



# PARTNERS OF THE HEART

VIEWER'S GUIDE

1. Introduction.....	3
• Note from the Filmmaker	
• How to Use This Guide	
2. The Story of Partners of the Heart .....	5
• Summary of the Blalock-Thomas Story	
• In His Own Words: Vivien Thomas	
• Success Story: Levi Watkins, Jr.	
3. For Students.....	13
• A History of the Heart	
• Medical Science in a Social Context	
• The People Side of Science and Medicine	
• In His Own Words: A Cardiac Surgeon Reflects	
• In Their Own Words: “Blue Babies”	
• From Molecule to Marketplace: Making Medicine	
• Success Stories: Henry Wall, Rodney Hood, Bevin Engelward, Maria Terésa Tarragó-Trani	
4. For the Classroom .....	31
• Two Kinds of Segregation	
• In His Own Words: Nat Crippens	
• Two Early Activists for Civil Rights	
• Discussion Questions, Activities	
5. More Activities.....	40
• Finding Local Heroes	
• Culturally Competent Medicine	
• Success Stories: Phua Xiong, Lydia DeSantis, Maurice Iwu, Benjamin Young	
• In His Own Words: A Mentor’s Legacy of Confidence	

## Introduction

### Filmmaker's Note

It has taken nearly a decade to bring you Partners of the Heart. More than ever, I am inspired by Vivien Thomas' upward journey and his ability to persevere long enough to prevail over a system that challenged his identity and denied him opportunity.

His story provoked me — and I hope will move you — to gain a better understanding of this country's personal and institutional legacy of racism. To move forward, we need to reckon with the history of a society that permitted Thomas to stand at Dr. Blalock's shoulder in the operating room but denied him a place at the dinner celebrating Blalock's 60th birthday party at a posh and segregated Baltimore hotel.

Vivien Thomas' story also serves as a sharp reminder of what society loses when a person is denied opportunity because of his or her race, religion, gender, etc. Like Thomas, many people, even today, need only an opportunity to show what they're capable of contributing.

This story also shows the importance of individual effort. As an individual, Vivien Thomas was as pragmatic and no-nonsense as the surgical tools he developed and passed on to others. He was hooked on the process of discovery and the quest for answers that really mattered. It was this passion for science that forged the bond between Thomas and Blalock and that would leave a life-saving legacy for generations to come. Their collaboration provides a framework for understanding how individual partnerships can break down society's barriers.

As we address issues of diversity and tolerance, and learn to appreciate the contributions of all Americans, Partners of the Heart provides an important story of African American achievement and the rich possibilities inherent in cooperation. My hope is that this film will spark a dialogue and will advance our struggle to understand race, history and who we are. In the very making of Partners of the Heart we went through this process ourselves.



- *Andrea Kalin Producer/Director/Co-Writer*



# How to Use this Guide

**This booklet is intended for three main audiences:**

- **High-school students who want to find out more about the film's story and what it means**
- **Teachers who want to use the film in classes on science, history or social studies**
- **Anyone who wants to know about mentoring programs that can link young people to careers in science and medicine**

For all viewers, **Section 2 summarizes the story**, offers Vivien Thomas' view of the relationship and shows some of the partnership's impacts, including the effect on young people like Levi Watkins, Jr.

**Throughout this guide you'll find short success stories** — profiles of people who have overcome obstacles of ethnic bias, gender bias and economic hardship, and who went on to make important contributions in health and medical science. Their stories bring the film's message into the present and show the range of paths available in broad fields like medicine.

For students, **Section 3 looks at the science and history of the human heart** and how medicine has treated it through many cultures and eras. Through the reflections of "blue babies" and four success stories, we also look at how medicine isn't just about science, it's about people.

**Section 4 offers classes historical context** for the Partners story, both in the structures of racial segregation and in the stories of early activists who spoke out for equal rights in the American South. The two stories told by Nat Crippens bring that history to life-and-death reality.

Teachers should pick the readings that best suit the dialogue they wish to explore. Objectives might include having students analyze the effects of racial segregation on the history of medicine or having science students discuss the impact of the blue-baby operation on the development of medicine today. **The discussion questions can help bring out themes in science and history.**

For more classroom activities, **Section 5 moves from the school to the neighborhood.** How can we find and appreciate the local heroes who live around us? How can medical professionals best respond to the communities around them? Through success stories involving Hmong (Southeast Asian), West African and Hawaiian cultures, we see how medicine can reflect a community and better serve its people.

**In the last section, you will find a list of resources for learning, links for more information** about the people profiled here and sources on mentoring for careers in science and medicine. For more paths into this rich story, see the DVD version of Partners of the Heart or visit the website at

[www.pbs.org/wgbh/amex/partners](http://www.pbs.org/wgbh/amex/partners)



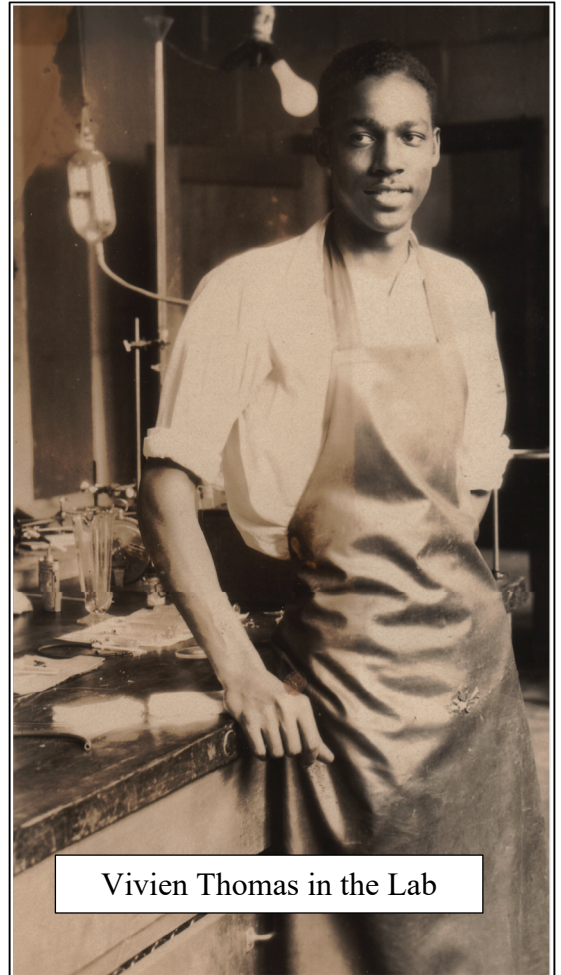
# The Story of Partners of the Heart

**Partners of the Heart** tells the story of Alfred Blalock and Vivien Thomas and how they, with Helen Taussig, helped to invent heart surgery.

How did they get the nerve to cut into the heart of a sick baby? How did they even work together? At the time, a black man and a white man could get arrested for just eating together in public.

Alfred Blalock came from a white Southern aristocratic family in Georgia. Vivien Thomas was born in Louisiana and grew up in Nashville; his father was a master carpenter in the African American community. The two men met in 1930, when Blalock was a 30-year-old surgeon and Thomas was 19 years old. Thomas applied for a job in the medical laboratory of Vanderbilt University in Nashville. Blalock hired him.

Blalock was a professor, busy doing research, operating on patients and teaching medical students. He needed an assistant, he told Thomas, whom he could “teach to do anything I can do, and maybe do things I can’t do.” Thomas took the job to save money for college and medical school. He had lost all his savings from carpentry jobs when banks failed after the Stock Market Crash of 1929.



Vivien Thomas in the Lab

Despite their differences in race, background and personality (Blalock had a quick temper, Thomas was very calm and slow to anger), Alfred Blalock and Vivien Thomas shared a deep commitment to excellence, and a belief in medicine. The combination of Blalock’s grasp of medical theory and willingness to challenge assumptions and Thomas’ technical expertise and innovative problem-solving skills made them a dynamic research team.

At that time, under the rules of racial segregation — mainly in the South but to varying degrees nationwide — they could not see each other outside the lab. Under Jim Crow laws, it was illegal for whites and blacks to meet socially, to date, even to share a meal. (“Jim Crow” was the name of a minstrel routine in the mid-1800s and later became a derogatory term for blacks and their forced separation from whites. Jim Crow laws were enacted throughout the South in the 1870s from a racist idea of “purity.” Schools, parks, public transportation, theaters, restaurants, even cemeteries had to keep whites and blacks separated. In 1954 the U.S. Supreme Court ruled that such laws were unconstitutional.)



In the privacy of the lab, though, the two men could talk over experiments. Vivien Thomas didn't have the advantages of Blalock's background and college education, but he had an excellent high school education, and in his work as a carpenter he had perfected a craftsmanship that would prove amazing in surgery. While working in the lab, Thomas studied science on his own and gradually did more and more of the operations in the animal laboratory himself, testing Blalock's theories about surgical shock. His drive for knowledge was important for the success of their experiments. Their research in Nashville created a new understanding of how shock happened. They showed that shock was caused by a loss of blood and plasma and that the body required transfusions to prevent shock during operations. This was revolutionary.

In 1940 Blalock accepted a job as the head of the surgery department at the medical school of Johns Hopkins

University in Baltimore. By that time, Blalock was convinced that Vivien Thomas was essential to his research. He insisted that Johns Hopkins hire Thomas too, even though the university had no African Americans on its professional staff. Like Nashville, Baltimore was segregated. As a black man, Thomas could "stop traffic" just by walking down the hall in a white lab coat and he was barred from eating in the same cafeteria as the hospital's white staff.

At Hopkins, the two men worked with Helen Taussig, a pediatric surgeon who wanted to fix a congenital heart defect called Tetralogy of Fallot. The condition limited the oxygen in afflicted children's blood, made them short of breath and gave their skin a bluish appearance. Blalock, Thomas and Taussig developed the "blue baby" operation, a surgical procedure that rearranged the blood vessels connecting a child's heart and lungs to increase the oxygen in the blood. Thomas tested the procedure and

perfected it in the animal laboratory; finally, they decided they were ready to try it on Taussig's patients. Blalock conducted the operation in November 1944, with Thomas advising him at each step. The success made headlines around the world and launched the modern era of heart surgery. The operation paved the way for open-heart surgery and heart transplants.

Thomas and Blalock pioneered advances in medicine, but the partnership was still held back by segregation. Thomas got no credit for his role in the breakthroughs until decades later. For most of his life he struggled to provide for his family and his children's education. When Thomas went to a party at the Blalocks' house, he went as a bartender, to earn extra money. In 1961, when Blalock's colleagues threw a big party to celebrate his 60th birthday at Baltimore's premiere Southern Hotel, the hotel still banned African Americans. Thomas was not invited, despite a friendship and collaboration of 31 years.

Neither man made a public statement about racial equality. Still, their partnership helped pave the way for social breakthroughs. Vivien Thomas' presence in the Johns Hopkins medical school encouraged African American orderlies like Richard Scott, who went on to study medicine and become a surgeon in Baltimore. Later, Thomas tutored young black students and introduced them to medical careers. In 1971 Johns Hopkins finally recognized Thomas' historic role when his former students of surgery commissioned a portrait of him to hang in a place of honor, near

Blalock's portrait. The university also gave him an honorary doctorate degree.

Levi Watkins, Jr., was one of Thomas' students. Watkins came to Johns Hopkins in the 1970s as an intern and later joined the faculty. One day in the cafeteria, Watkins noticed another black man and recognized him from a portrait that hung in the medical building, near Blalock's picture. "As soon as I saw him, I remembered there was this picture of this man in the hall," Watkins said later. "I knew black men didn't have their pictures on the walls of Johns Hopkins. So, I asked him who he was, because I knew he was somebody extraordinary." From that first meeting in the cafeteria, Vivien Thomas helped to lead Watkins through his first years at Johns Hopkins. Later, Levi Watkins opened the medical school up to many more people of color.

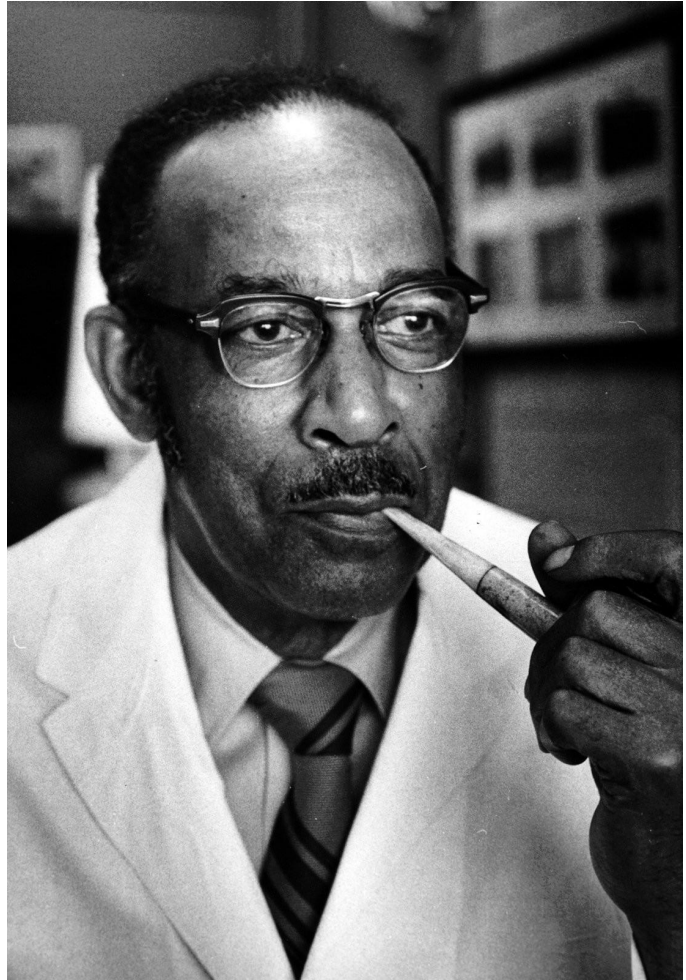
Vivien Thomas' partnership with Alfred Blalock was revolutionary in medical science. It was also revolutionary in another way: they worked together as individuals, looking past the divisions of race to create knowledge and healing.





## In His Own Words: Vivien Thomas

In his life, Vivien Thomas focused on his medical research and his family, and did not speak out on social issues. But in his autobiography, published just days after his death, he reflected on his experiences. (The book, originally titled *Pioneering Research in Surgical Shock and Cardiovascular Surgery: Vivien Thomas and His Work with Alfred Blalock*, was recently republished under the new title *Partners of the Heart: Vivien Thomas and His Work with Alfred Blalock*.) These excerpts tell us what he thought about life, his ideals, the pursuit of excellence and his partnership with Alfred Blalock.



### On his first mentor:

*My father took advantage of the propensity of boys to hammer on things and brought us up in his own trade of carpentry...During the summer, work hours were from 7 a.m. to 5:30 p.m. I began reporting for work when I was thirteen. He started us out with nailing. Next, he would have us sawing (no electric saws) to lines he had made to measure on the lumber. The day would soon come when we were doing our own measuring, making our own lines, sawing, and nailing. Gradually we went on to finish and trim work, learning to fit and hang doors, installing locks on them, and putting in inside stairways and banisters. As he had done with my brothers, my father had me working almost independently by the time I was 16 years old.*

### On learning perfectionism, at age 19:

*On a carpentry job, I was to remove the worn piece of flooring and match the color and grain to the remaining floor. Shortly after noon my foreman came by to inspect. He took one look at the floor and said, "Thomas, that won't do. I can tell you put it in." Without another word, he turned and left the house. I was stung, but I replaced the piece of flooring. This time I could barely discern which piece I had put in... Several days later, walking along with him to another job site, he said to me, "Thomas, you could have fixed that floor right in the first place." I knew I had already learned the lesson, which I still remember: whatever you do, always do your best...I never had to repeat or redo another assignment.*



On first meeting Alfred Blalock:

*I was favorably impressed by Dr. Blalock and his friendly, relaxed and informal manner in the interview and by the amount of time he spent explaining his experiment to me...Though I did not fully appreciate it at the time, he knew exactly what he wanted. Essentially what he said to me was: "I want somebody in the laboratory whom I can teach to do anything I can do and maybe do things I can't do."*

On contagious enthusiasm at Vanderbilt in the early 1930s:

*For me this was a time of hard work and study to become familiar with and use the additional apparatus and equipment to learn all the various techniques and methods required in the studies that followed. The volume of work each day was tremendous. Besides having an experiment in progress, the chemical analyses from the previous day's experiment were being done. And the days were long; there was no 8 a.m. to 5 p.m. during these studies. I don't know when Dr. Beard [another Vanderbilt surgeon and mentor to Thomas] slept; I would leave him in the laboratory at 6 or 7 p.m. Dr. Blalock would often leave even later...I did not realize that enthusiasm was contagious until I found that I didn't mind if I occasionally had to cancel some social activity. I had obviously 'caught' it from Dr. Beard.*

On how he taught himself surgery in the 1930s:

*...I would scrub up, prepare, and drape the anesthetized animal. When Dr. Blalock came in to scrub, he would have me begin the incision...One day he didn't make his schedule. I waited a while, made the incision, and covered it with moist gauze. I waited some more. Ten to fifteen minutes later he came in. "Sorry, I got tied up," he said. On another day, I made the incision and waited thirty minutes. After forty-five minutes, when he still had not come, I went ahead with the procedure and slowly and painstakingly struggled on through alone. He came in just as I was ready to close the incision. After looking over what I had done, he asked who had helped me. I said no one and Sam [a lab assistant] confirmed my reply.*

On racism and his partnership with Dr. Blalock:

*In 1937 Dr. Blalock told me that he was considering an offer to go to Henry Ford Hospital [in Detroit], as Chief of Surgery, and that if he accepted, he wanted me to go with him. I wrote an older sister, Olga T. Calhoun, who lived in Detroit, telling her of the possibility that I might be coming there. She wrote back and told me not to get my hopes too high, that Henry Ford was strictly lily white, and that it was worse than anything she had seen, even though she had grown up in the South. Some time later, Dr. Blalock said simply, "We won't be going to Detroit." He made no further comment and gave no reason for turning down the offer... It has been said and written that the position was turned down because, as my sister had suspected, I was not acceptable to them and that I was a part of a sort of package deal that Dr. Blalock had proposed.*

# *Nation's Top Surgeons Salute Vivien Thomas*

**Blalock Lab Assistant**

**Receives Recognition**

**From Hopkins Graduates**

**On intellectual curiosity and his work:**

*Dr. Blalock was strictly opposed to my helping anyone in the laboratory. I first learned of this around 1934-35. Dr. Blalock came into the laboratory one day and found me helping Dr. Ralph Larsen, Resident in Surgery, with something he was doing. He told me in no uncertain terms, with Larsen listening, "You are my technician and you are not to help anyone." I got the word but, if I knew Dr. Blalock was busy elsewhere or was out of town, I would help anyone if I had the time available. I was interested and curious about everything that went on in the laboratory. The interest and curiosity still remain with me.*

**On tackling the toughest problems:**

*I had never seen or examined a defective heart, and what I actually saw defies verbal description except in highly technical terms. I was amazed that some of these patients had survived as long as they had...While attempting procedures on an earlier project that had been particularly difficult, I had asked the Professor why he didn't find some easier projects. He replied that all the easy things had been done. The reproduction of any of the conditions that existed in these congenitally defective hearts would surely not be easy.*

**On the earning power of a college education for his children:**

*Almost everyone I talked with was ready to give me a job [as a carpenter, in the construction boom after World War II]. There simply were not enough carpenters to meet the demand. It was quite a temptation...I told him we were planning to move back to Nashville the following spring...Our dialog went essentially like this:*

**BLALOCK:** What's the matter, don't you like it here?

**THOMAS:** I want to give my children a better chance than I had and give them as much education as they want, but I won't be able to if I stay here at Hopkins.

**BLALOCK:** (whining) Well, Vivien, you're making more money now than anyone around here without a degree...

**THOMAS:** That's the problem, that's the reason I plan to be able to let my children get all the degrees they want.



# Success Story:

## Levi Watkins, Jr.

### Field: Cardiac Surgery

Dr. Watkins was the first surgeon to implant an internal defibrillator, which automatically detects irregular heart rhythms and corrects them. He became the first African American chief resident in cardiac surgery at Johns Hopkins.

Beginnings: Levi Watkins, Jr., was born in Parsons, Kansas, the third of six children. His father was a college professor who moved the family to Alabama to become president of Alabama State University. The minister of the family's church in Montgomery was Dr. Ralph Abernathy, the civil rights leader. In high school, Watkins joined the Dexter Avenue Baptist Church, led by Dr. Martin Luther King, Jr. At Dr. King's request, Watkins drove the church station wagon on Sunday mornings. He played an active role in the Montgomery bus boycotts of the 1950s.

Then what? Watkins attended Tennessee State University and, inspired by what he'd seen at Dr. King's side, he "felt it was time Vanderbilt was integrated." In May 1966 he became the first African American ever admitted to Vanderbilt University's medical school. He found out that he was accepted from a headline in the Nashville newspaper.

In 1970 Watkins began a surgical internship at Johns Hopkins University Medical School. There he met Vivien Thomas, who was head of the surgical research laboratory. "As soon as I saw him, I remembered there was a picture of this man in the hall," Watkins recalled later. "I knew right away he was somebody of importance. It was a kind of funny feeling ... because I knew black men didn't have their pictures on the walls of Johns Hopkins." The two became good friends and Thomas guided the younger man in the ways of Hopkins.

From 1973 to 1975, Watkins interrupted his surgical training to conduct cardiac research at Harvard Medical School. His research on the role of the renin angiotensin system in congestive heart failure was a breakthrough and led to new treatment for heart failure.



Levi Watkins Jr.

Back at Hopkins, he became the university's first black chief resident in cardiac surgery. In 1978 Watkins joined the faculty as an associate professor and the next year he joined the medical school's admissions committee. He wanted to increase the participation of minorities at the medical school, and in just four years, minority representation quadrupled among students. In 1983 he was appointed to the National Board of the Robert Wood Johnson Minority Faculty Development Program, which aims to increase the number of minority faculty members across the country.

Another First: Soon after he joined the surgical team at Johns Hopkins Hospital, Watkins performed an operation that captured international attention. In February 1980, he became the first surgeon to implant an automatic defibrillator into a human heart. This treatment has since saved the lives of more than 100,000 people who suffered from a dangerously irregular heartbeat.

In 1991 Watkins was made a full professor of cardiac surgery and within months was appointed dean for postdoctoral programs and faculty development for the medical school. In that role he has helped to make postdoctoral education in America more dynamic. His life has been featured in magazines and national television programs.



# History of the Heart

The long path of discovery that led to the pioneering “blue-baby” operation by Alfred Blalock, Vivien Thomas and Helen Taussig was filled with advances and missteps. Here are eleven steps in that journey and a look at the causes of heart defects and disease today. Reflect on how each step relates to the one before it.

## Eleven Steps to Knowing the Heart

### 2,500-1,000 B.C.E. Judgment of the Dead

The ancient Egyptians believed the heart, or the *leb*, was the center of life and morality. Egyptian mythology stated that after death, your heart is taken to the Hall of Maat, the Goddess of Justice, where it is weighed against the Feather of Maat. If your heart is lighter than the Feather, you join Osiris in the afterlife. If your heart is heavier, then the demon Ammut eats your heart — and your soul vanishes from existence.

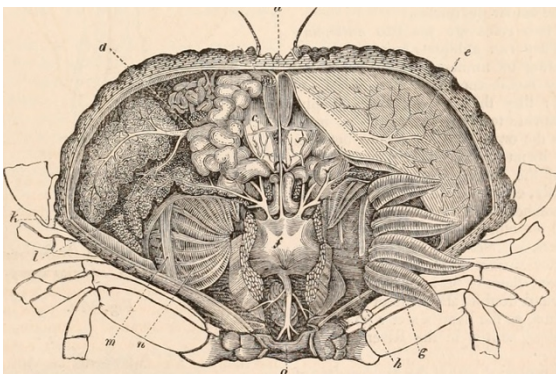


### 130-200 C.E. Galen

Perhaps the most important of all ancient physicians, Claudius Galenus was the personal physician to the Roman Emperor, Marcus Aurelius. Although Galen failed to understand things like circulation, he noticed several important features of the heart, including its valves and ventricles, and the differences between veins and arteries.

### 100-900 C.E. Native America's Heart

Early Americans recognized the importance of the heart. The Teotihuacan Culture in ancient Mexico believed that every human being contains several different spiritual forces. Most of these may leave the body at certain times, such as when one is dreaming. However, the *teyolia*, the spiritual force associated with the heart, must remain within the body at all times or the person will die.



### 1628 C.E. William Harvey

In England, William Harvey published “An Anatomical Study of the Motion of the Heart and of the Blood in Animals,” which detailed for the first time the idea of circulation and how blood travels through the body, propelled by the pumping heart. The idea is a major breakthrough and revolutionizes the way people think about the human body.



## **Late 1800s C.E “Heart Surgery Can Go No Further”**

“A surgeon who tries to suture a heart wound deserves to lose the esteem of his colleagues,” said Theodor Billroth in 1883. Like Billroth, most physicians considered it foolhardy to treat heart wounds. Later, Stephen Paget agreed: “Surgery of the heart has probably reached the limits set by Nature to all surgery; no new method, no new discovery, can overcome the natural difficulties that attend a wound of the heart.”

## **1890s Repair of Heart Wounds**

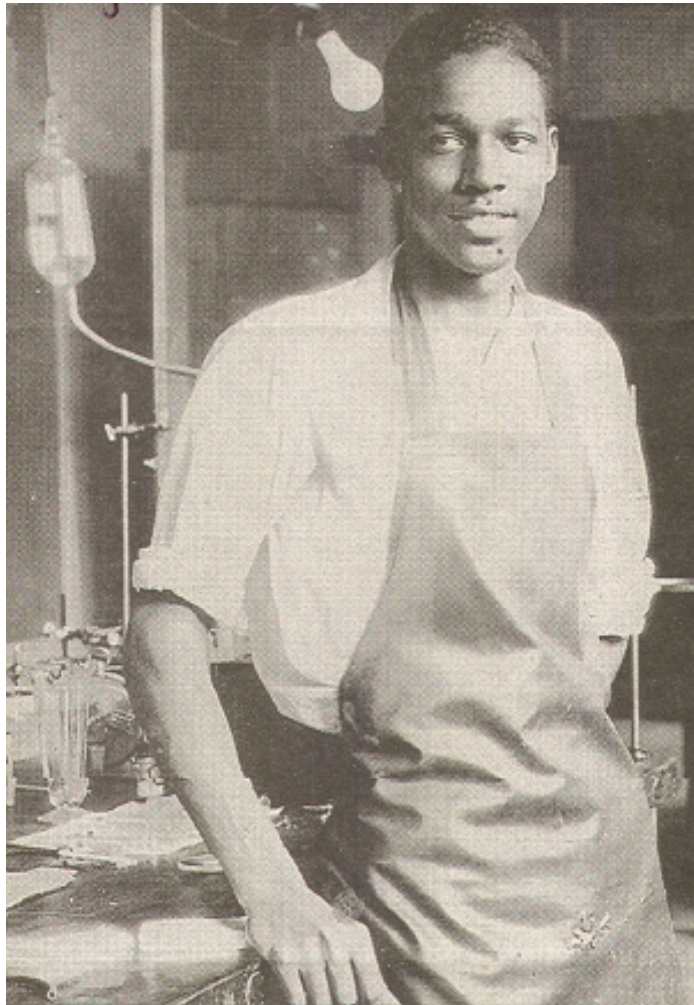
Still, other surgeons attempted heart operations. Henry Dalton and Daniel Hale Williams successfully sutured cardiac wounds. There was a high mortality rate, but innovators saw these and other successful operations as hope for the future. Most of the medical community disagreed.

## **1938 Modern Heart Surgery Begins**

Dr. Gross operated on the vessels near the heart in an attempt to repair a defect in the pulmonary artery of a young girl. This caused a sensation in the newspapers. Doctors around the world took notice. The era of modern cardiac surgery had begun.

## **1944 Blue Baby Operation**

Alfred Blalock, Helen Taussig and Vivien Thomas worked together in the first blue-baby operation, to treat a fatal heart defect (its technical name is “Tetralogy of Fallot”). The operation was a success and introduced heart surgery as a viable option, not just a last resort. World War II had brought improvements in anesthesia, antibiotics and blood transfusions, which helped pave the road toward the Blalock-Taussig shunt.

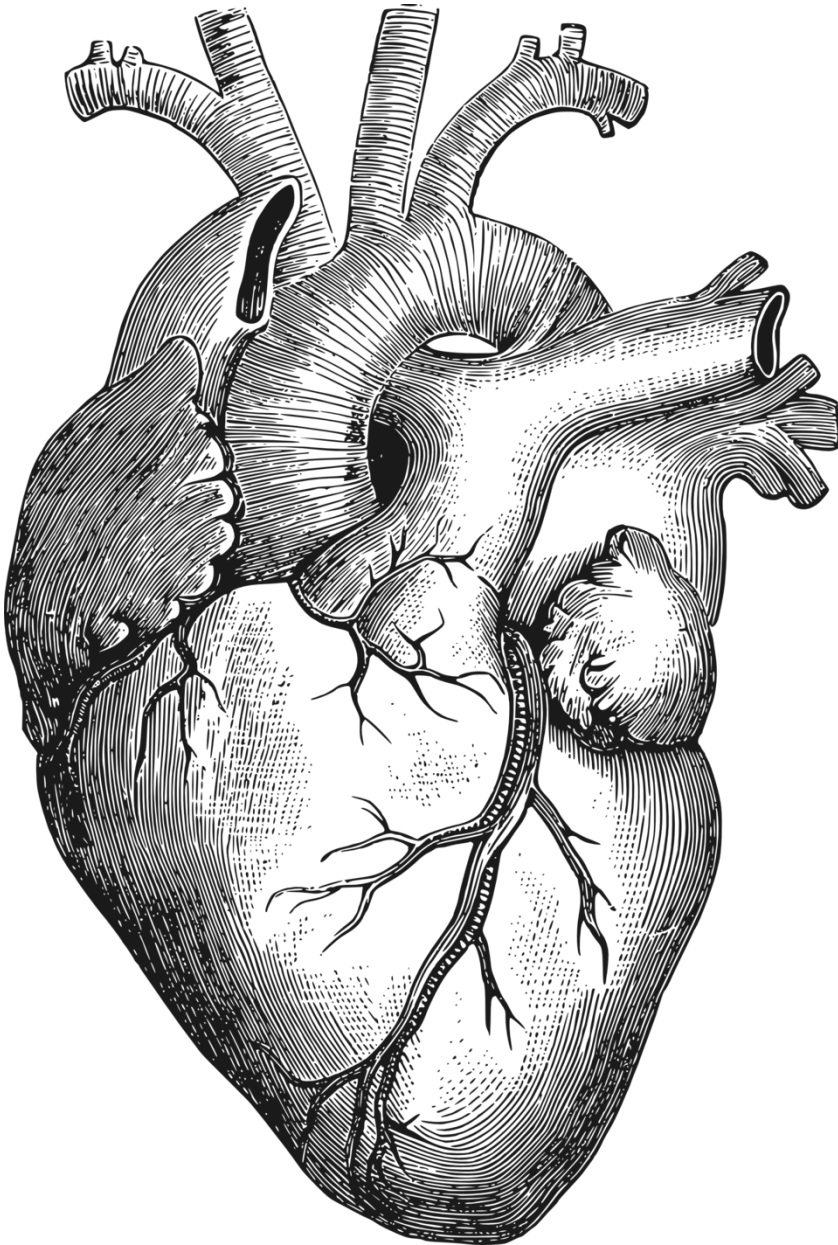


## 1952 First Open-Heart Surgery

At the University of Minneapolis Hospital, Dr. John Lewis, assisted by Dr. Walter Lillehei, performed the first successful open heart surgery. Using the hypothermia approach, they sutured a hole in the heart of Jacqueline Johnson.

## 1960s Heart Transplants

With the development in the 1950s of the heart-lung machine, which would take over the vital functions of the body and allow a surgeon more time to operate, cardiac surgeons became the celebrities of medicine. Several, such as Walter Lillehei and Henry Bahnson, lived up to the “work hard and play hard” mentality. Denton Cooley became a legend in Texas before he was 35. In 1967 in Cape Town, South Africa, Dr. Christiaan Barnard performed the first heart transplant, replacing the diseased heart of a 55-year-old man with the healthy heart of a woman who had recently died. The operation launched onto the front pages around the world, making a star out of Barnard.



## ***Now:***

### ***Artificial Hearts***

*Experiments with artificial hearts have been around since the mid-1950s. Despite several successes in the 1980s, it wasn't until the implantation of a battery-powered heart by Michael DeBakey in 1998 that many began to think of artificial hearts as the way of the future.*



# Medical Science in a Social Context

## What Causes Heart Defects?

And **what is a “blue baby”**? Before birth, the human heart starts as a simple tube. It then twists and rotates and forms cavities and valves to become a mature heart. When things go wrong (very rarely, considering how complex it is), problems can range from holes between the heart’s chambers to faulty connections, or valves that don’t open properly. The blue baby syndrome – Tetralogy of Fallot – is actually four heart defects (“tetra” means “four”) that happen all at once:

- there is a gap in the septum that normally separates the left and right ventricles;
- the valve that goes from the heart to the lungs is too small;
- the aorta “overrides” the defective septum; and
- the wall of the right ventricle is too thick and hard.

This combination is a very rare congenital heart defect. (Congenital means “present at birth.”) Congenital heart problems affect about one child in 100. We don’t know for sure what causes these defects — some may be caused by abnormalities in a person’s chromosomes, others may occur because the mother suffered an infection while she was pregnant. You can find out more about heart disease and health at [www.heartpoint.com](http://www.heartpoint.com).

## Heart Disease: Did you know?

**Heart defects are rare, but heart disease is the leading cause of death in the United States.** At least 58 million Americans (mostly adults) suffer from some form of cardiovascular disease, including high blood pressure. It is the No. 1 killer of women and men. Heart disease and stroke used to afflict more men than women, but since 1984, they have killed more women than men. Stress, smoking, fatty foods and inactivity are major factors contributing to this increase.

**Cardiovascular disease can hit anyone, regardless of the person’s shape or size.** Most types of heart disease are caused by our own behavior, like poor eating habits and lack of exercise. To sum it up, **too much of a good thing may kill us:** tasty saturated fat, sugar and television are just three. Even though heart disease occurs mostly in adults, it can start developing in children as young as 10 years old.



***This is what you can do:*** When it comes to eating and exercise, we all have room for improvement. With a few small changes, you can make your heart a lot healthier.

**SATURATED FAT:**

There are good fats and bad fats. Most saturated fats are bad. This type of fat rolls around in your bloodstream without dissolving. It settles on the walls of your arteries and eventually blocks the flow of blood throughout your body, making your heart work hard

***What to do:*** Make some changes. Try reduced fat or skim milk instead of whole milk. The taste will grow on you. The same goes for ice cream. Try low- or no-fat frozen yogurt or ice cream; light mayonnaise instead of regular; pretzels instead of potato chips; salsa instead of a creamy dip; grilled chicken instead of a burger; and sliced turkey instead of bologna. Skip the vending machine snacks and try yogurt or a piece of fruit. And remember, French fries are not the only vegetable!

**SUGAR:**

Guess how many teaspoons of sugar the average American consumes in a day. Try 21. The average teenage boy eats 34. The recommended daily allowance of sugar is just 10 teaspoons. Most processed foods have sugar added to them. For example, a 12-ounce cola contains more than 10 teaspoons of sugar. What's the problem? Sugar is empty calories, with no nutritional value. Consumed on a regular basis, it can cause weight gain, and too much weight gain can lead to heart disease (or obesity, or diabetes). Cut back while you can.

***What to do:*** Start with breakfast. Check the label on your cereal box. If it has more than 8 grams of sugar per serving, try a different brand and add a banana or strawberries for the sweetness. Instead of a soda, try water, seltzer, orange juice or low-fat milk. You've heard it before: Our bodies are two-thirds water. The next time you feel hungry, you might just be dehydrated. Try drinking more water throughout the day.

**TELEVISION:**

According to one study, the average American watches FOUR hours of the box a day! That means that each week, one whole day and night goes to nothing but television.

***What to do:*** You could enjoy a lot of other things in that time instead. Try some exercise. Walk with a friend, shoot some hoops, bike to a friend's house, try a new sport, or turn on the music and dance! It feels good because your body needs to be active. It's great for your head and your heart.

There's a quick and easy quiz that the Center for Science in the Public Interest has on its website called the Rate Your Diet Quiz. It's located at: [www.cspinet.org/quiz](http://www.cspinet.org/quiz). Two other sites loaded with information are [www.mayoclinic.com](http://www.mayoclinic.com), and the Department of Agriculture's food and nutrition information center at [www.nalusda.gov](http://www.nalusda.gov). Click on FNIC.

# The People Side of Science and Medicine

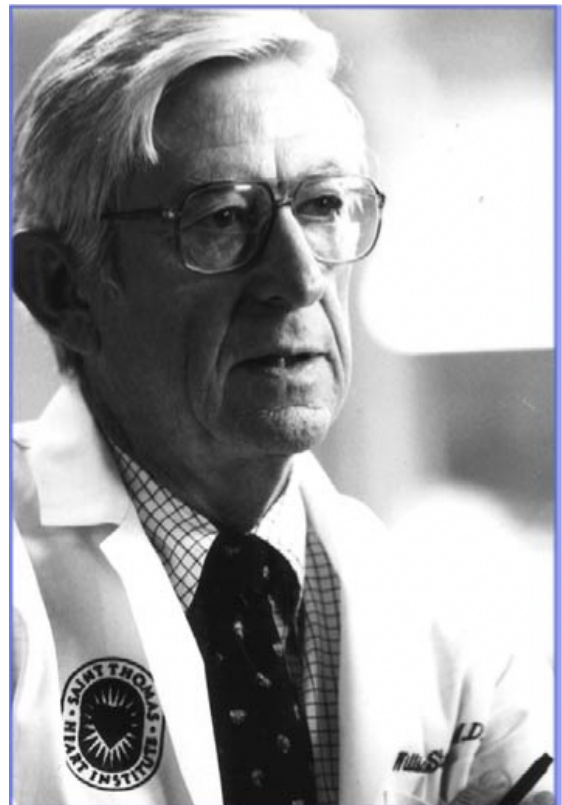
The Partners of the Heart story shows that who we are affects our approach to science and medicine. Usually, scientists and medical researchers are dedicated to testing their ideas and experiments, but their values can in subtle ways affect how they do research, and how their results get to the public. This fact is obvious to groups that feel slighted. The life stories of Henry Wall and Rodney Hood (pages 28 and 29) show again how race can affect medicine.

Drs. Bevin Engelward and Maria Terésa Tarragó-Trani challenged a different bias — the notion that women are less able to conduct science than men. People like Engelward and Tarragó-Trani are helping to prove that notion wrong, but people's biases are often slow to change.

## In His Own Words: A Cardiac Surgeon Reflects on Heart Surgery and the First Blue Baby Operation

**Dr. William Stoney** is a heart surgeon at the St. Thomas Hospital in Nashville, Tennessee, where he helped to establish a cardiac surgical service in 1967.

Several years ago I became interested in the history of cardiac surgery, especially the oral history. Our specialty did not really exist until the 1940s and 1950s and many of the pioneers of that time are still alive. I was fortunate to receive a grant from the Department of Cardiac Surgery at Vanderbilt to visit some of these first-generation surgeons and record their recollections on videotape for the Medical Library at Vanderbilt. So far, I have completed 32 interviews. All of them are very interesting, I think, and some are inspirational. They represent a time when everything in cardiac surgery was new and exciting.



### **On Early Experiments in Heart Surgery:**

*"The heart functions like a pump, and without the flow of blood, life can't go on."*



*“At the turn of the century, most surgeons thought that the heart would never be amenable to any kind of procedure, that just touching the heart was a no-no. There was a surgeon named Alexis Carrel. He had worked — in the period 1910 to 1915, prior to the First World War — on developing a number of vascular procedures in the experimental lab. But they never carried over into the clinical world. It was all there in the literature. He even received the Nobel Prize for his work.*

*So when Dr. Blalock started doing vascular surgery, there really wasn't any, in his training and in his background, there wasn't any experience to fall back on. The vascular surgery that he did, he sort of had to develop all over again. He had to repeat what Alexis Carrel had already done and learn how to do those procedures.”*

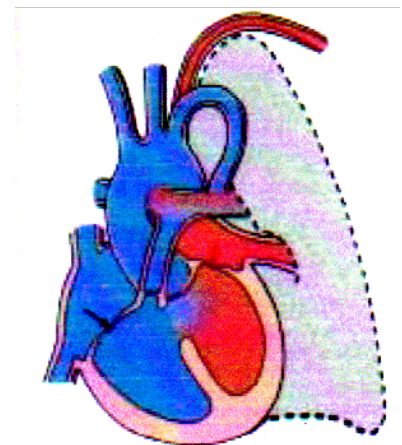
### **On Tetralogy of Fallot (Blue Baby Syndrome):**

*“Tetralogy of Fallot was a complex congenital abnormality of the heart. It was easily recognizable in that children had unoxygenated blood circulating that gave them — their skin and their eyes and their nails — a bluish sort of tint. In Tetralogy of Fallot, there's not enough blood going to the lungs. So they were called blue babies.*

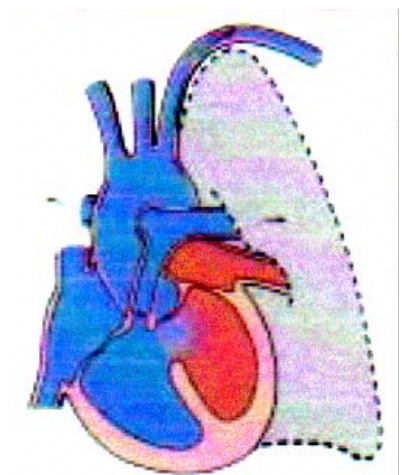
*Almost all of those died before they reached teenage years, although an occasional patient with Tetralogy may have reached...his twenties. But almost all of them died and many of them were severely disabled. They were undernourished and small. They would have fainting spells if they exercised too much because of not enough oxygen to the brain. They would sometimes have seizures. So their prognosis was very grim.*

*I don't think anybody thought that there was, right on the horizon, anything that could be done. There were so many unknowns.*

*The first patient that Dr. Blalock operated on, a little girl named Eileen Saxon, would pass out while she was eating, come out of her oxygen tent, and she was so sick that even when she would cry sometimes she would have a seizure and pass out.”*



**Fixed Blue Heart**



**Blue Baby Heart**



### **On the Instruments Used:**

*"I think it would be very primitive to compare today's vascular surgery to vascular surgery in the thirties. The instruments and the materials then were very primitive."*

*"The instruments that weren't available in the 1930s...[are those that] clamp and control bleeding of large blood vessels without injuring the blood vessels, and suture materials that allow the surgeon to sew vessels together. They were totally unavailable."*

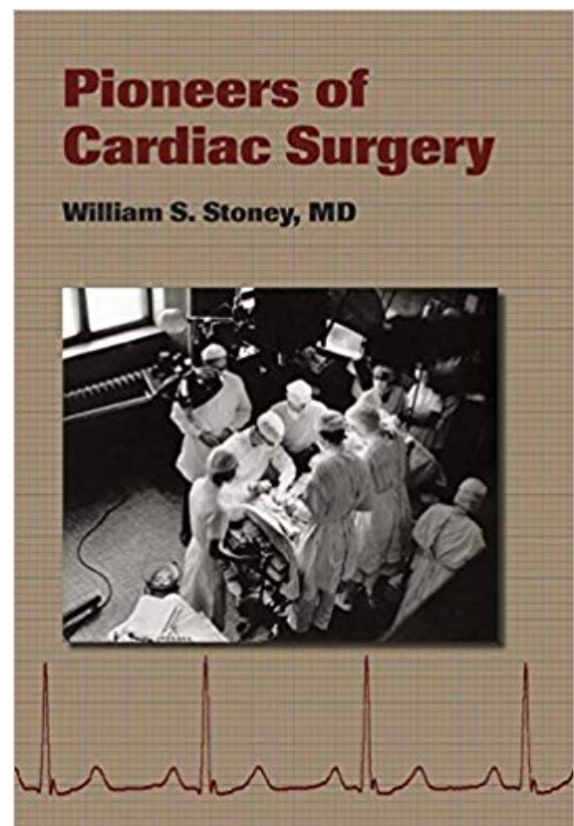
### **On the Aftermath of the Successful Blue Baby Operation:**

*"With the first three successful patients and with the first scientific paper about them, everybody suddenly, not just medical people but lay people, realized that children with Tetralogy of Fallot and with this terrible problem, that there was a surgical solution. And so people came, flocked, to Johns Hopkins after the first operations were reported back in 1945. The blue baby operation was a sensational event. There were a number of stories in the newspapers about people who had come to Baltimore with their little sick child. And the operation was successful...People came from Europe at the end of the Second World War. From my viewpoint, it was the very beginning. ...The blue baby operation was the beginning of cardiac surgery. Before that time, I don't think there was any real understanding or thought of it."*

### **On A Total Correction of the Blue Baby Syndrome:**

*"It was 10 years or more before a total correction of Tetralogy of Fallot was possible. This was a stopgap procedure, but it was highly successful. Many of these patients lived almost normal life expectancy. There were a few doctors at that time who were still working and thinking in terms of a heart-lung machine, so that some day total correction of congenital heart disease would be possible. But they were very few. It was certainly just a small number of people in the 1940s working on that problem."*

William Stoney's Book:  
*Pioneers of Cardiac Surgery*



## **The First African American Blue Babies:**

**Clarence Durham** of Baltimore was the first African American child to receive the Blalock-Taussig surgery for blue babies in 1945, within a year after the inaugural operation was performed. Sadly, the four-year-old did not survive after the procedure.

Seven-year-old **James Nix, Jr.**, of Washington, D.C., underwent the same surgery by recommendation of Dr. Roland B. Scott of Washington's Freedman's Hospital in 1946. Dr. Scott was the chief of pediatric services at Freedman's Hospital and he recognized that little James had enough of the symptoms of typical blue babies that he, too, could benefit from the surgery.



Photo from Partners of the Heart reenactment scene of first blue baby operation in 1944.



# **In Their Own Words: Blue Babies**

## **Sandra Stoltz**

On May 17, 1945, newspapers announced the success of the first three Blalock-Taussig Shunts. Almost immediately, sick children began to pour into Johns Hopkins. Sandra Stoltz was one of the first 50 children admitted and in October 1945 Dr. Blalock performed the procedure on her. Though she was very young when she came to Johns Hopkins, Stoltz has vivid memories of growing up as a blue child (or purple, as she liked to say) and of Blalock, Taussig and Thomas. She is now a prominent psychologist in Sedona, Arizona.

I think the idea that I was different from other children began to dawn on me when I was about three and I couldn't keep up with the others, the neighbor's kids, running around getting into trouble. I was more tired and I had to play differently. For instance, we'd be walking just one block to get ice cream or something and I'd have to squat in the middle of it because I was simply too tired to go on. And that embarrassed me. The other kids had to stand around and wait for me and I felt really weird.

I remember I was playing with the kids in the yard that was in back of ours and I passed out. And I woke up and there was this ring of adults around me, including one of the mothers who was a nurse, and they were all saying, "What's wrong? What's wrong? What should we do? What should we do?" And it's like I was old before my time, and I was saying, "Just leave me alone. Let me get my breath. I'll be fine, don't worry." I was reassuring them. It's hard to be a purple kid and not be embarrassed. I mean, there aren't that many purple kids running around.... I knew I was purple. I couldn't help but see it. My hands were purple, my nails were purple, my toes were purple, my nose when I looked in the mirror was purple...I was purple from head to toe. I no longer began to think of myself as a kid with a heart defect. I began to think of myself as a kid who was defective. And it took a long time to get over that.

In October 1945 I came to Johns Hopkins for the surgery. My parents told me I had a 50-50 chance, and I said, "There's no doubt about it. I'm gonna be in the 50 that make it...." I wanted it so desperately. In fact, my worst fear was that after all the examinations and tests they were going to run, they would find out that I wasn't eligible. That was my worst fear, not the surgery. In fact, I had a friend who wasn't eligible and she got to be 14 and then she was blue and then she died.

I met Dr. Taussig when we came to Hopkins to be evaluated for the surgery. ... She struck me as a very kindly, soft-spoken lady and I liked how she talked to me. She didn't talk down to me. ... I remember her being very reassuring and her calm, quiet voice was very soothing. [Blalock] was more remote; he was like God. The big surgeon. He was a very handsome man and he seemed big to me. I don't know whether he actually was or not. But I liked him. I really liked him. I remember Vivien Thomas as this very kindly, gentle, soothing man. I don't know what exactly he did to me; I think it was some sort of angiogram. He described the procedure step by step. He told me exactly what to expect and he made it unscary. He really did. He created a profound impact and of course, as an adult psychologist, I know he was way ahead of his time in terms of how to prepare children for something like this.



## **Joleen Reynolds**

After the first blue baby operation, news of the new surgery spread like wildfire. Doctors from around the world came to Johns Hopkins to watch Dr. Blalock perform the procedure. One such doctor was a surgeon from Dallas, Dr. Jay Duncan, who then returned to Texas to operate on children on his own. On June 1951 he operated on Joleen Reynolds, a spunky 10-year-old constantly trying to challenge her disability. Now she is an active community leader in Houston.

My first memory was going to lots of doctors and my parents trying to find out why I fainted. ... They said there was nothing they could do for me at first. They took me home and said you'll have to wait, but my parents said, well, some day there will be an operation that will help me be normal.

I always wanted to do more than I could do, and I was always challenging myself. In the first grade, we had a big May Pole festival and I wanted to do all the dances. I did the Indian Dance. I did the Himerbering Dance, and I tried real hard to do the

May Pole Dance, but I couldn't. It was just too long and you had to go up and down and up and down with the streamers on the May Pole, and I just couldn't do that. I was real disappointed. I was always wanting to do things I couldn't do.

I was nine years old when I found out there was a surgery that they could do that would help me. They put me through a cauterization and it was a really painful cauterization that they don't do anymore. I [lay] on a big black table and they had to shock me. And they told me that if I would be very still for the first shock and the second one that they wouldn't have to do it again. So I was very good, but this was a very painful ordeal. After that, they said, "Yes, you're a candidate for the surgery."... So, a year later, on June 20<sup>th</sup>, 1951, I went in to have my operation. Dr. Jay Duncan from Dallas performed it. At that time, he was the only doctor in the Southwest...who did that surgery. [Afterwards], I was able to ski; well, at least I tried to ski. I cried all the way down Bunny Hill because I was scared. I didn't have good balance, but I tried everything I could — that I thought that I could do. I did tennis, things that I could never have done as a child.

[Even after the surgery], I always thought I would not live beyond 40 or 50 simply because my heart had been defected and worked so hard. I would ask doctors and they would say, "Well, [we don't know]." That was when I realized that there wasn't anybody ahead of me for them to tell me. Finally, one day I asked my doctor how long I would live and he said, "Joleen, stop worrying about it. You could live to be 80." "Eighty? I don't have enough money to live to be 80." So then I went home and started planning my future because I never really thought that I would live long enough to maybe retire and have a future. Now I do.



## Margaret Belkov

One of the more successful blue baby operations occurred in August 1947, when Dr. Blalock operated on Margaret Belkov — affectionately called “Cookie” by her friends and family. So successful was the operation that when Blalock had to testify at the vivisection hearings in Washington, D.C., in 1949, he asked Cookie to accompany him. Blalock had Cookie and two other blue babies describe their lives before and after the operation to show the benefits of animal testing. Margaret “Cookie” Belkov now lives in San Francisco.

I got used to knowing what I could do and couldn't do....In recess we'd play — I don't remember the name of the game — we'd get in a circle and somebody touches you on the shoulder and you have to chase that person. [When someone would tag me], the teacher would say, “Now, don't run, Margaret.” And I just thought, “This is so stupid. I've got to run.” I think I really resented her for saying that.

I used to play dodgeball and, when I got tired, I got hit by the ball....So I tried to do a lot of things, and I could only do them at certain points....I learned to ride my sister's bike, which was too big for me. But I did it. I rode it. I had a hard time of it. When Mom told the doctor, he almost had a fit. He said, “You've got to be kidding.” He was shocked. But I wanted to do it and I did it. When I got out of breath, I just stopped for a while.

Sometimes I pushed it right to the edge, but I always did what I wanted....I'd get very out of breath. I'd really have trouble breathing.

I did want to be more like the other kids. I wish I could have kept up with them. I was the kid who went to the dance and no one would dance with me, and I knew why.

I used to wonder, though, what it would be like to not be sick...then I'd be able to keep up with my sister. She was the very athletic one and I couldn't do that....There were things I wish I could have done and there were times that I thought that if it wasn't for my heart, I'd be a lot like [my sister].

[After the surgery], I could do everything. I would do things and then all the sudden it would hit me that I should be out of breath. And I wasn't. I mean, it was really a second-life story....I was walking with my sister one day...and I was keeping up with her. I wasn't getting out of breath. And that was neat. That was great. I finally did something I really wanted to do. I kept up with her. I could walk with her.



## Edward Mansell

In 1947, Blalock embarked on a tour of Europe, teaching and performing the operation in numerous hospitals across the continent. The news of the new operation was so electrifying that wherever Blalock traveled, he was lauded and treated like royalty. In Guy's Hospital in London, Dr. Blalock performed his 301<sup>st</sup> operation on 13-year-old Edward Mansell. Mansell is now the oldest surviving blue baby, a father and a grandfather, and an active fundraiser for heart diseases at Guy's Hospital.



One of the things about my childhood you have to remember is that when I was five, a war broke out. And for the next few years, we were traveling around England trying to find a place to live. There was at one time a suggestion that we should go to America. I thought the Americans wouldn't help me because of my medical condition....Eventually, we landed at a little place called Letchworth in Hartfordshire, which was known as the first Golden City, and I was sent to a local school there.

It was a miserable childhood. You couldn't do what the other boys and girls were doing. A large proportion of blue babies squatted. The reason [you] did it was because [you] got out of breath. And you had to sit down, and if there wasn't a chair or wall or anywhere to sit down, then it was easier to be in the squatting position. And you just did it the moment you got out of breath, regardless of where you were.

I remember talking to my elderly aunt...and she would say that I would be standing there one minute and the next minute I would be squatting. She said this was commonplace the whole time. By the very fact that you were sort of out of eye-line with everyone else, it was a form of exclusion.

I remember Dr. Blalock came around, and whenever he came around, he was accompanied by these seemingly hundreds and hundreds of people just standing around, just wanting to be within earshot of the man, wanting to hear what he had to say.

We recovered very quickly after the operation. Within three to four days, we were out of bed, running around, and the amazing thing was that now we could run around and didn't get out of breath. Most children spontaneously stopped squatting and in fact the problem was trying to stop us from doing too much....Trying to control a 13- year-old, much less a six-year-old or three-year-old, was virtually impossible!



## From Molecule to Marketplace: Making Medicine

When we go to the drugstore to buy aspirin or to get a prescription filled after seeing the doctor, we usually don't stop to think about how that medicine got there. We take for granted that there are many medicines available to help us feel better. But it wasn't always that way.

Did you know that when your grandparents were little, there were no effective medicines to treat pneumonia? Or that a vaccine for the crippling disease polio became available only in the 1950s? Or that small pox used to kill up to 4 million people around the world each year? Or that at the beginning of the 20<sup>th</sup> century, the average American could expect to live to only age 45 or 50 instead of 75 or 80 today?

Researchers for pharmaceutical companies have played a large role in treating disease, reducing death and disability and improving the quality of life for people afflicted with various illnesses. Many of us don't realize the risks and costs involved in the quest to find medicines that relieve human suffering. So let's take a closer look at what goes into getting a medicine to the marketplace.

The average time it takes for a single medicine to go from being discovered in the laboratory to appearing on the pharmacy shelves is 12-15 years. And the cost? About \$500,000. Researchers must first discover the target for a potential medication to address. For example, the target might be a chemical to block the attachment of a virus to a cell's DNA. Once the target is identified, thousands of compounds are screened to see if they act on the target in the desired manner. If a good compound is found, thousands of lengthy tests must be performed to discover whether it is safe and effective for patients. The U.S. government's Food and Drug Administration must give its approval to all new medicines before they can be made available to patients, which takes time, too.

Right now, more than 1,000 new medicines are in the development stage at U.S. pharmaceutical companies. Many of these medicines are aimed at treating various forms of cancer; diseases often associated with aging, like arthritis, diabetes and depression; neurological disorders, such as Alzheimer's disease and multiple sclerosis; as well as the leading killers — heart disease and stroke. Even though it takes years for a drug to go from molecule to marketplace, there is good reason to feel hopeful that many of the medicines under development today will help people in the not-too-distant future to live longer and feel better.

Vivien Thomas understood how critical researchers are to advancing medicine. It's one reason he took so much care to properly train and mentor young medical students who came through his laboratory. Thomas also experienced the excitement and joy of scientific discovery, knowing that what researchers do in the laboratory can make an enormous difference in people's lives. Pharmaceutical researcher Dr. Henry G. Wall feels that joy too. In the pages ahead, you can read his story and those of Drs. Rodney G. Hood, Bevin Engelward and Maria Terésa Tarragó-Trani.

## Success Story: Henry G. Wall

**Field: Veterinary Pathology and Pharmaceutical Research**

**Beginnings:** Henry Wall grew up in Florida with six sisters and one brother. Two of his siblings have the same father as Wall. When his parents divorced, his mother and stepfather had five more girls. Wall's real father was blinded in an accident at a citrus packing plant. Even though his mother and stepfather worked, his family was very poor. "We were all encouraged to work whenever we could to supplement the family income," Wall says. For an agricultural project in high school, Wall and a classmate teamed up to raise a bull calf, using their lunch money to buy animal feed. When the calf ate grass saturated with fertilizer, it was rushed to a veterinarian. The calf died of poisoning—and Wall's interest in animal research was born.



**Then What?:** Wall attended Florida A & M University, majoring in animal science. He earned a doctorate in veterinary medicine from Tuskegee University in 1975. While in vet school, a summer job at Walter Reed Army Institute of Research led to his decision to pursue veterinary pathology. This field deals with animal disease and how animals can be useful in developing new medicines for people. Wall helped find antidotes for toxic substances that could be used against U.S. soldiers in a war.

**Obstacles Faced:** Even though he received some small scholarships and had a part-time job in college, money was always a problem. One of the turning points in Wall's life was when he joined the ROTC (Reserve Officers' Training Corps) so that he could get a full-tuition scholarship. In return, Wall had to spend four years in the Army upon graduation from college. Within two years, Wall was sent to Vietnam. He served in the Army, active duty, from June 1967-August 1971 and began vet school at Tuskegee in September 1971. "I learned the lesson of persistence. I also learned that one should not think that a good opportunity is not for them," says Wall, who faced opposition in becoming the first African American chosen for an Army veterinary education program.

**Focus:** Now at the pharmaceutical company GlaxoSmithKline (GSK), Wall is the head of pathology in the safety assessment division in North Carolina. He and his team of scientists study how different medicines affect the body to make sure they are as safe as possible for humans. Wall says he enjoys helping in the discovery of new medicines, knowing that those medicines will benefit people. When people learn what he does for a living, they will sometimes tell him about how certain drugs have helped them. "Those are the times when you know what you do is worth it."

**Achievements:** "Becoming a vet, that's probably what I would say is my greatest achievement, and in so doing, having the persistence to get to that goal." Along the way, mentors encouraged him — teachers in elementary school, high school and college, and senior officers in the Army, including a white captain from Mississippi who "never forgot his positive experiences with black people," says Wall. "What people saw in me was a desire to achieve all of my potential. They saw I had a goal and they also saw I would work hard."

**Excitement:** Mentoring young people is a passion these days for Dr. Wall, who regularly returns to Florida A & M and Tuskegee to talk to students. He also mentors student interns at GSK. One of the reasons Wall believes he attracted mentors in his youth is that he paid attention to their constructive criticism. "They saw by my actions that I listened. I think that motivates a mentor to give more. The more you respond, the more interested in you as an individual a mentor becomes."



## Success Story: Rodney G. Hood

### Field: Internal Medicine

**Beginnings:** Rodney Hood grew up in the Roxbury neighborhood of Boston, the eighth of nine children. His father was a shipyard mechanic and his mother, with no high school degree, “had a Ph.D. in common sense,” Hood says. She emphasized the importance of education. Hood graduated from Boston Technical High School, where he led the track team. An older friend decided to do pharmacy studies, so Hood considered it too. He did well in sciences, math and chemistry, and was leaning toward a career in engineering.

**Then What?:** After high school Hood accepted a track scholarship to Northeastern University in Boston. An injury in his first year ended his track dreams and put his college education at risk. But he got an academic scholarship and pursued pharmacy studies. He graduated second in his class. While in graduate school in Pharmacology-Toxicology at the University of California-San Francisco, he took classes at the medical school and decided to apply to medical school at the University of California- San Diego. He was one of the first African Americans to graduate there.

**Obstacles Faced:** Hood grew up in a rough neighborhood with lots of distractions. Many of his peers quit school. Others went to prison. He kept his focus with the help of his family and heavy involvement in extracurricular activities like track and field. He found that his friends respected his choice to focus on achievement and shielded him from getting into trouble.

Another obstacle was bad advice. One guidance counselor discouraged him from professional dreams. He said Hood should lower his expectations and learn a trade instead. Many talented African Americans got similar bad advice. “Surround yourself with people who will give you realistic advice that’s in your best interest,” Hood urges. “Be sure to get advice from multiple people before you make a decision. Your decision about what to do with your life should be based on your passion. Trust the advice of people who know you best and PERSEVERE.”

Health statistics show inequalities in health care and people’s access to it. African American and Hispanic doctors tend to have more problems getting their patients admitted to hospitals than white physicians, according to a 1998-99 survey. “America is infected with the disease called racism,” Hood says. “It’s institutionalized and it happens in ways that are very subtle.”

**Focus:** “I am a general internist who practices medicine in a low-income area in San Diego and I love it,” says Hood, age 56. He opened his medical practice in 1976 in an urban community that is about half Hispanic and half African American. There was a huge demand for physicians, especially in primary care. His practice grew quickly.

**Achievements:** Dr. Hood became involved in administration, founding the CompCare Health Plan and the Multicultural IPA. He also got into medical activism, both with the American Medical Association and the National Medical Association (a large professional organization formed in 1895 by African American physicians who were denied entry to the AMA). Hood became the 101st NMA president for the 2000-2001 term.

**Excitement:** “Stimulating people to take responsibility for their own health is exciting,” Hood says. He also enjoys talking with audiences and drawing attention to the medical disparities in the United States.



## Success Story: Bevin Engelward

### Field: Genetic Research and Public Health

**Beginnings:** Bevin Engelward grew up in Stony Creek, Connecticut, “an old-fashioned town where it was assumed that girls couldn’t do math, or drive well, and that science was mainly for boys.” Her father was a university professor in biophysics. From lobstering and other outdoor activities, she became fascinated with living things and biology.

**Then What?:** At an early age she thought she might become a physician, but the schoolwork was daunting. “The most important thing is to believe that you can succeed and to really want to do it.” Engelward enjoyed athletics and rowed on the crew team. At Yale University, she received a bachelor’s degree in history. She loved her advanced science classes, but she thought only “geniuses” could be scientists and worried that she was not good enough.

**Obstacles Faced:** The common belief that you have to be a star student to be a good scientist, or that you have to have great natural talent in math to be successful. Good study skills helped her past those misconceptions. “Math is essentially a language,” Dr. Engelward says. “Anyone can improve at a language through practice.” Another obstacle was a common attitude against women in science. “Something in our culture makes it possible for women to be taken less seriously than men,” she says. “A woman managing a lab sometimes has to work extra hard to get others to take her requests seriously. Women have to counteract the bias by becoming particularly good managers. That means being very clear about what she expects from the staff.” Engelward, 35, says that with any career, managing a family can be complicated. Because women have traditionally shouldered most family responsibilities, men occupied most positions in the upper levels of science. As men have become more supportive of women and their careers, that has begun to change.

**Focus:** She manages a research lab that aims to find the causes of genetic mutations that lead to cancer. “Recombo Mouse” is helping to show the process of genetic change. Dr. Engelward’s lab altered the genetic make-up of Recombo Mouse so that a movement in the mouse’s genetic sequence makes the affected cell turn bright fluorescent.

**Achievements:** Before pursuing graduate school, Dr. Engelward worked for two years in a microscopy lab and at a computer software company. When she went on to the Harvard University School of Public Health, she knew that she wanted to study biology. At the Massachusetts Institute of Technology her achievement was recognized in a rare gesture — she was asked to apply for a faculty position before she had even finished her doctoral degree. Her greatest satisfaction is in making a difference in a student’s life. She enjoys mentoring students and watching their careers develop.

**Excitement:** The opportunity to be creative in the lab, “to innovate things that nobody else has ever done before — the thrill of ground-breaking work.”



## Success Story: Maria Terésa Tarragó- Trani

### Field: Biochemistry Research

**Beginnings:** Maria Tarragó-Trani grew up in the city of Santo Domingo, in the Dominican Republic, one of four children. “My parents were loving but strict,” she recalls. She finished high-school studies at the Instituto Veritas, where a science teacher inspired her. “The way she taught science made it exciting,” Tarragó-Trani says.

**Then What?:** She got a bachelor’s degree in chemistry at the Universidad Nacional Pedro Henríquez Ureña, in Santo Domingo, and pursued graduate school in the United States. “I decided I wanted to apply whatever I learned to something living, to living processes — so I chose biochemistry.” After getting her Ph.D. degree, she had two children, now 10 and seven years old. While they were small she left research and worked part-time in a related field. In 2000 she resumed research with a project in the laboratory of Dr. Brian Storrie at Virginia Tech, funded by Carilion Biomedical Institute.

**Obstacles Faced:** “Number one, my own insecurities. Second, being a woman in a field dominated by men — especially being a foreigner and a Latina. You have to work harder to be taken seriously.” In graduate school, for example, male students were sometimes considered to know more. She had to invest more effort to be recognized. “I like working hard, and I’m true to myself,” says Tarragó-Trani. “Perhaps my best ally has been time. Over time, working with integrity and honesty, you can demonstrate that you’re a decent person, a good scientist.”

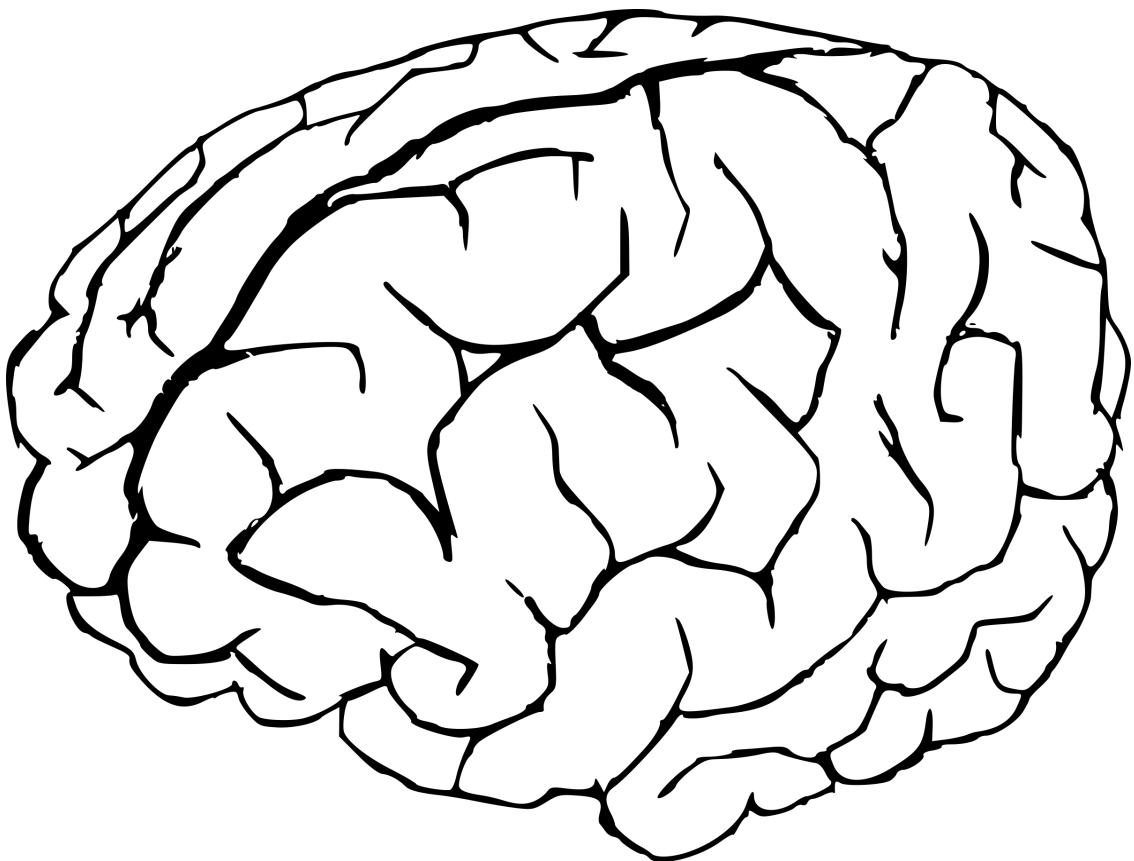
**Focus:** Dr. Tarragó-Trani’s research is focused on the chemical composition of cancer cells. In other words, she uses chemistry to help find cancerous cells and treat them. Her current study involves using a protein that specifically recognizes certain cancer cells (ovarian cancer and leukemia) to detect and treat those cancers. That protein is the shiga like-toxin B fragment (SLTB). The SLTB protein fragment binds to particular cancerous cells, it produces a chemical reaction, “like a lock-and-key interaction.” The SLTB protein fragment is also linked to a photosensitizer, a molecule that, when excited by light with a certain wave-length, produces a reaction that kills cancer cells. “It’s a really interesting combination of chemistry and biology.”

**Achievements:** In 2001 Tarragó-Trani and her supervisor, Dr. Storrie, submitted a patent application and hope to interest other biomedical groups in using the process they have developed. “It’s very satisfying to get projects to completion,” she says, whether it’s her Ph.D. degree or a research paper to be submitted for publication in a scientific journal. “The feeling that part of it is done is very good.”

**Excitement:** “Research can be very frustrating. It takes time. So when you have a breakthrough, it’s a really exciting moment.” One such moment came in her current experiments, where they tested the idea that the SLTB protein fragment enhanced the effect of the photosensitizer in killing cancer cells (compared with the photosensitizer alone). After days of work, they saw that the hypothesis was correct. Fluorescent chemical dyes made the living and dead cells look different from each other under a microscope. The nucleus of a dead cell would glow red. The living cells glowed green. “The most important ingredient is to like what you do. You have to remind yourself: What is your goal? Focus on that goal. It can be tough if you don’t have encouraging feedback, but remember

## **For the Classroom**

This section looks at the historical background of the partnership of Vivien Thomas and Alfred Blalock. First, Bobby Lovett, a historian of African American history at Tennessee State University, describes the differences in how segregation was practiced in Nashville and Baltimore. Then Nathan Crippens, a retired school principal, gives a first-hand recollection of how segregation directly affected his life in the 1920s through 1950s. Last, John Egerton, an independent writer on Southern history, describes two people who spoke out against segregation during the 1930s and 1940s. Have students reflect on these readings and discuss how the experience of segregation affected people on a day-to-day basis.





## Two Kinds of Segregation

### Dr. Bobby L. Lovett



Professor of History, Tennessee State University, Nashville, and author of *The African-American History of Nashville, Tennessee, 1780-1930: Elites and Dilemmas*.

**Partners of the Heart** tells the story of two medical scientists who got their start in Nashville, and who completed their mature work in Baltimore. The film shows the peculiar nature of Jim Crow society in the first half of the 20<sup>th</sup> century and the costly limitations of that society's Old South rules, practices and racial attitudes. These two men — one African American, one European American — lived and worked in a society that kept constraints

on African American citizens long after the U.S. Supreme Court declared in *Brown v. Board of Education* (1954) that racial segregation was harmful and unconstitutional. In Baltimore, too, Vivien Thomas and his family were disappointed to find "the gateway to the North" segregated and quite keen on confining African Americans to a lower socioeconomic position in American society.

Nashville, like most southern cities, was segregated more by post-Emancipation practices and coercion than by law. Tennessee's Jim Crow law of 1867 kept local schools segregated until 1957. Through most of Nashville's history, blacks and whites often lived in the same neighborhoods — often on alternating streets, but not segregated by residential codes. Near Vanderbilt University, where [Thomas and Blalock] worked, the neighborhood of 8th Avenue to 15th Avenue was home to middle- and working-class black families; from 16th Avenue to 21st Avenue was home to whites only, just because it had always been that way. In downtown Nashville, signs for "colored" and "white" kept restrooms, restaurants, hotels and streetcars segregated until 1960, when student sit-in demonstrations forced changes.

In Baltimore, Thomas and his family saw another side of Jim Crow segregation. Like nearby northern cities, Baltimore had inner-city ghettos demarcated by law. Maryland was a former slave state, and its rules of Jim Crow warned travelers from the North what to expect further south. One of the first successful lawsuits to force the racial integration of an all-white graduate school was brought to court in Maryland in 1936. That case set a precedent for similar NAACP suits to follow throughout the South. The NAACP lawyer who argued that case in court was Thurgood Marshall, who was born and raised in segregated Baltimore and who later became the first African American justice on the U.S. Supreme Court.

Baltimore relied on laws and zoning ordinances to enforce neighborhood segregation. The Maryland judiciary upheld restrictive housing covenants as late as 1938. The Supreme Court declared all such devices unconstitutional in 1948. Still, segregation of suburban housing remained a barrier for Baltimore's black working class, as historian Harold A. McDougall has noted (*Black Baltimore: A New Theory of Community*, 1993). Public schools in Baltimore were desegregated six years after Nashville began to desegregate its schools. In 1964, the comprehensive Civil Rights Act was passed, which allowed African Americans to sue for damages in federal courts for violations

against their rights. Only then did Johns Hopkins and other Baltimore institutions finally agree to desegregate fully.

In the wake of Rev. Martin Luther King, Jr.'s assassination in 1968, riots and the Black Panthers shook up Baltimore. The city experienced yet another form of de facto segregation when many more whites fled to the suburbs. By 1978, just before Thomas retired, so many whites had left the city that two-thirds of the children in the city's schools were classified as black.

Still, in the era of Jim Crow segregation, Vivien Thomas and Alfred Blalock formed an incredible American team of medical research and surgical skill that made incalculable contributions to medicine in the United States and internationally. Thomas went from Jim Crow Nashville to Jim Crow Baltimore, and on to limited success. Blalock went from success to greater success, unencumbered by racial limitations. This film gives the viewer a real story of the contradictions of that peculiar institution called Jim Crow, and the human and inhuman effects of racial discrimination in American society.



## In His own Words: When an Ice- Cream Cone Isn't Just an Ice- Cream Cone



**Nat Crippens** was a school principal in the South during the 1940s. Like other African Americans then, he navigated the strange rules of segregation. This is his account of an afternoon's encounter that nearly triggered an explosive situation.

*You knew that, objectively, you didn't have to do something wrong to have a problem. You only needed somebody to perceive that you had done something wrong. Many people suspected that if a youngster did something [against Jim Crow laws], then he would be punished for it [by whites], even though he hadn't really done anything wrong. This awareness made each family set the limits of what they would stand for.*

*I had an experience with my little three-year-old boy, my oldest son, my pride and joy. And I was in a little town where I was the principal of the only black high school in the county. That sort of gave me an elevated niche to cocoon me from the worst effects of segregation. But I was shocked one day when I was brought face to face with a situation that could have been explosive, but would not be recognized that way today. One Saturday morning I stopped by the drug store that sold bus tickets, accompanied by my three- year-old son. We were going to the next town. My son knew the store as the place to get ice cream — it was the only ice cream place in town that served blacks. While I was buying our bus tickets, there was a little white girl his age who had just bought an ice cream cone and she was eating it. And he walked over to her and said, "Give me some."*

*And she held hers out to him and he took a bite from it. That's not a crime, now. But that was a real crime in that little Southern town at the time it happened. Every kind of thought raced through my mind. Whatever happened, I thought, nobody was going to hit my boy. And I just tensed up to protect my family's integrity. Surprisingly, the mother smiled and said to her little girl, "You are very generous," and didn't say anything else. Then the store owner smiled. And I relaxed.*

*But at that split second, I was prepared to fight... That's how deeply embedded that kind of thing was in the South at that time...If that mother had reached over and smacked my child, I don't know what I would have done. Or if the store owner had instead come around the counter and attacked me — and sometimes that happened — I would have forgotten my job, forgotten everything else.*

**What would you do?** Put yourself in Nat Crippens' shoes in the 1940s. What would you say if the woman complained about your son eating from the same cone as her daughter? How would you handle the situation?

## In His Own Words: When a Neighborhood Drew the Line

**Nat Crippens** grew up in eastern Tennessee and southeastern Kentucky in the 1920s. Like other African Americans, he learned early to navigate the strange world of racial segregation. This is his account of what happened one afternoon when he was seven years old — and its life-and-death consequences.

*When I was seven years old, in 1921, a great many race riots and lynchings were happening in the South. One afternoon the African American boy who lived next door became the focus — he was 17, a handsome boy, and had been working in the home of a white family for five years. He and the family's daughter formed a closer relationship than they probably should have. The father came home from work unexpectedly and as he came up the steps, he heard the boy running down the back steps. The man realized that the boy and his daughter had been alone together in her room. That was the biggest taboo of the time.*

*That afternoon, word got around that this boy would be lynched. According to the rumor, either a policeman or sheriff was going to drive to the boy's home and arrest him. The police car would get about a block away, and then a white mob would pull him from the car, drag him to a lamppost where he would be lynched and his body riddled with bullets. This would all be arranged. That was a threat for the whole African American community.*

*My father was a preacher and one of the leaders in the community. In our little shotgun house, about 15 feet from the boy's house, leaders of the black community came and went all afternoon, conferring with my father. Late in the afternoon, the house filled up with people for a prayer meeting. And at the end of it the group vowed to each other to protect that boy at all costs. About 50 of the men then went next door to protect the teenager from being arrested.*

*In front of a nearby church there was a vacant lot. By the time it got dark, at least 600 or 800 young white men were milling around in that lot, cursing, yelling, and intimidating the whole African American community. The children were scared. Around nine o'clock, the authorities drove up and knocked on the boy's door. When it opened, he was surprised to find the house full. But he said, "Boys, you know what I'm here for. I've got to get that boy and put him in jail, to make sure the wrong kind of people don't get their hands on him."*

*My father, as leader of the group, said, "Officer, we know what will happen if the boy goes with you. We've prayed about this and we can't let it happen."*

*The officer got mad and turned red in the face. "Now boys, it's better for one black boy to die than for the whole community to be destroyed, isn't it? The people in that field are in an ugly mood. If I don't bring this boy to jail, they may come up here and burn this whole block to the ground."*

*My father told him, "We know there are enough people out there to come and take this young man. There are only 50 or so of us here. They have enough to take him, but you*



*go tell them that the first 50 that come will be lying there in the street when the sun rises tomorrow morning.”*

*The officer left and went to the men in the field and when he relayed the message, the mob got loud, yelling and shooting and using the n-word. My mother kept my older brother and me away from the window. The shooting and cursing went on for an hour or so. We assumed they were surrounding the block, getting ready to attack. My father was next door, but before he had left he had given my brother, who was nine, and me each a pistol, in case the white mob came in the door. With trembling hands we took the pistols. It is hard to imagine a greater terror than we experienced that night. But they didn't attack. About midnight or 1 a.m., the cars had all gone.*

*When my father returned, we all hugged and cried, we were so happy. It took an hour or more to calm down from our rejoicing.*

*The next day, about midmorning, the area judge came up to our house and knocked on the door. The judge knew my father, and he sort of laughed and said, “I hear you boys had a lot of fun here last night.” But he knew it was no laughing matter. He then said he and the other authorities had known the threat was coming. “We could have stopped it and we should have.” He tried to reassure us, and told us it would never happen again. And it didn't.*

*That was in Johnson City, about 250 miles east of Nashville. The incident did not appear in the newspapers. No one knew about it except the people involved.*

**What would you do?** Put yourself in the place of Nat Crippens' father. What would you be willing to risk to protect someone from a lynch mob? How would you limit the risk?

## Two Early Activists for Civil Rights

### John Egerton



In the segregated South before the Civil Rights movement, a few brave individuals, black and white, challenged the prevailing culture of racism. Here are two of their stories that are featured in historian John Egerton's book *Speak Now Against the Day: The Generation Before the Civil Rights Movement in the South* (1999).

**John Henry McCray** was a black newspaper publisher in Columbia, South Carolina. His weekly paper was the *Lighthouse & Informer*, and every week starting in the 1940s, this young man was printing stories and writing editorials that said, "Wake up, people. Something's gonna happen here and you're not gonna like it." One week he was talking to white people, and the next week he was talking to black people. He attacked the very system that was imposed by whites and tolerated by most blacks. He took everybody on. Some called McCray's newspaper a "political bible" for the state's African American voters.

In 1944 McCray along with several others launched the South Carolina Progressive Democratic Party. In that election year, they saw it as a force to open the state's political process to black participation. McCray was the party's first chairman. He was also dedicated to the NAACP and helped it to enroll more members in South Carolina than in any other southern state.

In 1950 McCray was jailed for his bold positions. When he was released several months later, he immediately resumed his protests against the system.

As a series of court cases led toward *Brown v. Board of Education*, McCray wrote in one editorial, "In the America for which we labor, fight and die today, there are no Negro, no white, no racial children. They are all just children, and any teacher not prepared to teach all of them isn't prepared to teach any of them."

On the white side of the divide, you had **Aubrey Williams**. He grew up poor in a blacksmith's family outside Birmingham, Alabama. Never went to high school. Worked at odd jobs around Birmingham in the 1920s and early '30s. Somehow, without a high school diploma he managed to get into college; [he] graduated, went to divinity school and became a minister. In all these experiences, Williams nurtured a burning commitment to people in need.

Williams' social work came to the attention of the Roosevelts after Franklin Roosevelt became President in 1933. This drawling white guy from Alabama became, surprisingly, a favorite of Eleanor Roosevelt. She made sure that he got a job in her husband's Administration. He advanced through the federal government.

Williams became a voice for social change in the South. The region's white congressmen considered him a threat to their way of life, but it was Williams' roots in Alabama and the suffering he saw in the South that made him champion racial equality. It was an unpopular position.



In January 1945, Roosevelt nominated Williams to be head of the Rural Electrification Administration, a position that required Senate confirmation. At the Senate hearing, white southern Senators accused him of being a Communist and misusing public funds.

Williams refuted those claims. And he asserted that segregation had held back the South. He was denied the job. Still, he continued to call for equality and pressed the Democratic Party to take a stronger, affirmative stand on Civil Rights.

Egerton says, “Reading these stories, and seeing that there were such people of conviction — people who had the courage to move against the tide in order to move society forward — ought to inspire us to realize that in our own time, there are things that we need to speak out about. There are other inequities in society. We have not come to the end of this road, by a long shot.”

**Discuss the problems** that John Henry McCray and Aubrey Williams faced. What did each of them see as the solutions? What historical factors made their struggle different from the struggle faced by the Civil Rights Movement 20 years later? What might have inspired them to take the positions they did, and see different possibilities in the world?

## Discussion Questions

### Medical Research:

- What dangers did Vivien Thomas and Alfred Blalock risk when they decided to operate on the human heart? How did they keep these risks to a minimum?
- The blue baby surgical technique was considered a radical procedure in its time. Consider the recent developments on gene therapy, cloning and stem-cell research. What makes these radical? How does the idea of what is “radical” change through time?
- For the blue baby procedure, Blalock and Thomas conducted both the research (scientific discovery) and the clinical application (they performed the operation after it became a standard procedure). Which do you think is more important — the discovery process or how the discovery is applied?

### Society and Race Relations:

- What are some key events in American racial history from 1930 to 1964, the period of the Blalock-Thomas partnership? What changes did each of those landmark events signal?
- Vivien Thomas lived in a racially segregated society, but he did not fight the Jim Crow system directly. Why not? What risks did that involve? In what other ways did he challenge the system?
- How is the world that you live in similar to the segregated world that Vivien Thomas lived in? How is it different?
- How does social change happen — through public protest or through private relationships?

## Activities

### Interview with a Family Member

Ask your parents, grandparents or other relatives about a national figure (any kind — religious leader, politician, musician, etc.) who affected their lives in a personal way. Ask them what lesson they drew from that person’s life for themselves, and what message they would pass on to their children or grandchildren. Then research that national figure and the events that your relative described.

### Writing Exercise

Write a first-person narrative as if you were Vivien Thomas. Write about the challenges that he faced and what he thought of his achievements.



## More Activities

The activities in this section are designed to help students explore links within their community and between communities. In the first one, identifying local heroes helps to explore the idea at a personal level, within a community. The second explores the idea of an individual providing connection and cross-cultural understanding between communities.

### Finding Local Heroes

In making Partners of the Heart, we knew we were telling the story of two highly intelligent but very different men. As we peeled back the layers of their lives and their characters, we came to see each man as a hero in his own right. In putting together this Viewer's Guide, we found more heroes — they are the success stories profiled in these pages.

What makes a hero? Honesty? Hard work? Sacrifice? Resilience? Brilliance? Humility? Giving of himself or herself to others? In today's world of sports stars and celebrities, it can be hard to separate the hype from the heart. Who are the heroes in your community? Or your school?

Maybe you question whether the idea of "hero" is outdated, and wonder if labeling any person "a hero" makes it harder to appreciate who they really are. That's fine. Don't get hung up on the words. The Heroes Project is designed to help discover people you respect, people whom you would like to be more like, but you may never have considered. You might even create a web page about that person; if so, consider posting it on the "Heroes Project" section of the Partners of the Heart website.

**How to Begin: To figure out how to select a person, decide on some criteria.**

- Create a list of character traits that define a hero for you.
- List different types of heroic acts. What do they have in common?
- What historical figures do you consider to be heroes? List the traits they have in common.
- Discuss your ideas with classmates to come up with a list of criteria you will use in searching for an unsung hero.

### Research:

Talk with your parents, neighbors and other adults who have lived in your community a long time. You might also talk to a grandparent or someone your grandparents' age.

If you're doing this as a group, you may want to divide the tasks. One person can visit the library to read about your community's past, someone else can visit long-time restaurants or stores and ask about the people who work there or visit regularly. You might write a letter to the editor at the local newspaper asking for suggestions.

## **When you have a list of candidates:**

Discuss as a group who you would like to profile. Consider what they have done, what they are doing, and their impact on others.

## **When you have selected a hero:**

Confirm that your hero is willing to participate. Then begin the more focused researching and profiling process.

- Interview your designated hero, his or her friends, co-workers, family members, neighbors and other significant people in your hero's life.
- Create a timeline of the person's life, marking significant events that make him or her your hero.
- Write a short biography of your hero.
- Include quotes that represent this person's philosophy and outlook on life.
- Get some photographs from the person to be included on your web page. When you have all that, it's time to put it all together in a web page. Create a single web page that combines a written bio, a timeline, some photos, quotations, and more. Put all of the elements in a zip file and e-mail it to the Partners of the Heart web team with information about you, your school and the making of the site. We plan to post the sites and create links that let people view them.

## **Working with Different Communities: What is "Cultural Competency"?**

Cultural competency is a set of skills that increases a person's understanding of the differences between different groups or communities. Cultural background shapes our behavior and values. Differences in culture therefore affect the way we approach everything, including health care.

Physicians and nurses should realize, for example, that each culture defines family ties differently. Physicians who are culturally competent welcome collaboration and cooperation for better health.

The following four success stories describe medical professionals who are culturally competent.

## **Writing Activity**

Choose one of the four stories on the following pages and write about that person, describing the difficulties you think he or she faced in dealing with different cultures.