



**The Arnold and Mabel  
Beckman Foundation**

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# THE ARNOLD AND MABEL BECKMAN FOUNDATION

Located in Irvine, California, the Arnold and Mabel Beckman Foundation supports researchers and non-profit research institutions in making the next generation of breakthroughs in chemistry and the life sciences. Founded in 1978 by philanthropists Arnold and Mabel Beckman, the Foundation supports US institutions and young scientists whose creative, high-risk and interdisciplinary research will lead to innovations and new tools for scientific discovery. In this exclusive interview, we have had the pleasure of speaking with Dr Anne Hultgren, Executive Director and CEO of the Arnold and Mabel Beckman Foundation. Here, she tells us all about the Foundation's history, and the various ways in which it continues to accelerate the advancement of science today.



**Who were Mabel and Arnold Beckman, and what inspired their passion to advance scientific research? Please describe how they came to establish the Beckman Foundation.**

Arnold O. Beckman (1900–2004) and Mabel Meinzer Beckman (1900–1989) spent a lifetime together, dedicated to a career focused on advancements in science. They left a profound impact on science and society through the introduction of instrumentation that transformed the biology and chemistry laboratory from qualitative observations to the modern quantitative laboratory. Dr Beckman's inventions that merged electronic measurement techniques into analytical instrumentation opened up new fields of exploration for scientists around the world.

Arnold Beckman started his chemistry career at the early age of nine years old in Cullom, Illinois when his father built him a 'laboratory' in a shed in their backyard. His high school teachers recognised his talents and helped him to get several jobs in chemical and textile manufacturing industry. When he

started college, he was already working as a consultant to several established companies to measure the chemical by-products and quality of their products. Arnold Beckman went on to study photochemistry at the University of Illinois – Urbana Champaign, and then received a PhD in chemistry at Caltech in the 1920s where he was hired as an assistant professor.

In 1934, a chance phone call from a friend started Dr Beckman on a new path, and he began his transition from academic researcher to entrepreneur and into a businessman who founded a multibillion dollar company – not at all common for scientists in those days. A former classmate from Illinois had contacted him with a problem he was facing at the Southern California Fruit Growers Association: he needed to quickly and accurately measure the acidity, or pH, of lemons in the fields to determine the optimum time to harvest for the best tasting juice.

Dr Beckman spent a month making his first glass electrode pH meter with an electronic read-out dial, and he sent the prototype to his friend. When his friend

called two months later and asked him to make another because his lab mates were always borrowing the first one, Dr Beckman decided that there was a business opportunity. His company – initially National Technical Laboratories, later renamed Beckman Instruments – was founded, and he began developing scientific instruments that are still used in laboratories worldwide.

While the list of inventions is long, some notable examples are: The pH meter; the UV and IR-spectrophotometers; the oxygen analyser used in submarines, airplanes, space missions, and infant incubators; precision variable resistance dials that first enabled radar and later became essential components in any instrument with a knob; an analogue computer system used in manufacturing process controls; the ultracentrifuge that enabled protein and nucleic acid separations; and environmental oxidant recorders to measure smog composition and sources, providing the scientific foundations in the Clean Air Act.

Dr Beckman always said, 'I have done more for the advancement of science by providing analytical instruments to

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researchers than I could have done by myself in my own laboratory.’ Along with the success of their company came much personal financial success for the Beckmans. In the 1970s, they began discussing thoughts and ideas with trusted friends about how to leave a legacy and use their wealth to help others. Dr Beckman later reflected on that decision process and recalled ‘We knew that our fortune came from selling instruments to scientists, and so we decided that we should give back to scientists.’ In 1977, they formed and personally funded the Arnold and Mabel Beckman Foundation, and started their philanthropy with their first gift to University of Illinois – Urbana Champaign in 1978.

### **Tell us about the innovative research institutes that were set up by the Foundation, and the types of research that are carried out in them.**

The earliest gifts the Beckmans made as part of the Arnold and Mabel Beckman Foundation were to establish the five Beckman Institutes, all built around the core principle of collaboration in the sciences. The Beckmans worked

very closely with each Institute in the strategy, planning, design, and construction of the buildings to make sure that the Institutes would enable their vision that the next advances in science and technology were going to occur because of increasingly interdisciplinary programmes. The results are the Institutes located at University of Illinois – Urbana Champaign, Caltech, City of Hope, Stanford, and University of California – Irvine.

The Institutes were founded based on innovations both in science and in the management of the laboratories within the host University. Most of the Institutes themselves have very few permanent staff or members; rather, they were designed to help bring groups together and provide the infrastructure and instrumentation for collaborative projects to happen. By building shared resources, this allows the researchers to access state-of-the-art instruments, and the experts dedicated to using and maintaining them, without having to build that capability within their own individual laboratory. This deliberate design allows projects to come and go

through the Institutes depending on need and innovation, and this flexibility keeps the research at the forefront of science.

### **These institutes continue to produce ground-breaking scientific discoveries today. Please tell us about a few recent research highlights from one or more of these institutes.**

We are incredibly proud of the work and progress made within the Beckman Institutes over the years, so it’s hard to pick just a few examples. The Institute at University of Illinois – Urbana Champaign is unique in the range of projects that are supported within the Institute, from nanoscale imaging capabilities to materials engineering to cognitive development programmes with longitudinal studies on mothers, infants and children.

For example, recently at UIUC, the Autonomous Materials Systems Group members Moore, Sottos, and White commercialised a new self-healing material that can respond to stresses in the environment and adapt rather than fail, while Schantz and Llano from



the Cellular and Molecular Foundations of Intelligent Behavior Group published a landmark study on the environmental factors that influence child brain development, with a particular focus on auditory system development.

The City of Hope Beckman Research Institute has for many years been a pioneer in research on personalised treatments for cancer and other devastating diseases. They continue this tradition with Dr Yanhong Shi, who recently demonstrated a technique to use induced pluripotent stem cells (iPSC) for personalised treatment of neurological diseases, including Alzheimer's, that will be moving into clinical trials in the near future.

As a final example, at the Stanford Beckman Research Center, Dr Daniel Jarosz's research in protein hereditary traits is creating a paradigm shift in our understanding of how certain traits may be influenced through prion adaptations that are passed from parent to child, rather than just through the commonly understood genetic mutation or variability.

**In addition to running the centres, describe some of the other ways through which the Beckman Foundation currently supports scientific research in the US. Who is eligible to benefit from the Foundation's various programmes and awards?**

The Foundation also has several grant programmes that focus on young scientists to foster the next generation of innovators and leaders in science. When Dr Beckman was asked to describe his long-term goal for the Foundation, he explained that he wants his Foundation to 'find and support the young people with innovative ideas who don't yet have the clout to get the major government research grants.'

To meet this goal, the Foundation has a trio of annual grant programmes for young scientists in chemistry and life science research. First is the Beckman Young Investigators Program for new faculty members within the first three years of a tenure-track position. These are four-year awards for junior faculty to build new research directions within their laboratories. The second programme is a Chemical Science Postdoctoral Fellowship Program, with a focus on new postdocs interested in fundamental chemistry problems and chemical instrumentation development. Our third annual programme is the Beckman Scholars Program for undergraduate institutions with a strong culture of involving undergraduates in laboratory research. The Scholars Program provides grants to support 15-month research projects in selected mentor laboratories.

In addition to these annual programmes, the Foundation also funds special initiatives when possible. As a recent example, the Foundation's Scientific Advisory Council realised that the innovations associated with Cryogenic Electron Microscopy were revolutionising the field of structural biology, but that the instrumentation cost was impeding the adoption of the technology within the US, especially for smaller research universities that had excellent programme ideas. This challenge became a perfect opportunity for the Foundation, and in 2017 we provided grants to five universities to share in the cost of acquiring new Cryo-EM instrumentation. We are hopeful that this increase in Cryo-EM capabilities will help accelerate the discoveries that this new measurement technique enables, carrying on the legacy of Dr Beckman's passion for novel methods.

**Please tell us about the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, California, and how it facilitates research collaborations.**

The Beckmans realised that Southern California was a natural location for a West Coast location for the National Academies of Sciences and Engineering, especially given the large number of Academy members who live here, and to provide a more convenient meeting space to promote collaboration around the Pacific Rim.

They presented a concept to the Academies leadership of creating the 'Beckman Center', a versatile meeting space which would be dedicated to conferences about advances in science and technology, emphasising collaboration and multidisciplinary topics. Working with the Irvine Company, the Beckmans designed and built the Beckman Center, and donated both the building and land to the National Academies.

Today, the Beckman Center continues the original mission of hosting Academies functions and scientific programmes, including the Kavli Frontiers of Science Symposium, the Keck Futures Initiative, the Arthur M. Sackler Colloquia, and the Distinctive Voices lecture series that brings popular science talks to the general public.

**Finally, please tell us about the future goals and plans for the Foundation.**

The Foundation is celebrating its 40th year, from the first gift made in 1978 and over \$700M in grants and support to science since. We're marking this milestone with a year-long speaker series that touches on themes revolving around the impact of the Foundation in scientific innovation, philanthropy, and partnerships with other STEM organisations in our local region.

Looking forward, we are excited to continue our grant programmes for



young scientists, support the Beckman Institutes, and host our annual Beckman Symposium, where nearly 300 Beckman award winners and alumni attend a three-day event to present their newest research findings as poster or oral presentations, learn about a broad range of research topics from their peers, and discuss career tips with experts from academic and industry. We are also always exploring opportunities to work with science programmes within our hometown of Orange County, CA to inspire future scientists, and developing new special initiative programmes, like Cryo-EM, to meet the needs of the scientific community.

As we like to say at the Foundation – the future looks bright – and we are confident that over the next 40 years we will continue the Beckmans' commitment to supporting scientific research and young scientists and honour their legacy of philanthropy.

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