

## Shining Lady in the Sky

### How the Rocket Boys of Buffalo Were Launched By a Government Administrator and Committee At the National Institutes of Health

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Like many researchers with big ideas and limited funds, Terence Boylan decided to seek government funding. On February 9, 1957, he sent a proposal to the [National Institutes of Health](#) in Bethesda, Maryland. He didn't know if his ideas would be laughed at or found worthy of support. If he had been a more experienced researcher, he would have known that the odds favored laughter. Terence, however, was only 9 years old, and he earnestly believed NIH was the place to go for funds. A few days earlier, he had asked his father where he got his money. Dr. John Boylan, a physician and medical researcher at the University of Buffalo, was busy reading medical school applications. So he didn't ask why his son wanted to know. He just quickly said his grants came from NIH.

As a winter's night settled on their home in Snyder, New York, Dr. Boylan returned to his reading and Terence set his sights on writing to NIH.

*My friend and I are very interested in space travel and have a great idea for a rocket ship. We were wondering if we could have a little sum of money (\$10.00) to fulfill our project. We would [be] most grateful if you would send it to us.*

*Sincerely,*

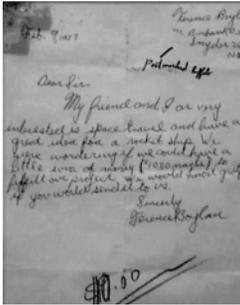
*Terence Boylan*

As he recalls the story, Boylan explains how it grew out of a special friendship. His next-door neighbor, Bruce Cook, "had [cerebral palsy](#) as a very young child, and was paralyzed in all limbs except his left arm." The brain damage also had affected his development. "Although he was 5 or 6 years older than I was, some of his limitations diminished the age difference." At the time, Terence didn't think of Bruce as a *special* friend. "He was just my best friend and playmate," he says. "I'd go over to his house, grab his wheelchair and push him down the street into our little village. We just hung-

out together all the time." Their rocket dreams were also fueled by shared interests. Bruce had a keen interest in astronomy, Terence was fascinated by rockets, and they both loved to experiment with their chemistry sets.

Their first rockets were made of found objects and balsawood. If they didn't blow up, they disintegrated in flight. Determined to do better, Terence went to the public library in nearby Amherst, New York. There, he found a whole shelf devoted to books on rocketry and Wernher von Braun, who developed the famous V-2 rocket. Terence sat for hours looking through the books. "Understanding what I could," he says, "but largely looking at diagrams." Eventually, Terence drew up elaborate plans for a shiny aluminum rocket. This is when he and his friend ran into money problems. The aluminum they needed cost \$2.00 a sheet, and they had already spent most of their savings on experiments with balsawood rockets.

### Rocket Boys Move a Forefather of the NIH Grants Program



Terence's request made its way to the NIH Division of Research Grants. The little white envelope likely arrived in a bulging canvas bag of mail. In 1957, DRG was struggling with a wave of applications. Previous investments in biomedical research were paying off with dramatic advancements and many new research proposals. According to DRG historian Dr. Richard Mandel, application volume in 1956 "had increased 40 percent, overtaxing duplicating facilities and requiring immediate staff expansion." At the same time, new grant money was pouring into NIH. After the Salk polio vaccine was deemed effective in 1955, President Eisenhower and Congress realized it would be cheaper to fight diseases in laboratories than in hospitals, and the 1957 NIH grants budget was doubled to \$123 million.

It's thus amazing that anyone had time to tear open Terence's letter. But someone did, and it soon raced through the division. Smiles and laughter likely trailed as it landed on the desk of DRG's Chief, Dr. Ernest M. Allen. It was surely a simple government-issue desk, but it was no less auspicious. The man who worked there was one of the key architects of the NIH grants program that transformed medical research in this country. Allen was recruited as World War II ended to help administer medical research contracts transferred to NIH from the military and to help set up a grants program. Almost everything had to be made up as he



The [Shannon](#) Building (Bldg. 1). The main NIH administration building in 1957 and today.

and his colleagues went, since NIH did not have a grants division or office. Most of its research before then was conducted in laboratories on its sprawling campus in Bethesda. Allen championed a two-tiered peer review system that uses committees of outside experts—not bureaucrats or political appointees—to assess research proposals first for scientific merit and then relevance. He accepted a Lasker award given to DRG by the American Public Health Association in 1953. He also received honorary doctorates from Emory and Clemson universities.

The hands that held these honors carried the slim request from Terence to the March 12, 1957 meeting of the National Health Advisory Council. This group



Ernest Allen

made funding recommendations after considering the scientific assessments of the review groups that performed the initial review of incoming grant applications. The 1957 NHAC included noted scientists and a few civic leaders, such as Mary Rockefeller, wife of Nelson A. Rockefeller, and Edmund Fitzgerald, president of the Northwestern Mutual Life Insurance Company. They faced a packed agenda, but they paused to hear Allen read Terence's request. It's clear it was near the top of Allen's agenda, because he soon wrote to Terence.

*Dear Terence:*

*Your request for \$10.00 in support of your rocket ship project was read to the National Health Advisory Council on March 12. The members of the Council agreed that your proposal does not fall in the health and related sciences fields for which they recommend research support. On the other hand, they agreed enthusiastically that you should receive the funds requested and contributed as individuals to make the support possible.*

*In accordance with the wishes of the council, I am therefore pleased to forward my check in the amount of \$10.00. Please accept our very best wishes for a successful project.*

*Sincerely yours,*

*Ernest M. Allen, Sc.D.  
Chief, Division of Research Grants*

One of Allen's best friends, Dr. Martin Cummings, says he isn't surprised that Allen took up Terence's cause. For 50 years, Cummings knew him as a "thoughtful and uncommonly modest human being . . . who was intensely interested in the scientific education of young people." But there may have been a little more to it than this. Allen knew what it was like to be in a fix and have to make a plea for help.

After he received a master's degree in French literature from Emory University, Allen taught at a community college in Augusta, Georgia, for 15 years. It was a career he loved and one he only abandoned because of a misunderstanding. He agreed to help the National Youth Administration not knowing he had accepted a full-time job running an NYA center that provided part-time jobs to struggling college and graduate students. It was a government program supported by the Works Progress Administration, which aided the unemployed during the depression. Allen came to enjoy this job, but he soon faced his own employment problem—the NYA was liquidated in 1943. Before turning out the lights for the last time, Allen heard the U.S. Public Health Service was looking for centers to dispense newly developed antibiotics to treat a nationwide epidemic of venereal diseases. He somehow managed to convince PHS that his soon-to-be-defunct center would make a perfect VD clinic.



NYA workers conducting a survey of physicians. Photo: The Franklin D. Roosevelt Presidential Library

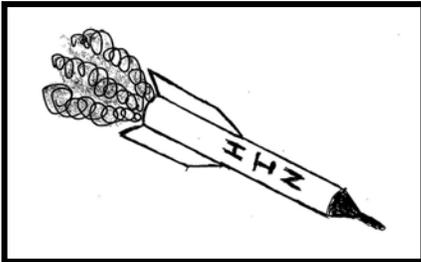
The key to understanding how Allen was recognized as a great administrator and perhaps the key to understanding why he took Terence's letter to heart may be found in the fact that his life had been transformed by a letter he wrote when he needed help. He had many unanswered questions about setting up his clinic, so he systematically wrote down 68 of them in a letter to Dr. Rod Heller, Chief of the PHS Division of Venereal Diseases. In a few days, Allen received a phone call from Heller and an invitation to come to Washington.

### **The Phone Rings for the Rocket Boys**

The metallic urgency of a Bell phone also heralded the news at the Boylan home. Terence's father found the *Buffalo Evening News* on the line. "My father didn't know what they were talking about," says Boylan, who hadn't bothered to tell him about his request. "All he could figure out from the call was that some reporters were on the way to the house and wanted to talk about a government grant." Though Dr. Boylan had conducted seminal research on the physiology of the kidney for years, he could not have been prepared for the research interview that followed. When the reporter and photographer arrived, they told him they had gotten wind of Terence's grant, and they wanted to see him because he was certain to be the youngest grantee on record. Boylan remembers it as if it happened last week. "I ran next door and got Bruce, brought him back to the house and they interviewed us," he says. "My father was sitting over in the corner of the living room, tickled pink and probably wondering what would become of all this."

The next day, the rocket boys of Buffalo were introduced to the city: "Boy Rocket Ship Builders Obtain 'National' Funds," the headline read. The article included a large photo. In it, Bruce's face shines like a full moon over Cape Canaveral, as Terence holds one of their balsawood rockets, flashing a to-the-planets smile. In speaking with the reporter, however, Terence was all business. "We want to get down to work," he said. "As soon as the money gets here we'll go ahead." The bemused reporter, however, noted that the rocket boys faced a big challenge: how to get the rocket down safely. This was no small problem. Their plans included launching a mouse to "test it for the effects of space travel." A hard landing could spell the end of their dream and their unsuspecting mouse.

### Grandiose Plans Ground Rocket



Despite the lift they got from the award and article, the rocket boys of Buffalo were soon grounded by more technical problems than they had imagined. "My grandiose plans for the rocket ship made it too heavy," says Boylan. "The propulsion system that I would have needed to have gotten that rocket way up was too complicated for me." It's unfortunate that

he didn't reach this conclusion before buying the aluminum and riveting the rocket ship together.

The worst part, however, was that everyone at school knew what he and Bruce were up to. "I really had to get a rocket up pretty soon," says Boylan, "because everyone was going to be asking me 'yeah, sure, so when are you going to launch it?'" Terence rummaged for new parts and inspiration in the dustbin at his father's lab and searched the shelves at the local hardware and grocery stores.

In the meantime, NIH took care of the paperwork. On the copy of the award letter Allen sent to Terence, someone penciled a note asking if NIH should seek the usual progress report. Someone else crossed it out. Allen perhaps did it with a gentle stroke. He couldn't have expected Terence to report much success. The thank-you letter he had sent didn't show much in the way of advancements:

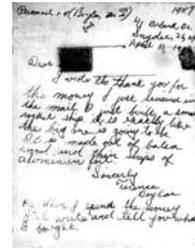
*Dear Sirs,*

*I wrote [sic] to thank you for the money I just received in the mail. I just built a small rocket ship. It is exactly like the big one is going to be. It is made*

*out of balsa wood and thin strips of aluminum foil.*

*Sincerely*

*Terence Boylan*



Dr. Allen likely smiled the sweet-humored smile of a schoolteacher, hoping that maybe years down the road the award might pay off in some way. The letters were placed in a folder and filed like all the other correspondence that came and went that year.

### **The Scramble for New Parts and Inspiration**

Terence, however, still believed he was commissioned to reach for the stars and see if we might one day travel in space. He continued scrounging around his father's lab. The breakthrough came in the trash. Terence found some laminated cardboard tubes used to ship delicate scientific glassware. They were about 4 feet long with a 3-inch diameter. "They hardly weighed anything," says Boylan, "but were so strong you could drive a car over them." He sawed off a 9-inch section and started work on a prototype. He lined it with heavy aluminum foil and screwed on a tin can with a hole drilled in the center of the bottom. Terence then stacked a few metal washers inside and hammered a small brass piece of a plumbing connector through the last washer, thereby creating a nozzle. For a launch pad, Terence laid down the base of a truck jack and drove a 12-foot solid metal curtain rod through a small hole in it 3 feet into the ground. Eyelet screws on the fuselage would guide the rocket up the rod.

His friend kept an eye on everything. "Bruce Cook was a wonderful stickler for certain details," says Boylan. "I can see his face when I told him that we put screw eyes on one side of the rocket . . . 'oh, no, [he said] it'll be off balance!'" Terence thus put two counterbalancing eyelets on the other side of the rocket.

When it came to designing and building their rockets, Terence and Bruce were pretty much on their own. Bruce's father, however, helped supply critical ingredients for their rocket fuel: potassium chlorate, manganese-dioxide, charcoal and sulfur. It was a recipe they developed from their library research and experiments with their balsa wood rockets. They also knew it could be the recipe for disaster. Boylan clearly remembers the law their fathers laid down. "We could build all the rockets we wanted," he says, "but we couldn't use any matches." Doing so would put them too close to a potential explosion. An old train transformer and 20 feet of parallel wires connected to a thin strip of magnesium foil solved the ignition problem.

Their bigger problem was getting the fuel to burn evenly and at a slow enough pace to keep the rocket in sustained flight. When they simply filled the rocket with fuel, the combustion often raced up just one side of the fuselage and blew a hole in it. Adding a measured amount of ordinary household sugar retarded explosions and helped the fuel mixture to burn more evenly. But even then, it would sometimes burn so fast that the heat would cause a total blowout. Terence finally came up with a simple but ingenious solution: between every inch or two of fuel, he inserted a layer of laundry cardboard. It slowed combustion just enough to give the rocket a steady and sustained ascent.

Terence, however, went to his father when stumped by one final technical problem: how to separate the nose capsule, containing the mouse, from the body of the rocket before it came back down. Dr. Boylan suggested using a mercury switch, connected to a battery, a magnesium wire and a small amount of gunpowder. When the expended rocket turned to fall back to earth, the mercury would shift, volts would flow and the capsule would be blown free. Terence went back to work with his vision now complete—an attached parachute would allow the capsule to float down safely into his backyard or one nearby.

### **How a Boy Moved an Agency**

Back at NIH, Ernest Allen also had a new vision. Terence had set him thinking about kids. The development of the polio vaccine and antibiotics gave them hope for a better future, and the expanding NIH research program was adding to this hope. NIH also was working to develop the next generation of researchers. Fellowships were bringing new scientists into laboratories across the country, but perhaps NIH could do more. There were likely countless kids like Terence eager to join the great research enterprise now bustling with promise. Allen and his colleagues were thus inspired to develop and pilot a new NIH program to get young people involved in medical research. High school teachers around the nation would be encouraged to submit applications for student research projects.

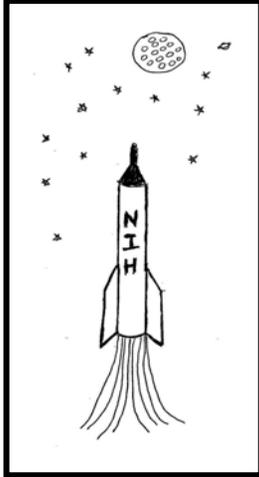


Sputnik Satellite. 1957  
Photo: NASA archives.

It's remarkable to note that it was now the spring of 1957—months before Americans would see a cold-white streak on an October night sky and gasp at their scientific inadequacies. The Russian satellite Sputnik hadn't yet been rolled to its launch pad at the Baikonur Cosmodrome in Kazakhstan. In fact, it hadn't yet been built. Sputnik was a last-minute addition to a new intercontinental ballistic missile the Russians were testing for delivering their nuclear bombs. U.S. and U.S.S.R. scientists certainly had been thinking about going into space for some time. Still, the rocket boys in Buffalo, Allen and the NHAC reviewers were ahead of most in thinking about the future.

## A Flick and a Flash

After their prototypes proved successful, Terence and Bruce built the big one—a 4-foot rocket with long aluminum fins screwed to its cardboard fuselage.



Terence drilled air holes in a plastic, egg-shaped box like the ones watches used to come in. Inside, he added padding, food and a nipped eyedropper of water. After inserting the mouse and attaching a parachute, Terence put the capsule atop the rocket and capped it with a funnel from the hardware store. They now were ready to shoot for the stars.

With a flick and a flash, their train transformer ignited their rocket. It blasted from the Boylan's backyard and shot straight into the June sky. It soared beyond where birds fly, and then something unexpected happened. "It disappeared," says Boylan. "We thought we'd be able to watch it . . . a little speck up there in the sky, and then see

it turn . . . coming down maybe in a neighbor's yard." But after a glorious whoosh and a faint streak, it was gone.

"We were stunned," Boylan recalls. "We just stood there in silence, wondering what we'd done, and what had happened to our rocket." It was perhaps a good thing no one had invited the reporter from the *Buffalo Evening News* to the launch. Otherwise, the next day's headline might have been "Rocket Boys Dispatch Mouse to Heaven." But within an hour the phone rang. Someone from Clarence, New York, had spotted the parachute and followed the capsule to the ground. Terence and Bruce had pasted a note inside asking anyone who found it to please call the Boylan's number. Terence was flabbergasted. Not that someone called, but that the capsule had landed in Clarence. The town was 10 miles away.

Terence's parents drove the rocket boys to Clarence that afternoon, where they found their mouse very much alive. After retrieving their spent rocket from a neighbor's yard, they drove home and soon put their mouse back into its little home. "Isn't that the amazing part," says Boylan. After 47 years, his words rush with wonder, as if he still can't believe he and Bruce exceeded their own seemingly crazy expectations and baffled all the adults in their lives.

**"I wish they had been on my team. It took us a couple of years to be able to build a rocket that might reach out ten miles!"**

—Homer Hickam, author of the best-selling novel *Rocket Boys*, which was made into the movie *October Sky*.

## The Legacy of Terence's Research Program at NIH

The high school research program Terence inspired ran for a few years, but a lack of management controls caused difficulties. "Grants typically went to high school biology teachers," says Mandel, "and several of them had students conduct live-animal experiments which were attacked by anti-vivisectionists." Congressional investigations followed. The program was discontinued and new policies were made on the ethical use of animals in NIH research. If Terence and Bruce were conducting their rocket experiments today, their fathers would have laid down another law: "No mouse." As grantees, they would have known that NIH will not fund research that unnecessarily puts animals at risk of injury or death. The rocket boys could have proven their concept by putting an egg in their capsule. (Their fathers also would have likely shown greater concern about the dangers of mercury and the other chemicals loaded in the rocket. It is now, in fact, illegal to build and launch homemade rockets like the rocket boys did in 1957.)

Once Terence got NIH thinking about young people, however, it never gave up trying to reach them. NIH established a [summer internship program](#) that brings high school, college and graduate students from across the country to its Bethesda campus, where they work alongside leading NIH scientists conducting cutting-edge biomedical and behavioral research. NIH also developed [interactive and multimedia curriculum supplements](#), which are given free to teachers from K-12th grades. Insights from recent research are presented in teaching units, such as "Chemicals, the Environment, and You"; "Human Genetic Variation"; "Cell Biology and Cancer"; "Understanding Alcohol: Investigations into Biology and Behavior"; and "Emerging and Re-emerging Infectious Diseases."



NIH oral health teaching [supplement](#) for Grades 1-2.

Kids still send letters to NIH. Some seek information for a school report. Some share their ideas on preventing SARS or AIDS. Others who suffer from a difficult disease or who love someone who does ask for information and for more to be done to end the suffering.

Terence, however, was one of the few kids to seek research support. Much has changed since then, but when "Crayon" letters arrive in the mail, someone at NIH will still pause to open them. Looking at their cockeyed stamps, labored letters, and earnest pleas for help, one cannot help but feel, as Allen did when he held Terence's request, that the future is at hand.

## Finding Terence

Allen never knew what happened to Terence and how much bang the NHAC got for its 10 bucks. He would have been thrilled to hear the story, and also surprised that it surfaced, because the rocket folder was one of many slated to be boxed and shipped to the National Archives for storage with its other 21 million boxes of government documents. Mandel, however, found the folder when he went to write a history of DRG: *A Half Century of Peer Review—1946-1996*. Though the letters inside were time-tinged, they still caused a stir like the day in 1957 when Terence's request raced through DRG. This time, it and the

other letters landed on the desk of DRG's Information Officer, Dr. Sam Joseloff. He was inspired to frame and hang them on DRG's wall of honor with photos of Allen and the other DRG chiefs.



The Director, Office of NIH History, Dr. Victoria A. Harden, accepted the original rocket letters from CSR's Don Lockett for the NIH archives.

DRG has since been reorganized and renamed the [Center for Scientific Review](#). The rocket letters were moved to a climate-controlled room for storage with NIH's most treasured historical documents. Copies of the letters, however, remain on CSR's wall of honor. Over the years, they have spawned many smiles and most recently a Web search to find the man Terence became. It didn't take long, since he has his own Web site: [www.terenceboylan.com](http://www.terenceboylan.com).

Boylan was ecstatic when he learned that NIH still remembered him. "My little letter on the hallowed halls of NIH!" he said. "Wow . . . I was smiling all day." Boylan generously shared his story for this article. After describing how he and Bruce completed their rocket research, he said they built a rocket car and raced it on a string track on the sidewalk in front of their homes.

When he reached 12, Terence got a job in his father's lab at the Mount Desert Island Biological Laboratory in Salsbury Cove, Maine, where his family spent their summers. He started by washing pipettes, but by the next summer, he had talked his father into letting him set up his own lab in an unused corner of an instrument shed. There, he conducted experiments guided by his father, who challenged him to measure the rate at which ethyl alcohol retards fluid reabsorption in the piked dogfish. In the following summers, Terence investigated trigger mechanisms for the antidiuretic hormone, ADH. Terence was smitten with the precision measurements the laboratory equipment provided him, and his father patiently taught him how to calibrate most of the machines in the instrument shed.

## Soaring on Songs

Like many kids his age, Terence also loved rock 'n roll and pulled together a neighborhood band—the Pre-teens. They didn't have the most original name, but they had an original song by Terence and they got to perform on Buffalo Bob's Radio Show. Pretty soon they were playing for school dances and assemblies. In 1962, Terence traveled to New York City and went to a coffee house in Greenwich Village, where he met Bob Dylan, who encouraged him to mix some American folk and blues into his rock music. With a new sound, Terence got gigs at the most popular coffeehouses in Buffalo. The next year, he hitchhiked to the Newport Folk Festival. "I met Pete Seeger and Theodore Bikel," says Boylan, "and they invited me to join the 'New Folks Concert,' a recent addition to the festival made up of new young singer-songwriters, mostly from Boston and New York."



Terence Boylan at Bard College.

This all happened in his sophomore and junior years of high school. It's no surprise that his grades fell. "I was warned," says Boylan, "if I was going to be a pre-med, I had to bring them up. I went away to school for my senior year and did well enough to get into Bard." Before going to college, however, he again hitchhiked to the Newport Folk Festival. It was an exhilarating time in a new era, when songs pulsed with new thoughts

and life. Paul Stookey of Peter, Paul & Mary described the scene in the 60s, "There was a great fraternity between all the performers and a great exchange of ideas. There was a sense that we were holding hands, in a metaphorical sense, for a better world."

The 1964 Bard College catalog didn't say the school was a hothouse for musicians, but that's what Boylan found. He quickly formed a band—the Ginger Men—with his older brother John, who was also a student there. During the weekends and summers, they played at the famed cafes and coffeehouses in Greenwich Village. It was, however, a solo performance at the Village Gate that impressed *New York Times* critic Robert Shelton. Terence soon had an MGM recording contract. As he left to record his album and tour the country, he promised his parents he would return to complete his studies and get his B.A. He managed to do this, but he never made it to medical school. He recorded another album for MGM with Bard classmates Donald Fagen and Walter Becker, who eventually formed the band Steely Dan.



Terence Boylan 1977.

Boylan later toured with Linda Ronstadt, Bonnie Raitt and the Eagles, a band his brother pulled together to back up Ronstadt. He then recorded three albums for Warner Brothers' Asylum label, joining David Geffen's stable of stars. Boylan's biggest hits include *Shake It, Don't Hang Up Those Dancing Shoes* and *Where Are You Hiding?*

Some people may be disappointed that Boylan didn't become a scientist, thinking that the hope Allen and the NHAC had for him wasn't quite realized. Minds might change if they hear his music, which is unusually literate, heartfelt and full of surprises. Boylan builds his songs like he built his rockets. He uses few clichés or stock parts. His songs are crafted from the things he finds around him, and he sends each one up like a fuel-packed rocket as if to see how far it will go. It's hard to listen to his song *Trains* and not see rockets rising in a June sky and feel the beats of the vested hope carrying him forward.

*I've driven forty thousand miles  
Hung my coat on every nail  
For all the dreams I've long forgotten  
For all the loves that couldn't fail*

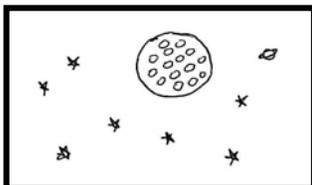
*There are trains that ride to  
northern rivers  
Planes that glide through higher  
space, there are  
Ships that sail on foreign waters  
With names I cannot place*

*But for all the broken stallions  
still riding  
For all the eagles in the sun  
I raise my glass to the shining lady  
Whose time is yet to come*



—Trains -- the last stanzas. Used with permission from Terence Boylan.

The little "grant" certainly had a big impact and Boylan never stopped being a rocket boy. "Can you imagine what a thrill that was," he says. "It made me think, wow, you can do anything. You can try for something that anyone with any brains would tell you not to do because it's not going to happen . . . well, there's nothing stopping me from trying."

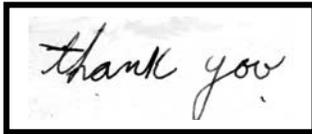


It's difficult to know how much the rocket "grant" meant to Boylan's friend Bruce. He died while Boylan was recording records and touring the country. Bruce surely had a rough life, given the paralysis and other limitations associated with his cerebral palsy. But he

had the ability to remember the bright June morning he and his best friend soared beyond their imaginations. It's possible that the memory helped keep Bruce going until his struggle was over and he was free from the bonds that confined him to a wheelchair most of his life.

### NIH Reviewers Still At It

"I think of the wonderful generosity of those people," says Boylan, focusing on the boost he and Bruce got from Allen and the NHAC. "I wish that I could have thanked everyone in person."



Allen and the NHAC were, nonetheless, just doing a job that fired up their neurons: finding research applications that might make a difference. Much has changed since then, but folks like those who passed the hat for Terence still help NIH. They now come to town—many of them three times a year—with laptops slung over their shoulders and suitcases rolling behind. The weight of their luggage, however, is light given the weight of their responsibilities. They spend 20-48 hours of what little free time they had—often on evenings and weekends—to read their assigned applications and write critiques. However, they will be paid only a small stipend for the two days they are in town discussing and scoring applications.



Outside experts assessing NIH grant applications. Photo from the [Images of Peer Review Exhibit](#) by Dr. Michael Lang.

There are many reasons why they set aside their own research, miss family meals and go the gauntlet of airport screenings. They say they get charged learning about new areas of science, working with some of the best scientists in the country, and helping NIH fund research. They may also see it as an honor that will advance their careers or a duty to their research community.

But like climbing a mountain, the task of reviewing increasingly complex research applications often becomes bigger than the initial reasons for doing it, and slowly with each step the effort seems to become ennobled. Sometimes it seems heroic—like after 9-11. When few in the nation would fly, most NIH reviewers still climbed into planes and flew to Washington for their meetings.

"This is what makes NIH such a special place," says NIH Director, Dr. Elias Zerhouni. "Scientific research needs money and brains, but it thrives because hearts and



Dr. Elias Zerhouni hosting a town hall meeting.

passions are engaged."

Last year, over 14,000 scientists responded to the call and served as reviewers on CSR peer review groups. Additional experts served on advisory councils of the 24 NIH institutes and centers that fund research grants. These councils now do the job NHAC did, assessing how well applications found to have scientific merit address NIH goals for finding new treatments and new ways to prevent disease.

NIH Institute and Center directors make the final funding decisions based on the budget and priorities provided by Congress and the Department of Health and Human Services, and on input from the scientific community and the public. Nonetheless, a primary factor in determining whether a researcher's application is funded is how well it fares in peer review. Of course, it is not a perfect system and NIH is constantly looking for ways to improve it. "But no one can deny its successes or the contributions reviewers have made identifying promising proposals," says Dr. Zerhouni. "One need only look at the list of [Nobel Prize winners](#). Nearly 100 of them were supported by NIH grants."

### Ripples of Life

It's difficult to imagine where Allen's life might have gone if he hadn't been encouraged to join the government and if he hadn't been mistaken about what he was getting into. But Allen never regretted it. He looked back on his 38-plus-year career with wonder. NIH grants had stirred the scientific interests and creative passions of thousands. Fresh-faced, white-coated researchers were put to work at new equipment with electric hums in labs and clinics across the country. Allen, however, gave most of the credit to others, particularly the scientists who came up with the ideas and results.

Allen's contributions nonetheless mattered as they joined those of countless others, and by the time [he died at the age of 94 in 1999](#), many [ripples](#) had radiated from Bethesda, which was named after an ancient pool once believed to have the power to heal. Mortality from heart disease dropped by 36 percent from 1977 to 1999, and now it is no longer the number one killer in the United States. Death rates from stroke decreased by 50 percent during the same time, and improved treatments and detection methods increased the relative 5-year survival rates for people with cancer to 60 percent.

Larger ripples are expected. With the support of Congress, the public and the scientific community, the NIH budget was doubled between 1999 and 2003. Much more research is being done to combat cancer, heart disease, diabetes, Alzheimer's disease, bioterrorism, AIDS, emerging diseases, addiction and



Some of the 70,000 grant applications sent to NIH each year.

other illnesses, as well as to understand the basic genetic and molecular processes of life and disease. The grants program Allen championed plays an important role. Of the \$28 billion that NIH annually invests in medical research, over 80 percent supports outside research and training, including 50,000 grants to more than 212,000 researchers at over 3,000 universities, medical schools and other research institutions in this country and abroad. With this dramatic expansion, waves of new grant applications—over 70,000 a year—now flow into NIH. Each surge seems to say Allen made no mistake.

### **The Surprise Payload**

Allen and Terence's stories confirm the belief that birthed the NIH grants program: We can't produce scientific advancements like pulp from a forest or edicts from a bureaucracy. We have to find and fund people with bright ideas and the drive to do what has never been done before. It may take many grinding years with setbacks that can come like November fog or Arizona thunderstorms. But the investments eventually pay off as more people leave their doctor's office with new drugs or action plans that give them a fighting chance against diseases that killed their parents or grandparents.

Medical research can also pay off in ways as unpredictable as Terence and Bruce's rocket and Allen's career. An esoteric line of research can suddenly become the main line for understanding a disease that's killing millions. A failed drug shelved for years can find a new life treating a new disease. One never knows when a scientific investment long forgotten will suddenly start paying new dividends. Just look at what Boylan is up to now.

Despite the demands and distractions of his musical career, he never forgot about the need for more medical research. Over the years, he has spent hours reading journals and talking with doctors, who on occasion have asked him where he got his medical degree. He says "it's just a hobby that has always fascinated me." But there's more to it than that. When his father died, Terence established the Boylan Foundation for International Medical Research, a non-profit organization that raises funds to support biomedical research and scientist exchange fellowships. To date, over 1,200 medical students and post-doctoral fellows have participated in the International Bio-Medical Exchange Program, which his father co-founded in 1979, and which Boylan now helps support. One of the foundation's other beneficiaries is the Mount Desert Island Biological Laboratory, where Boylan was recently named Chairman of its Board of Trustees. "It was one of my proudest days," he says, "because my father had been a trustee of the lab." No doubt his father and Bruce, as well as Allen and the NHAC would be proud, too.

G.K. Chesterton once said, "I've searched all the parks in all the cities and found no statues of committees." One may never be built, but the 1957 NHAC and the other NIH review committees that have met over the years deserve to be remembered. None of us can go to a doctor, pharmacy or hospital and not be touched, like Terence, by what happened years ago when NIH reviewers assessed an application and agreed it looked like a good one.



One of the very early scientific review groups that met in 1946—The Biochemistry and Nutrition Study Section.