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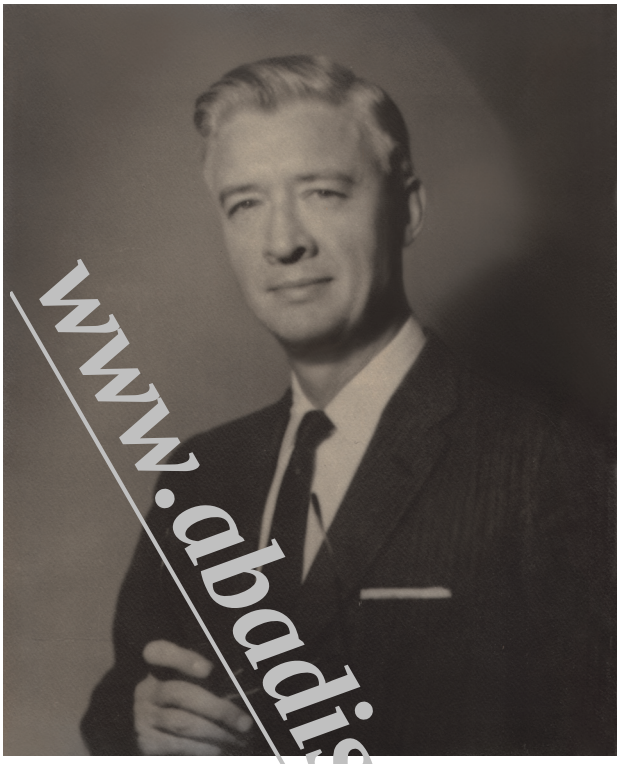
Dedication and Acknowledgments

"If I have seen further, it is by standing on the shoulders of Giants."
Sir Isaac Newton, 1675



Marshall Parks. Photo courtesy of Grace Mitchell and Mary Heersink, edited by Tony Cutts.

This book is dedicated to Marshall M. Parks, MD, who was the visionary who founded the subspecialty of Pediatric Ophthalmology and Strabismus. Although the first full-time pediatric ophthalmologist was his mentor, Dr Frank Costenbader, it was Dr Parks who took over the mission and propelled the profession into the major international subspecialty we have today. He developed many of the strabismus surgical techniques still in use, and directly trained a large number of us. If we count the fellows trained by his fellows, the number explodes, and via his influence on other strabismus teachers, all of us have been influenced by Dr Parks' teaching. He certainly provided me with the surgical foundation that allowed my career to flourish.

There were other standout teachers over the years, who generously gave their time to their young trainees, of which I was one of the lucky recipients. Two college professors pushed me to set my sights higher than I had originally planned—Robert Engel and Edwin Moise. Maurice Hanson, the genius neurologist at the Cleveland Clinic, taught me how to listen to the patient and take a history that would usually lead to the correct diagnosis. Froncie Gutman spent hours teaching me to perceive subtle findings in ophthalmology. Milton Edgerton, the most gifted plastic surgeon I have ever observed, taught me how to recognize and dissect within planes, and how meticulous one's surgical skill can become, given enough dedication. He was regularly able to achieve results not thought to be possible, and repair deformities thought to be inoperable. This led me to never give up on difficult cases.

I had the good fortune to be assisted with this book by several generations of Marshall Parks' family. The remarkable illustrations found throughout the book as well as on the cover were drawn and painted by Mary Heersink, Marshall Parks' daughter, who studied, grasped, and rendered the complex anatomy of the eye muscles and pulleys with uncanny skill and talent. She was also my biggest cheerleader throughout the project. His son-in-law, Paul Mitchell, with typing and logistical assistance from Grace Mitchell, contributed the fascinating chapter on the history of strabismus surgery, helped to edit all the chapters,

and contributed additional illustrations. His grandson, and hopefully budding ophthalmologist, Christiaan Marshall Heersink, contributed a unique section to the chapter on collagen. Marnix Heersink, his son-in-law, and Sebastian Heersink, another grandson, both provided facility and personnel support to help complete the project.

Marshall's influence is also seen throughout the book via eight of his fellows (besides myself), who contributed excellent chapters (alphabetically): John E. Bishop, Malcolm Ing, Marilyn Baird Mets, Monte del Monte, David Stager Sr, David Stager Jr, Everett A. Moody, and Frederick M. Wang.

The other contributing authors and co-authors also made excellent submissions, all well thought out and researched. Thank you to Robert Clark, Susana Gamio, Richard Hertle, Maham Khan, Lionel Kowal, Joel Miller, Yair Morad, Seyhan Özkan Leonard Rich, Alan Scott, Felisa Shikida, Helen Song, Monte Stavis, and Donny Suh. Joe Demer wrote a fascinating foreword about the background work that led to the research, which promises to revolutionize strabismus surgery. Robert Clark also deserves special thanks for patiently answering the many questions about pulleys and eye muscle function I posed to him over the last 2 years. Leonard Rich also provided frequent feedback, which helped to plan the book's organization and content.

There were more people who helped the project along: Ben Burgess, who obtained permissions and references, helped to track down patient data, and operated the video system through many surgeries. In my other work location, Jason Brehm assisted with surgeries and video recording, and Charity Carnley helped with videos and photographs. Tony Cutts performed photography and videography, digitized many slides, and edited the wonderful photograph of Marshall Parks at the top of this section. Cynthia Harrison helped with collection of patient data, and coordination of all those involved with the project, and Melanie Sheeley collected references. The two groups I work with, Eye Center South of Dothan, AL, and Eye Health Partners, based in Nashville, TN, graciously tolerated my reduced clinical hours, and were uniformly encouraging of the effort. My patients were also supportive, and several sent photographs to use in the book. One patient, who is a writer, wrote a heartwarming essay to open the book, and reminds us why we are engaged in this profession.

Thank you to Mr Lamsback at Thieme publishers, who conceived the project and invited me to do this book, and to the editors who saw it through.

I hope that Marshall Parks would be proud of this work. It is certainly the result of the seeds he planted. Here he is, looking at the pages to follow.

Marshall's Vision. Painting by Mary Heersink, photographed by Tony Cutts.

My Search for Relief from Double Vision

"I'm sorry," said the doctor, "but there's nothing more I can do for you."

After three attempts, he was unable to straighten my severely misaligned eyes. The left eye he repositioned the day before had slipped back to its original position, once again making binocular vision impossible and returning me to a world of constant, maddening double vision, where everything in my two visual fields overlapped like photographic slides laid carelessly atop one another.

Concluding that my condition was hopeless, my problem unsolvable, the doctor simply gave up. I asked what I could do, if he would please try again, if he could refer me to someone else, perhaps a cutting-edge researcher who might try a different approach. I would eagerly travel, I told him, overseas if necessary. He just lectured me angrily about the foolishness of pursuing a lost cause. Accept it, he said, and stop chasing the impossible.

His words fell heavily on me, for at this point it seemed clear that my search for a physician who could help bring my eyes and my view of the world into alignment had come to an end. Here was a preeminent and highly respected strabismus surgeon at one of the country's leading hospitals throwing up his hands in defeat.

If he couldn't help me, who could?

I had sought out this specialist after a nightmarish series of eye-muscle operations by a physician in New York City. Over the course of 2 years, the New York doctor performed four surgeries, each time using adjustable sutures on multiple muscles and in the process creating thick wads of scar tissue. He inserted sleeves and dime-sized disks of Supramid, a type of nonstick plastic, in my eyes in an attempt to keep the operated tissue from adhering to the sockets and lids. Not only did it fail to perform as expected, but also the plastic hardened into brittle translucent shards and began extruding from my eyes. The pain was excruciating.

From one operation to the next, my vision problems went from bad to horrific. My eyes moved independently of each other with no points of agreement. They were irritated by every movement and felt scratchy, as if they were embedded in sand. For weeks after each operation, my eyes bobbled loosely up and down as I walked, turning my separate windows to the world into bouncing, impressionistic panes of color and light. The sensation was that my eyes had come unfastened and were rolling uncontrollably in their sockets like marbles in a cup.

I was devastated, unable to imagine spending the rest of my life looking at the world as if through a kaleidoscope, the images of both eyes separated by a wide gap diagonally and at an inward tilt relative to each other. I felt off balance and unsteady, could not look at anyone in the eye, had trouble driving, tripped on stairs, and was unable to concentrate on anything but the discomfort and disorientation. The minimal depth perception I had enjoyed before the operations was gone. During Christmas dinner at a friend's house, for example, I tried pouring myself a glass of wine. I missed the glass entirely and poured red wine onto the white tablecloth.

Compounding the physical discomfort and visual difficulties were the profound psychological effects that the renowned strabismus specialist had dismissed as nonsense. I likened myself in some ways to a soldier returning from war with disfiguring wounds, alive but feeling weak, inadequate, and defeated. An essential part of me had been taken away. I was unfit, less than whole, uncomfortable in social settings, and my self-confidence was shaken.

My search for someone who could repair the damage and undo the work of the New York doctor went on for several years and involved endless Internet searches, and fruitless visits and calls to eye specialists across the United States and to medical researchers in Europe. The search led nowhere. Slowly, I came to realize that maybe the lecturing doctor was right. I should accept my fate and give up.

* * * * *

My hunt for someone to restore some sense of normalcy to my eyes and my life was actually the second phase of a search that had begun years earlier, when I sought help for a lifelong problem with double vision. For reasons that were unknown at the time, my eyes became noticeably misaligned around age 2. I remember trips with my mother to the eye doctor and then to a bakery for brownies. Eye-muscle surgery at ages 3 and 5 allowed me, with effort, to fuse the images in primary gaze but left me with irreconcilable exotropia and hypertropia in side gaze. All my life, I saw the world in duplicate, like a living split-screen television, and the consequences were sometimes painful. Because of my poor depth perception, baseballs whizzing toward me had a way of missing my mitt and hitting me in the face, once breaking a tooth.

Late one night in the college library, I found myself staring at a book and struggling to keep both eyes on the page. The words kept floating up and down and required effort to keep them together. I decided to try an experiment. I stopped struggling and relaxed my eyes, then watched in amazement as one image drifted steadily upward. I was amused and wondered how far it would go. I did not understand that damaged or misplaced muscles made it hard to hold my eyes in proper alignment, and that telling my brain to relax allowed my eyes to move to a more comfortable, albeit wildly misaligned, position. It did not occur to me that there was something wrong. It seems

foolish to admit it, but even as an adult I did not realize that double vision was not normal!

As I got older, my visual acuity worsened and my double vision became more acute and less tolerable. Even in primary gaze, fusion required increasing effort. I did some research and learned that my condition was called strabismus, and that it could be corrected in some cases through surgery. Over the course of a decade, I consulted ophthalmologists in Washington, D.C., Virginia, and Maryland and corresponded with doctors all over the country.

My search took me to Los Angeles, where a prominent surgeon at the University of California declared my condition "not your garden variety strabismus." He was less than encouraging but suggested a procedure that might give me some relief. As it happened, I had recently moved to New York to work as an Editor at Reader's Digest magazine. Traveling to California for surgery and follow-up visits would be inconvenient, so I asked the Los Angeles doctor to recommend a physician in New York.

It was one of the worst mistakes of my life.

Beginning 3 months into my new job, the New York doctor performed four operations, each time cutting as many as five eye muscles and reconnecting them using adjustable sutures, a procedure that involves the use of slip knots to tether operated muscles back to the eye. After each operation, I returned to the doctor's office at dawn the following morning for the adjustment, during which he tugged on the threads attached to my eyes while I strained to look in the opposite direction, tears mixed with blood streaming down my face. I sat in a reclining chair, leaning backward and staring upward. The doctor stood behind me wearing what looked like a gas mask with protruding lenses, hovering over me and brandishing scissors and long tweezers. He tugged on the sutures until he thought the eye had moved far enough, then tied the strings in a knot and marched me into another room, where I gazed at a white rectangular shape projected on a screen and described what I saw. If the two images were out of alignment, which was always the case, it was back to the reclining chair and the long tweezers for more tugging and adjustment. During the fourth and last of these sessions, my wife and 7-year-old twin daughters played musical chairs and other games in the waiting room until I emerged—eyes aching, grotesquely swollen, and still out of alignment—3 hours later.

The problems caused by the New York doctor's catastrophic series of operations made my previous condition seem mild and even preferable by comparison. "What have I done?" I wondered. My double vision was worse than ever and now accompanied by pain, puffiness, squinting, disorientation, an absolute lack of depth perception, increased light sensitivity, severely reduced eye movement, fatigue, and debilitating psychological dysfunction. Once, I had enjoyed a modicum of fusion. Now I couldn't bring my eyes together at all. My brain, unable to accept or reconcile the conflicting images, struggled constantly to unite the two. But it could not, and my overworked eye muscles were exhausted by the effort.

* * * * *

I had foolishly scheduled surgery with the New York doctor just 3 months after starting an important, high-pressure job at a major national magazine, hopeful that my problem would be fixed at last and I could enjoy the rest of my life as a "normal" person free of double vision. Before the first operation, the doctor downplayed the consequences of the surgery and dismissed my concerns, saying only that my eyes might be "a little red" afterward. I was not prepared for the nightmare that awaited me and my family.

After three rocky years at Reader's Digest, I decided I could no longer handle the workload because of my eye problems. Constant double vision and painful, restricted eye movement made reading almost impossible, and what good is an editor who can't read? The job also required frequent meetings, which, naturally, meant interacting with other people. I tried to concentrate on the matters at hand but could think of nothing but my discomfort, embarrassment, and the twisted, out-of-sync images swirling before me. My energy and optimism spent, I resigned from the magazine with a wife and two small children and no idea how I was going to support them.

* * * * *

After 5 months of uncertainty and unemployment, exciting news came out of the blue: I was offered a job in the federal government in Washington, D.C. I was thrilled but also terrified because I was still lugging and trying to disguise my weighty physical and psychological baggage. How can I handle a high-pressure job as Publications Manager in the Executive Office of the President? In time, consumed by the demands of my new job, I abandoned all hope of finding relief for my eye issues, finally accepting the advice of the specialist who told me to stop chasing a lost cause. I would just have to accept things as they are.

At lunch one day about a year later, a coworker listened to my tale of woe and made a casual suggestion that proved a turning point in my life: "Don't give up," he said. "There's bound to be someone out there who can help you."

He's right, I thought. What do I have to lose? So I resumed the quest with fresh enthusiasm. After weeks of Internet searches, phone calls, emails, false leads, and dead-ends, I came across a website for Louisiana State University (LSU) and the short bio of a doctor named Irene Ludwig. I was impressed by her list of accomplishments and experience. She clearly had considerable technical knowledge and an impressive resume. But what really piqued my interest was her concentration on scarring and her research on the effects of surgery on eye muscles and tissue. Her interest in muscle repair went beyond tools and measurements and