The [redacted] Endowed Fund for Science Education Outreach

At age 12, Sara Achour had little interest in science and even less in the presentation by Salk Institute researchers that she and her classmates were being asked to attend one gloomy Tuesday morning in 2003. Grudgingly, she entered the school library, expecting the tedium of a lecture. Instead, she found herself engaged in a science experiment that changed her life. Forty-five minutes later, after a hands-on experience with genetics, she emerged so passionate about the field that by the time she reached high school, she was on a quest to gain as much knowledge about genetics and science as she could.

The catalyst for Sara's transformation was the Salk Institute's Mobile Science Laboratory, a classroom on wheels that transports the exhilaration of scientific discovery to as many as 18 middle schools and 2200 students and their teachers each year. Since the program's inception more than a decade ago, it has introduced some 22,000 students throughout San Diego County to laboratory science, with an engrossing three-day curriculum, "Discovering DNA," that is aligned with the California Life Science Content Standards for the seventh grade.

Sara went on to take AP chemistry as a sophomore and passed the exam with a top score; she also spent a month at UCLA, taking a college-level course in genetics. As a junior, she took four AP classes and applied to Salk's High School Summer Enrichment Program. She was the only student at her high school accepted into the program, and for two summers running, she spent eight weeks as an intern in the bioinformatics lab of Dr. Gerard Manning, helping to decipher the paramecium genome. She is now preparing to enter UCLA in the fall, majoring in biology and bioengineering, all because of the Salk Mobile Science Laboratory program she attended—reluctantly—five years ago.

Galvanizing Tomorrow's Scientists

The Salk Institute has been able to achieve its stature as one of the world's preeminent biomedical research institutes because as young people, each of its distinguished faculty had experiences that, like Sara's, set them on a lifelong path in scientific research. Because continued scientific innovation is contingent upon a steady pipeline of dynamic young investigators, the Salk Institute has long placed a strong emphasis on educational outreach programs designed to excite students about careers in science. Outreach to students and the community was part of Jonas Salk's vision for the Institute, and the Salk Mobile Science Lab, which introduces 90-160 students at each school to hands-on, interactive science, is among its most visible, ambitious, and effective strategies.

Developed in collaboration with the San Diego County Office of Education and local teachers in response to the lack of funding for middle school science education in San Diego, the Mobile Science Lab brings these hands-on laboratory experiences to schools from Oceanside to Chula Vista, from the coast to Julian and beyond. The program is especially important because multiple studies have shown that middle school is the age when large numbers of students lose interest in science and mathematics, and once they become turned off, they seldom regain enthusiasm for

these fields. This unfortunate phenomenon has contributed significantly to the declining numbers of students preparing for scientific careers (*HHMI Bulletin*, June 2002, http://www.hhmi.org/bulletin/pdf/june2002/MiddleSchool.pdf), a development that continues to threaten U.S. innovation in science and technology.

Salk provides the Mobile Science Lab to participating schools at no cost, and the program brings all the necessary equipment to the classroom. The lab visits a different school every two weeks and is booked solid within a week of opening its schedule for the coming year. The majority of schools are underserved in some way, and nearly half are urban; approximately 70% of the students belong to a minority group, and more than 55% meet the criteria for the federal free and reduced lunch program.

During the lab's three-day "Discovering DNA" program, students conduct experiments demonstrating how traits are passed from generation to generation through DNA. They learn about DNA's structure and function and the techniques used for DNA fingerprinting and screens for disease. On the first day, they look at populations of fruit flies under the microscope to learn about model organisms and genetic mutations. On the second day, they learn to extract DNA from wheat germ. On the third day they do gel electrophoresis with food coloring to demonstrate the most elemental step in analyzing DNA: separating it by size.

Integral to the program's success are the volunteers responsible for implementing it in the classroom, including undergraduate and graduate students in the sciences, and postdoctoral fellows, retired scientists, and faculty from Salk and other research institutes, UC San Diego, and industry. Each volunteer works with a small group of middle school students, sharing his or her passion for science and giving the students the unique experience of working closely with a researcher at a formative time in their lives. Many students establish warm bonds with the volunteers, who double as role models for young people with little or no previous contact with scientists or other college-educated professionals.

The evidence is conclusive that the mobile lab's hands-on approach to science education works. In 2005-06 and 2007-08, in partnership with Price Charities, the mobile lab delivered the program to every seventh grader at Monroe Clark Middle School in City Heights. Pre- and post-tests administered to the students demonstrated that their understanding of key concepts in genetics improved from 37.7% to 75.2% after the three-day curriculum.

Even more significant, however, is the enthusiasm for science that the program generates. Every time the lab visits a school, it is flooded afterward with notes from students, which typically include such sentiments as:

- "I hope you could come and teach us about more stuff that we don't know. I had fun doing the experiments and other stuff. I always wanted to do experiments like we did. Thank you." —David

- "Wow! That was so amazing and fun. Please come again….I'm thinking about being a scientist but to study cells. I'm not sure if it's what I'm going to do, but it's a great possibility." —Jazmine

- "Thank you for coming to our school and doing experiments with us. It was the most fun thing that has happened in the whole year." —Misael

- "When I grow up I want to teach students like U. I want to be a scientist too. Sincerely, your scientist, David."

- "I thank you for coming to my class and showing us stuff that we may not have done until college. All of you have shown me how fun it is to be a scientist doing experiments that can help the world." —Kevin

- "You really changed my preference on science. I used to hate science, but now it is my favorite subject because you made it fun." —Brooke

- "Before you came, learning about the cells was hard for me. When you came it became easy, and I am happy that I could understand about cells. And since you came and taught me, science became my favorite class….I told my dad I want to be either a doctor or scientist…." —Rachel

The teachers who schedule the Mobile Science Lab for their classes are equally appreciative, noting:

- "We have an extremely limited budget, so it's great to have the Salk Institute come out with all their wonderful equipment. The students were really engaged, because they were DOING every day, and the days they took stuff home, whether DNA (which was a real hit) or goo (as they called it), they were very happy. Some of the hardest kids to reach were fully involved each day; it was nice for them to feel success." —Kathy Nida, Mountain Empire Middle School

- "Science comes alive in the real world for the students. The thank you notes they write express that valuable knowledge has been gained by the students but, more important, they express that the students have formed strong bonds with the researchers. This personal influence plus the opportunity to use real scientific equipment has planted seeds that I'm sure will grow into future scientists. You will never know who or how many, but someday there will be young graduate students saying that it all started with the Salk Mobile Lab." —Linda Love, Hillsdale Middle School

- "The Salk Mobile Science lab is a blast! My former students have commented about the lab and still recall what they learned. Probably the best thing about the Mobile Science Lab is that it is open-ended. It leaves the students with a sense of empowerment...like they can make a difference. I feel like a lot of students don't realize their potential, and by meeting real scientists that make a difference in cancer, diabetes or even smallpox, the students grasp onto what they might want to be and do when they grow up. I am extremely thankful to be a part of the program and have nothing but great things to say about the Salk Mobile Science Lab. Thank you for the opportunity."—Kari Maxwell, Tierra del Sol Middle School

Beyond the middle school classrooms, the Salk Mobile Science Lab partners with the Reuben H. Fleet Science Center to extend the program's reach into the community. During the center's special "DNA Days," visitors of all ages participate in abbreviated variations of the Mobile Lab's curriculum, and during the summer, the lab participates in the science center's weeklong DNA camp.

Looking Ahead

To broaden its scope, the Salk Mobile Science Lab has been pursuing strategies for working directly with teachers. Because the program is at capacity as far as the number of schools served, this initiative will also allow the Mobile Lab to extend its reach to students at the schools it is unable to visit in person, sharing the laboratory experience with thousands more students each year.

A kit-based curriculum, which the lab created in partnership with Miramar College and the Southern California Biotechnology Center, is training high school teachers throughout San Diego County and providing them with the equipment and supplies necessary to perform cutting-edge experiments. The kit is in constant use and is projected to be the first of multiple kits on biotechnology concepts available to San Diego County high schools.

A similar training and support program is also in the works for middle school teachers, many of whom have little or no biotechnology background. Developing focused, curriculum-specific activities that middle school teachers can access both before and after the Mobile Science Lab's visit will impact student learning and teacher presentations beyond the three days of actual contact with the lab and help teachers solidify and extend the content knowledge presented in the program.

Over the long term, Salk is committed to ensuring that the program keeps pace with the latest developments in science and pedagogy, pursuing collaborations and incorporating new elements as they emerge to guarantee as many students as possible an intellectually stimulating introduction to hands-on laboratory science.

Sustaining the Salk Mobile Science Laboratory

With initiatives like No Child Left Behind requiring schools to focus resources on reading and mathematics, strapped districts cutting science education, and middle school students continuing to lose interest in science, the importance of outreach programs like the Salk Mobile Science Laboratory cannot be overstated. The program is entirely supported by private philanthropy, and for more than ten years, generous, visionary donors have contributed the funds that have allowed it to flourish, inspiring thousands of middle school students to learn about science and motivating some, like Sara Achour, to make it their life's work. The Mobile Science Lab's entire annual budget is less than $100,000 (see current budget, attached), which makes it an extraordinarily cost-effective program, considering the number of students it reaches and the powerful impact it has on them.

Each year, however, the Institute must identify donors willing to underwrite the lab for the following school year.

In order to provide a dependable source of funding for the Salk Mobile Science Laboratory, the Institute is seeking $2 million to create an endowed fund that will generate the resources necessary to sustain Salk's visionary science education outreach program permanently. Endowment is a long-term investment in an institution, funded by a significant gift. The gift is invested in perpetuity in an interest-bearing fund, and each year, a portion of the yield is expended to support the institution and its programs. The balance is reinvested to continue growing the endowment as a hedge against inflation and the volatility of market conditions.

The Salk Institute respectfully requests your consideration of a generous $2 million contribution to establish an endowed fund that will support the Salk Mobile Science Laboratory.

Not only will the fund bear the name of your choice, but you will have the honor of naming the Mobile Science Laboratory program itself.

Your support will be acknowledged in all publications and other media promoting the lab and Salk's related precollege science outreach programs. At the same time the fund provides the much-needed resources that will enable the Mobile Lab and similar endeavors to inspire future scientists, it will honor your generosity and [redacted]'s memory, recognizing her deep commitment to education and ensuring that her dedication is translated into ongoing funding for a program that she held dear.

Its impact will be manifest in the thousands of students who discover how much they love science, whose scientific literacy is substantially enhanced, and who go on to become the scientific pioneers of tomorrow, securing America's continued place at the forefront of discovery that benefits humankind.