "process trainer" that teaches students the knowledge and skills needed for controlling and modifying the chemical properties of a substance, which is important in pharmaceutical companies, beverage companies and refineries. The first group of students to tackle this project struggled, leading the instructor to modify his approach to teaching it the next time around.

Students have also learned valuable engineering skills while building recreational tools, such as an improved fishing tackle box and a collapsible truck rack. As one student described her project: "We had to construct a bow [for shooting arrows] ... that incorporated calculations to find the forces each wood could withstand at different thicknesses and lengths ... the best part was making something physical from the equations and concepts I learned in class. It was very cool to see my bow perform to the qualifications I designed it to."

▼
Students casting aluminum as part of a manufacturing processes lab

Since its inception in 2009 with four students and one professor, the Benedictine College School of Engineering has grown to over 225 students and 10 full-time professors, and Benedictine now has its own accredited degree in mechanical engineering while continuing to partner with UND to offer degrees in other engineering disciplines. Dedicated, vibrant faculty have been a key element as well. Dr. Muggli was recognized for outstanding teaching by the College in 2011, and his co-investigator, Dr. Kimberly Shankman, was honored as educator of the year at Benedictine in 2013.

The impact of developing this program reaches beyond the Benedictine College campus. Benedictine developed the engineering program as a model for other liberal arts colleges, in particular by demonstrating the modest cost and low risk of their collaborative approach with UND. Dr. Muggli has visited with a number of these campuses, many of which expressed great interest, with several entering into their own memoranda of understanding with UND. With modest costs and little risk, this flexible model can be replicated at any of a large majority of U.S. colleges that do not now offer engineering degrees.

▲ Nurturing living things

Enriching the Lives of Young Children

Child Development Institute

Early childhood experiences matter greatly. Ninety percent of brain development occurs before age five and is shaped by the child's environment. Sadly, for a variety of reasons, one in four young children is at risk for a developmental delay according to the Centers for Disease Control and Prevention. That is why opportunities provided by the Child Development Institute (CDI) are so important.

▲ Geometry for toddlers

The CDI has earned a strong reputation in the early childhood field for expertise and quality programming. The Institute grounds its activities and services in research on child development, brain science and learning theory. It bases its support for families on the nationally recognized Strengthening Families Framework. Research shows this framework is effective in preventing child abuse and neglect by reducing stress, improving parents' bonds with their children and building their resiliency through social connections with other families.

When a shuttered public library in the heart of Canoga Park in Los Angeles became available, CDI seized the opportunity to create a free, drop-in Early Learning Center for children ages zero to six. In this welcoming environment, parents find a safe, enriching place where their children can learn and be curious about the world around them and play with other youngsters. For children who have, or are at risk for, developmental delays and disabilities, therapeutic interventions are embedded throughout the Center's programming in a non-stigmatizing way.

▶ Developing an appreciation for nature

Canoga Park is a densely populated, predominantly Latino immigrant community in the San Fernando Valley. Six in ten children live in poverty, 40% of mothers have less than a high school education, and births to teenage mothers are significantly higher than the county rate. Overcrowded housing, unsafe neighborhoods and limited open space curtail opportunities for children to play and interact with their peers and the natural world. These factors increase children's risk for developmental delays, academic failure and poor life outcomes.

▲ Cooperative play

A grant from the Keck Foundation in 2009 supported renovation of the library to establish the Early Learning Center. The space houses a Children's Discovery Zone, featuring a climbing tree, a dress-up station, and a science and art center. There is also a lending library, teaching kitchen and infant room. Outdoor activities take place in the nature classroom and a children's garden. A partner agency operates an onsite Head Start program. Open six days a week, the Center welcomes an average of 1,300 children and family members each month, resulting in an estimated 23,000 individual annual visits. This high usage far exceeds initial projections and confirms the community's significant need for easily accessible early childhood programming and resources.

At the Center, children have ample time for free play, which, as Dr. Joan Maltese, CDI's President and CEO says, "builds their brains." She adds that, "They are finding out about cause and effect, problem solving, and sharing, as well as discovering that learning can be fun." Structured activities include Mommy and Me classes, reading circles, and movement and stress reduction workshops. For parents who have concerns about whether their child is reaching age-appropriate milestones, the Center's staff and other training professionals are on hand for consultation. More than 500 children benefit from developmental screenings annually, with over 40% receiving referrals for additional supports and services. "By catching developmental delays or disabilities early, a child's life trajectory will be changed because our interventions happen when they can make the most difference," says Maltese.

The opportunity to address parents' concerns in a non-threatening environment is particularly important for the families CDI is serving. Data show that fewer children living in underserved communities are being referred for early intervention services compared to those from wealthier areas. In Canoga Park, before the Center opened, no similar programs existed to identify children with developmental delays before they entered school.

Building on this groundbreaking work, CDI is developing a second Early Learning Center in Reseda, an equally high-need community in the San Fernando Valley. With additional support from the Foundation, the Institute will remodel a mid-century church to house a new Center replete with the same features that make the Canoga Park facility so inviting. The CDI expects that after the Center opens in early 2020, over 5,000 children and families will visit annually. Both locations also will provide unique training opportunities to individuals interested in early childhood careers.

The critical role of children's earliest experiences cannot be overstated. By replicating its successful programs and activities, CDI will be providing rich experiences that promote the healthy development of an even greater number of underserved children to help them thrive.

▼
Building gross motor skills

▲
Learning balance and coordination

THE HELP GROUP

STEM and Special Needs – A Pathway to Success

Special needs students with an affinity for science, technology, engineering and math (STEM) often fail to enroll in or complete college because of learning disabilities and poor social skills. Consequently, as adults they are either unemployed or underemployed, while millions of STEM jobs go unfilled.

The HELP Group serves children, adolescents and young adults with special needs related to autism spectrum disorder, learning disabilities and developmental delays at nine specialized schools. In the Fall of 2015, the HELP Group opened the STEM³ Academy at its Valley Glen campus to 56 middle and high school students. In 2016, the Keck Foundation supported the HELP Group's development of an elementary school component to the program and the fine tuning of its project-based curriculum.

Students are thriving in the STEM³ Academy's rich academic environment. They design and make prototype objects using equipment like 3D printers, laser cutters (CNC routers) and hand tools. Guest speakers from companies such as Northrop Grumman, Caltech and Netflix, as well as field trips to the Jet Propulsion Lab and City of Hope, offer a window into a world of work many of the students never imagined for themselves. Annual career days and internships round out the opportunity to dream big. About two thirds of the 2018 graduating class enrolled in college. Among the prior year's graduates, 85% are pursuing degrees in STEM fields.

Given the STEM³ Academy's success in Valley Glen, the program has expanded to a campus in Culver City. A total of 128 students are enrolled in the program at the two locations.

◄
Prototyping a design for a 3D printer out of cardboard

◄
Discussing the workings of robots

▲
The Robotics team at FIRST World Championship

2018 REPRESENTATIVE GRANTS

2018 REPRESENTATIVE GRANTS

MEDICAL RESEARCH

Center for Infectious Disease Research
Seattle, WA
Alexis Kaushansky, Noah Sather
$1,000,000
To evaluate the role of prior infection in vaccine-induced protection.

Rockefeller University
New York, NY
Erich Jarvis, Shiaoching Gong, Michael Long, Ofer Tchernichovski
$1,000,000
To study the neurocircuits underlying language development.

Salk Institute for Biological Studies
La Jolla, CA
Janelle Ayres
$1,000,000
To investigate mechanisms of infectious disease tolerance.

Scripps Research Institute
La Jolla, CA
Peter Schultz, Angad Mehta
$800,000
To study new bacterial strains with chimeric RNA-DNA genomes.

University of California, Davis
Davis, CA
Ben Montpetit, Priya Shah, Christopher Fraser, Richard Wozniak
$1,000,000
To investigate the function of Flaviviridae viral RNA in the host cell nucleus.

University of California, San Francisco
San Francisco, CA
Diana Laird, Andrew Brack, Saul Villeda
$1,000,000
To develop a novel chimeric rodent model for studies on aging.

University of Chicago
Chicago, IL
Tao Pan, Murat Eren, Eugene Chang, Mitchell Sogin
$1,000,000
To develop a high throughput molecular technique to interrogate the function of the microbiome.

University of Virginia
Charlottesville, VA
Michael Wiener, Lei Wang, Ken Dill
$1,000,000
To develop a new high-resolution methodology for protein structure determination.

Washington University in St. Louis
St. Louis, MO
Weikai Li, Rui Zhang
$1,000,000
To develop a termini coupling method for determining the structure of human membrane proteins.

SCIENCE AND ENGINEERING RESEARCH

Arizona State University
Tempe, AZ
Anne K. Jones, Peter R. Buseck, Moreno Meneghetti, Tarakeshwar Pilarisetty, Scott G. Sayres, Timothy C. Steimle
$1,000,000
To synthesize 1D carbon chains stabilized by metal clusters.

Colorado State University
Fort Collins, CO
Kristen Buchanan, Mario Marconi, Carmen Menoni, Jorge Rocca
$1,000,000
To image and direct the propagation of magnetic spin waves at the nanoscale.

Purdue University
West Lafayette, IN
Chen-Lung Hung, Sergei Khlebnikov, Luis Martin Kruczenski, Qi Zhou
$1,000,000
To test the equivalence of string and field theories in a laboratory scale experiment.

University of California, Berkeley
Berkeley, CA
Stephen Leone, Norman Yao
$1,000,000
To explore nonequilibrium quantum phases using ultrafast X-ray spectroscopy.

University of California, Santa Barbara
Santa Barbara, CA
Andrea Young
$1,000,000
To develop a new high-resolution scanning probe microscope for thermal and magnetic imaging at millikelvin temperatures.

University of Colorado at Boulder
Boulder, CO
Dan Dessau, Gang Cao, Josef Michl, Charles Musgrave, Sean Shaheen
$1,000,000
To achieve high temperature superconductivity in organic solids by engineering intermolecular coupling.

2018 REPRESENTATIVE GRANTS (CONTINUED)

University of Hawai'i at Mānoa
Honolulu, HI
Margaret McFall-Ngai, Anthony Amend, Nicole Hynson, Camilo Mora, Craig Nelson, Joanne Yew
$1,000,000
To study the microbiome in a Hawaiian watershed across multiple ecosystems.

University of San Diego
San Diego, CA
Rae M. Robertson-Anderson, Moumita Das, Jennifer L. Ross, Michael J. Rust
$1,000,000
To develop biomaterials that autonomously modulate their mechanical properties from stiff to soft.

Washington State University
Pullman, WA
David Y. Lee
$700,000
To investigate chemical reactions that circumvent the classical transition state.

Woods Hole Oceanographic Institution
Woods Hole, MA
Ying-Tsong Lin, Daniel P. Zitterbart, Paul Matthias, John N. Kemp
$1,000,000
To develop a 3D acoustic sensor that will detect and interpret sounds in deep oceans.

SOUTHERN CALIFORNIA

Civic and Community

Bet Tzedek
Los Angeles, CA
$250,000
To expand the Employment Rights Project to provide legal assistance to human trafficking survivors.

Boys & Girls Clubs of the Los Angeles Harbor
San Pedro, CA
$250,000
To provide employment and career pathways for non-college going youth.

Boys & Girls Clubs of Metro Los Angeles
Los Angeles, CA
$300,000
To expand quality programming to more at-risk youth by strengthening operational capacity.

California State University, Northridge
Northridge, CA
$300,000
To develop 50 virtual reality scenarios and assess their effectiveness in training mental health professionals.

Center for the Pacific Asian Family
Los Angeles, CA
$200,000
To renovate a transitional living facility for victims of domestic violence and their children.

Goodwill Industries of Southern California
Los Angeles, CA
$300,000
To create a replicable program model that provides vulnerable populations with employment opportunities in manufacturing.

Los Angeles Child Guidance Clinic
Los Angeles, CA
$250,000
To improve outcomes for at-risk transition age youth by constructing a new facility for the Life Learning Center.

Richstone Family Center
Hawthorne, CA
$300,000
To expand and integrate child abuse prevention, treatment and wellness services by constructing a Family Healing Center.

United Way of Greater Los Angeles
Los Angeles, CA
$400,000
To catalyze efforts to reduce street homelessness and expand the production of lower cost permanent housing.

Wayfinder Family Services
Los Angeles, CA
$250,000
To recruit, train and support families to care for foster children with special needs.

Early Childhood

Child Development Institute
Woodland Hills, CA
$500,000
To establish the Reseda Early Learning Center for children at risk for developmental delays and their families.

Uplift Family Services
Los Angeles, CA
$250,000
To expand early intervention services that promote young children's readiness for school.

Health Care

Didi Hirsch Community Mental Health Services
Culver City, CA
$500,000
To expand services by providing a permanent home for the Suicide Prevention Center.

Partners in Care Foundation
San Fernando, CA
$250,000
To develop a sustainable model for integrating community-based social services with healthcare.

Valley Community Healthcare
North Hollywood, CA
$300,000
To increase access to health care by hiring two registered nurses who will have an expanded role in the clinical setting.

Vision to Learn
Los Angeles, CA
$225,000
To provide free eye exams and corrective lenses to low-income children in Los Angeles County by purchasing two mobile vision clinics.

Precollegiate Education

Advancement Project
Los Angeles, CA
$350,000
To develop a web-based visualization of LAUSD's budget, educational indicators and neighborhood conditions for decision-making at the district and school site levels.

College Track
Los Angeles, CA
$250,000
To enable underrepresented South Los Angeles students to enroll in and graduate from college.

UNITE-LA
Los Angeles, CA
$300,000
To improve teacher preparation in science and math through a data sharing partnership between LAUSD and six local schools of education.

UNDERGRADUATE EDUCATION

Azusa Pacific University
Azusa, CA
James H-J Yeh
$200,000
To integrate the Internet of Things and other wireless communications into the engineering and computer science curriculum.

California State University, Bakersfield
Bakersfield, CA
Chandranath Basak
$150,000
To acquire equipment for teaching and research in marine science.

California State University, Los Angeles
Los Angeles, CA
John Bachman
$325,000
To promote hands-on, project-based learning by equipping a makerspace for use in engineering, computer science and technology.

Mount Saint Mary's University
Los Angeles, CA
Kim Middleton
$350,000
To engage students with hands-on learning across the curriculum by establishing and equipping a makerspace.

Oregon Institute of Technology
Klamath Falls, OR
Eklas Hossain
$225,000
To expand an electrical power grid laboratory for use in research and course work.

San Jose State University
San Jose, CA
Lionel Cheruzel
$325,000
To develop a program aimed at recruiting and training freshman biochemistry and chemistry students to conduct collaborative student/faculty research.

Texas A&M University
College Station, TX
Wei Li
$300,000
To develop an interdisciplinary program for students to explore the design of smart/connected communities of the future.

University of Dallas
Irving, TX
Ellen Steinmiller
$300,000
To purchase a scanning electron microscope for cross-disciplinary use in courses and research.

University of Montana
Missoula, MT
Richard Bridges
$300,000
To integrate student competencies in STEM and the humanities through new co-curricular activities in neuroscience.

University of Utah
Salt Lake City, UT
Stephen Goldsmith
$250,000
To establish an undergraduate minor in dark sky studies by developing three new courses and a drone-based research program.

2018 FINANCIAL STATEMENTS

REPORT OF INDEPENDENT AUDITORS

The Board of Directors
W. M. Keck Foundation

We have audited the accompanying financial statements of the W. M. Keck Foundation, which comprise the statements of financial position as of December 31, 2018 and 2017, and the related statements of activities, and cash flows for the years then ended, and the related notes to the financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in conformity with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free of material misstatement, whether due to fraud or error.

Auditor's Responsibility

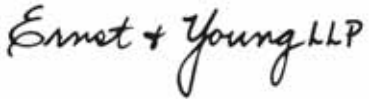
Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the W. M. Keck Foundation as of December 31, 2018 and 2017, and the results of its activities and its cash flows for the years then ended in conformity with U.S. Generally accepted accounting principles.



May 10, 2019

STATEMENTS OF FINANCIAL POSITION

December 31 *(In Thousands)*		2018		2017
Assets				
Cash and cash equivalents	$	19,521	$	23,032
Interest and dividends receivable		1,649		1,492
Prepaid federal excise taxes		423		432
Investments		1,133,884		1,236,616
Unsettled trades		12,771		12,739
Other assets		402		399
Total assets	$	1,168,650	$	1,274,710
Liabilities and net assets				
Payable to brokers	$	138	$	925
Accounts payable and accrued expenses		1,389		1,606
Grants payable		24,355		13,800
Deferred federal excise taxes payable		2,938		5,082
Total liabilities		28,820		21,413
Net assets without donor restrictions		1,139,830		1,253,297
Total liabilities and net assets	$	1,168,650	$	1,274,710

See accompanying notes

STATEMENTS OF ACTIVITIES

Year Ended December 31 *(In Thousands)*	2018	2017
Revenues, income and (losses) gains		
Net investment income and (losses) gains:		
Interest	$ 7,495	$ 5,813
Dividends	9,419	9,859
Net realized gains on investments	52,141	70,381
Change in net unrealized (losses) gains	(107,235)	132,411
Investment management expenses	(6,163)	(6,438)
Taxes withheld	(261)	(304)
Total net investment income and (losses) gains	(44,604)	211,722
Other income	110	321
Total revenues, income and (losses) gains	(44,494)	212,043
Expenses		
Grants	64,320	64,655
Salaries, employee benefits and payroll taxes	3,390	3,400
Professional services, contract services and other management and general services	2,048	1,914
Federal excise tax (benefit) provision	(785)	3,309
Total expenses	68,973	73,278
Change in net assets without donor restrictions	(113,467)	138,765
Net assets without donor restrictions, beginning of year	1,253,297	1,114,532
Net assets without donor restrictions, end of year	$ 1,139,830	$ 1,253,297

See accompanying notes

STATEMENTS OF CASH FLOWS

Year Ended December 31 *(In Thousands)*	2018	2017
Operating activities		
Change in net assets without donor restrictions	$ (113,467)	$ 138,765
Adjustments to reconcile change in net assets without donor restrictions to net cash used in operating activities:		
Depreciation and amortization	42	44
Net realized gains on investments	(52,141)	(70,381)
Net unrealized losses (gains) on investments	107,235	(132,411)
Changes in operating assets and liabilities:		
Interest and dividends receivable	(157)	(268)
Other assets	(11)	(5)
Prepaid federal excise taxes	9	(139)
Payable to brokers	(787)	484
Accounts payable and accrued expenses	(217)	(126)
Deferred federal excise taxes payable	(2,144)	2,648
Grants payable	10,555	9,325
Net cash used in operating activities	(51,083)	(52,064)
Investing activities		
Purchases of investments	(483,263)	(357,083)
Proceeds on disposition of investments and return of capital	530,869	405,412
Acquisition of fixed assets	(34)	(23)
Net cash provided by investing activities	47,572	48,306
Net decrease in cash and cash equivalents	(3,511)	(3,758)
Cash and cash equivalents, beginning of year	23,032	26,790
Cash and cash equivalents, end of year	$ 19,521	$ 23,032
Supplemental disclosures		
Unsettled trade at year end	$ 12,771	$ 12,739
Taxes paid during the year	$ 850	$ 800

See accompanying notes

NOTES TO FINANCIAL STATEMENTS

December 31, 2018

1. Organization

Formation and Goals of the Foundation

W. M. Keck established the W. M. Keck Foundation (the Foundation) as a charitable trust in 1954. In 1959, Mr. Keck changed the trust entity to a corporate entity by forming the W. M. Keck Foundation as a Delaware corporation and transferring the trust's assets, and eventually by bequeathing the residue of his estate, to the corporation. It is this Delaware corporation that exists today and continues to be known as the W. M. Keck Foundation. The Foundation's goals are principally to identify and support university and college research and education programs in the areas of science, engineering, and medicine. In addition, the Foundation gives some consideration to promoting liberal arts education and, in Southern California, to supporting community services, health care, pre-collegiate education, and the arts. Operations are funded by the Foundation's returns on its investment portfolio.

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Grant Payments

In accordance with accounting standards for not-for-profit entities, unconditional grant payments are recognized as an expense in the period in which they are approved. If these grants are to be paid over a period exceeding one year, they are recorded at the net present value of the future cash payments, using an applicable Treasury Bill rate. Grants that are conditioned upon a future and uncertain event are expensed when these conditions are met. A conditional promise to give is considered unconditional if the possibility that the condition will not be met is remote.

Cash and Cash Equivalents

Cash and cash equivalents are defined as liquid investments with remaining maturities of three months or less at time of purchase.

Investments

Investments in equity securities with readily determinable fair values and all investments in debt securities are measured at fair value in the statements of financial position. Fair value is established based on quoted prices from recognized securities exchanges.

Investments in private equity funds and hedge funds are measured at fair value, using the net asset value (NAV) as a practical expedient, which is based on net asset values reported by the fund managers. Pursuant to provisions of Accounting Standards Update (ASU) 2009-12, *Fair Value Measurements and Disclosures (Topic 820): Investments in Certain Entities That Calculate Net Asset Value per Share (or its Equivalent)*, the Foundation believes that the net asset value of these investments as of December 2018 and 2017 approximates their fair value as of that date. However, because of the inherent uncertainty of valuation, the estimated fair values for these securities and interests may differ from the values that would have been used had a ready market for the investments existed, and the differences could be material.

Purchases and sales of securities are recorded on the trade date. Dividend income is recorded based upon the ex-dividend date. Interest income is recorded as earned on an accrual basis. Realized gains and losses are recorded upon disposition of securities based on the specific identification method. Unrealized gains and losses are included on the statements of activities and represent the net change in fair value for investments held at the end of the year.

2. Summary of Significant Accounting Policies (continued)

Fair Value of Financial Instruments

The Foundation's statements of financial position include, but are not limited to, the following financial instruments: cash and cash equivalents, accounts payable, and accrued liabilities. The Foundation considers the carrying amounts of these assets and liabilities on the statements of financial position to approximate the fair value of these financial instruments because of the relatively short period of time between origination of the instruments and their expected realization.

Concentrations of Credit Risk

Financial instruments that potentially subject the Foundation to concentrations of credit risk consist of cash and cash equivalents and investments. The investment portfolio is managed within the Foundation's established investment guidelines.

Fixed Assets

Fixed assets are carried at cost, less accumulated depreciation, and are included in other assets on the statements of financial position. Depreciation is computed on the straight-line method over the estimated useful life of each type of asset or the term of the related lease, whichever is shorter. The depreciable lives for leasehold improvements are ten years, for furniture and equipment five years, and for software three years.

Recent Accounting Pronouncements

Effective January 1, 2018, the Foundation adopted Financial Accounting Standards Board (FASB) ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)*, using the full retrospective method of transition. This ASU converged and replaced existing revenue recognition guidance, including industry-specific guidance and requires revenue to be recognized in an amount that reflects the consideration the entity expects to be entitled in an exchange of goods or services. The adoption of this ASU did not materially impact the Foundation's financial statements.

In June 2018, the FASB issued ASU No. 2018-08, *Not-for-Profit Entities (Topic 958): Clarifying the Scope and the Accounting Guidance for Contributions Received and Contributions Made*. This guidance clarifies and improves the scope and the accounting guidance for contributions received and made with the objective of reducing the existing diversity in practice. The Foundation is evaluating the impact of this guidance, which will be effective in 2019.

In August 2016, the FASB issued ASU 2016-14, *Not-For-Profit Entities (Topic 958): Presentation of Financial Statements for Not-For-Profit Entities*, which require not-for-profit entities to revise financial presentation to include net asset classification, quantitative and qualitative information as to available resources and management of liquidity and liquidity risk, information on investment expenses and returns, and the presentation of operating cash flows. The standard aims to help the reader of the financial statements to better understand the financial position of the organization and enhance consistency among similar organizations. The Foundation has adjusted the presentation of these statements accordingly. The ASU has been applied retrospectively to all periods presented.

In February 2016, FASB issued ASU 2016-02, *Leases*. This standard introduces the new leases standard that applies a right-of-use (ROU) model and requires a lessee to record, for all leases with a lease term of more than 12 months, an asset representing its right to use the underlying asset and a liability to make lease payments. For leases with a term of 12 months or less, a practical expedient is available whereby a lessee may elect, by class of underlying asset, not to recognize an ROU asset or lease liability. At inception, lessees must classify all leases as either finance or operating based on five criteria. Balance sheet recognition of finance and operating leases is similar, but the pattern of expense recognition in the income statement, as well as the effect on the statement of cash flows, differs depending on the lease classification. This ASU is effective for fiscal years beginning after December 15, 2019, with early adoption permitted. The Foundation is currently evaluating the future impact of the new standard on the financial statements.

Fair Value Measurement

The Foundation applies the principles of Accounting Standards Codification (ASC) 820, *Fair Value Measurement*, for all financial assets and liabilities that are recognized or disclosed at fair value in the financial statements. This standard defines fair value, establishes a consistent framework for measuring fair value, and expands disclosure for each major asset and liability category measured at fair value on either a recurring or nonrecurring basis. The standard clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. As a basis for considering such assumptions, the Foundation establishes a three-level fair value hierarchy, which prioritizes the inputs used in measuring fair value as follows:

Level 1 – Assets that have readily observable prices (quoted prices in active markets accessible at the measurement date for assets). The fair value hierarchy gives the highest priority to Level 1 inputs.

Level 2 – Assets that are based on quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant assumptions are observable in the market or can be corroborated by observable market data for substantially the full term of the assets or liabilities. Financial assets and liabilities in this category generally include asset-backed securities, corporate bonds and loans, municipal bonds, forward contracts, future contracts, interest and credit swap agreements, options, and interest rate swaps.

Level 3 – Assets whose fair value cannot be determined by using observable measures, and can only be calculated using estimates or risk-adjusted value ranges, when little or no market data is available. The inputs into the determination of fair value require management's judgment or estimation of assumptions that market participants would use in pricing the assets or liabilities. The fair values are, therefore, determined using factors that involve considerable judgment and interpretations, including, but not limited to, private and public comparables, third-party appraisals, discounted cash flow models, and fund manager estimates. The fair value hierarchy gives lowest priority to Level 3 inputs.

Assets and liabilities measured at fair value are based on one or more of three valuation techniques noted below:

(a) *Market approach*. Prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities.
(b) *Cost approach*. Amount that would be required to replace the service capacity of an asset (replacement cost).
(c) *Income approach*. Techniques to convert future amounts to a single present amount based on market expectations (including present value techniques, option-pricing, and excess earnings models).

The Foundation's assets measured at fair value on a recurring basis at December 31, 2018 were as follows (in thousands):

	Level 1	Level 2	Investments at NAV	Total
Assets:				
Common and preferred stock	$ 384,658	$ –	$ –	$ 384,658
Corporate bonds	–	31,935	–	31,935
Municipal bonds	–	3,883	–	3,883
Government bonds	25,622	65	–	25,687
Foreign investments	64,108	24,937	–	89,045
Mortgage- and asset-backed securities	–	66,395	–	66,395
Mutual funds	244,153	–	–	244,153
Private equity funds	–	–	234,454	234,454
Hedge funds	–	–	53,674	53,674
Total	$ 718,541	$ 127,215	$ 288,128	$ 1,133,884

2. Summary of Significant Accounting Policies (continued)

The Foundation's assets measured at fair value on a recurring basis at December 31, 2017 were as follows (in thousands):

	Level 1	Level 2	Investments at NAV	Total
Assets:				
Common and preferred stock	$ 421,401	$ –	$ –	$ 421,401
Corporate bonds	–	17,677	–	17,677
Municipal bonds	–	2,901	–	2,901
Government bonds	22,837	91	–	22,928
Foreign investments	84,649	14,060	–	98,709
Mortgage- and asset-backed securities	–	35,743	–	35,743
Mutual funds	412,805	–	–	412,805
Private equity funds	–	–	145,748	145,748
Hedge funds	–	–	78,704	78,704
Total	$ 941,692	$ 70,472	$ 224,452	$ 1,236,616

The Foundation has classified its mutual funds, equity securities, preferred stock, and certain of its government bonds and foreign investments that have quoted prices in active markets as Level 1 within the fair value hierarchy. These securities are valued under the market approach using inputs observable in active markets for identical securities. The Foundation has classified certain of its government bonds, corporate bonds, municipal bonds, foreign bonds, and mortgage- and asset-backed securities as Level 2 investments. The fair value of these assets is valued under the market approach using inputs observable in active markets for similar assets. The Foundation has measured its investments in hedge funds and private equity funds at fair value using the net asset value as a practical expedient, which is based on net asset values reported by the fund managers. These investments that use net asset value as a practical expedient are not classified in the fair value hierarchy. The fair value of the underlying assets in private equity funds is valued under the income approach using discounted cash flows and other inputs not observable in active markets. The hedge funds in which the Foundation is invested hold a mix of Level 1, 2 and 3 instruments.

3. Liquidity and Availability of Resources

The Foundation's financial assets available within one year of the statements of financial position date for general expenditure are as follows (in thousands):

Year Ended December 31	2018	2017
Cash and cash equivalents	$ 19,521	$ 23,032
Interest and dividends receivable	1,649	1,492
Liquid investments (excludes private equity)	899,430	1,090,868
Unsettled trades	12,771	12,739
Total financial assets available to management for general expenditure within one year	$ 933,371	$ 1,128,131
Supplemental disclosure		
Grant commitments due within one year	$ (11,700)	$ (13,800)

Liquidity Management

The Foundation has $933,371,000 of financial assets available within one year of the balance sheet date to meet cash needs for general expenditure. None of the financial assets are subject to donor restrictions that make them unavailable for general expenditure within one year of the statements of financial position date. The Foundation maintains a policy of structuring its financial assets to be available as its general expenditures, liabilities, and other obligations come due. In addition, the Foundation invests cash in excess of daily requirements in short-term investments.

4. Investments

The cost and fair value of investments are as follows (in thousands):

	Year Ended December 31, 2018		Year Ended December 31, 2017	
	Cost	Fair Value	Cost	Fair Value
Common and preferred stock	$ 280,516	$ 384,658	$ 273,135	$ 421,401
Corporate bonds	32,107	31,935	16,333	17,677
Municipal bonds	3,481	3,883	2,279	2,901
Government bonds	25,424	25,687	23,160	22,928
Foreign investments	78,032	89,045	73,385	98,709
Mortgage- and asset-backed securities	67,351	66,395	36,001	35,743
Mutual funds	248,965	244,153	360,665	412,805
Private equity funds	204,143	234,454	131,558	145,748
Hedge funds	47,000	53,674	66,000	78,704
Total	$ 987,019	$ 1,133,884	$ 982,516	$ 1,236,616

The change in net unrealized gains on investments is reflected on the statements of activities and is summarized as follows (in thousands):

Year Ended December 31	2018	2017
Net unrealized gains, beginning of year	$ 254,100	$ 121,689
Net unrealized (losses) gains on investments for the year	(107,235)	132,411
Net unrealized gains, end of year	$ 146,865	$ 254,100

The Foundation has made total capital contributions (net of distributions/return of capital) of $251,143,000 to private equity funds and hedge funds it held as of December 31, 2018. The hedge funds can be redeemed on a quarterly basis and are invested in Level 1, Level 2 and Level 3 investments. One hedge fund was partially redeemed in 2018, and is expected to be fully redeemed in 2019. Proceeds from this partial redemption totaling $11,155,000 were not received until the first quarter of 2019, and are separately reported as an unsettled trade in the 2018 statement of financial position. The private equity funds are primarily invested in assets valued using Level 3 inputs and, as of December 31, 2018, are subject to lock-up provisions up to 11 years subject to certain further extension adjustments. The Foundation had total future capital commitments related to private equity funds of $91,068,000 as of December 31, 2018.

5. Taxes

The Foundation qualifies as a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code and, accordingly, is not subject to federal income taxes. However, the Foundation is classified under the Internal Revenue Code (IRC) as a private foundation and, as such, is subject to a 2% (1% if certain criteria is met) federal excise tax on net investment income.

During 2018, the Foundation accrued a 2% excise tax on net investment income. Private foundations are required to distribute annually, in qualifying charitable distributions, an amount equal to approximately 5% of the average fair market value of the Foundation's assets (the minimum distribution). If the Foundation does not distribute the required minimum distribution, a one-year grace period is granted to distribute the undistributed income.

The Foundation uses the liability method for accounting for excise taxes. The federal excise tax provision (benefit) consists of the following (in thousands):

Year Ended December 31	2018	2017
Current	$ 1,359	$ 661
Deferred	(2,144)	2,648
	$ (785)	$ 3,309

Deferred federal excise taxes arise primarily from the net unrealized appreciation in the fair value of investments and the Foundation uses the maximum federal excise tax rate of 2% for the years presented.

The Foundation completed an analysis of its tax positions, in accordance with FASB ASC 740, *Income Taxes*, and determined that there are no uncertain tax positions taken or expected to be taken. The Foundation has recognized no interest or penalties related to uncertain tax positions. The Foundation is subject to routine audits by the taxing jurisdictions; however, there are currently no audits in progress for any tax periods (tax years 2014 through 2018 remain open and subject to selection for such routine audits).

6. Functional Classification of Expenses

Functional expenses present expenses by function and natural classification. Expenses directly attributable to a specific functional area of the Foundation are reported as expenses of that functional area. Indirect or shared costs are allocated between Program Services and Management and General Services based on the proportion of full-time employee equivalents of a program or other supporting service versus the total organizational full-time employee equivalents.

The following is a functional classification of the Foundation's expenses:

Year Ended December 31, 2018 *(In Thousands)*	Program Services	Management and General	Total
Grants	$ 64,320	$ –	$ 64,320
Salaries, employee benefits and payroll taxes	3,116	274	3,390
Professional services, contract services and other management and general services	1,833	215	2,048
Total functional expenses	$ 69,269	$ 489	$ 69,758

Year Ended December 31, 2017 *(In Thousands)*	Program Services	Management and General	Total
Grants	$ 64,655	$ –	$ 64,655
Salaries, employee benefits and payroll taxes	3,135	265	3,400
Professional services, contract services and other management and general services	1,731	183	1,914
Total functional expenses	$ 69,521	$ 448	$ 69,969

7. Grants Payable and Conditional Grant Commitments

Grants payable and conditional grant commitments as of December 31, 2018, are as follows (in thousands):

	Unconditional	Conditional
2019	$ 11,700	$ 6,100
2020	2,000	16,500
2021	2,000	16,500
2022 and thereafter	10,000	118,000
	25,700	157,100
Less present value discount	(1,345)	–
	$ 24,355	$ 157,100

Projected timetable and payment amounts shown above for conditional grants are estimated. Conditional grants will be recorded as an expense in the period when the conditions to the grant are met. These grants are conditioned upon other donors matching the amounts contributed by the Foundation, receipt of building permits and other regulations, and compliance with budget, timetable, and grant agreement requirements.

8. Lease Commitments

The Foundation leases its main office space. Annual base rent is $544,000, which is payable through the end of the lease term in 2019. Rent expense is recognized on a straight-line basis over the lease term. As of December 31, 2018, the approximate future minimum scheduled lease obligation for the lease is $498,000.

Total rental expense for each of the years ended December 31, 2018 and 2017, was approximately $413,500. Deferred rent was approximately $119,000 and $249,000 at December 31, 2018 and 2017, respectively.

9. Employee Retirement Plan

The Foundation maintains a qualified 401(k) Profit Sharing Plan (the Plan) for eligible employees. Employees can contribute a percentage of their pretax compensation subject to Internal Revenue Service (IRS) limitations. The Foundation matches 200% of the employee's deferral, but not more than 6% of the employee's compensation in total until IRS compensation limits are reached. The Foundation's matching contributions to the Plan were approximately $285,000 and $292,000 for the years ended December 31, 2018 and 2017, respectively.

10. Subsequent Events

The Foundation's management has evaluated subsequent events through May 10, 2019, which is the date these financial statements were available to be issued. Management has determined that no material subsequent events have occurred during that period that would require the Foundation to either recognize the financial impact of such events in the accompanying financial statements or disclose any such events to ensure the financial statements are not misleading.

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