

Preface

Hassler Whitney never seemed to have a dull moment—his wheels were always turning. He might be climbing in the Alps, drawing geometric figures to get intuition about a math problem, puzzling over a better fingering in a violin passage, flying to Holland to judge ice-skating contests, or turning his Christmas present pictured on p. 292 into an even more awesome challenge.

Hass—he preferred being called that—was like a force of nature. Within five minutes of meeting him, he already put me as cellist in a string quartet. He changed the way I think and do math, and his continual work with examples soon defined the way I teach. And he greatly broadened my musical horizons.

I first met Hass in 1965 and knew him for more than 20 years. I once casually mentioned to Don Albers, former Director of Publications and editor at the MAA, that there ought to be a biography written about Whitney, since he was such an interesting character. Don jumped at the idea. “Do it! He’s a true icon of American mathematics! He needs and deserves a biography.” That planted a seed. Robion Kirby, a leading topologist, gave me further encouragement when he asked me to write a biography for his online, free collection of mathematical biographies, *Celebratio Mathematica*. My contribution turned out to be just a few pages, but it got me started. The idea of a book-length biography on Hass kept marinating in me, but I wanted to capture something a little deeper about Whitney. As a little boy, the Scottish physicist James Clerk Maxwell often tried to analyze mechanical devices and would ask “What’s the go of it?” In this book, through examples and stories, I’ve attempted to uncover and share what it was that made Whitney tick—his “go.”

Two things I’ve learned: First, Hass always worked on what caught his fancy and seemed significant; second, he was a highly geometric thinker. He would draw lots of little diagrams and pictures and learn from them. He’d organize his results and formulate conjectures. Although the germs of his proofs were generally geometric, in the interests of rigor he habitually translated arguments into algebraic terms when writing things up for an article. Much of the driving intuition never shows up in the formal article, and his papers generally have a reputation as difficult reads. They remind me of those hard, dark brown lumps issued to GIs during WWI. You drop one into a cup of boiling water and after ten or fifteen minutes you get a good cup of coffee. One lump could make 20 or 25 cups. Many of his papers are like those lumps.

How, then, to write a biography that includes the ideas of his most important work? The answer is certainly not to condense his already tightly-written articles. Excluding his two books and published abstracts, his total published page count

comes to 1,187. But his work almost always started from a perfectly understandable geometric germ plus some sensible hunches. He then explored his guesses with lots of concrete examples and built up intuition suggesting the answer and how to get to Q.E.D. In this book we illustrate a big theorem in simple cases and then sketch the basic idea of how it can be proved. Pictures are an invaluable aid here, just as they were with Whitney. In fact, in writing this book I often created a string of pictures that serve as a trail of bread crumbs leading to the end result, with text becoming the tissue connecting these pictures. It has been my goal to give an appreciation of what Whitney accomplished, and in general terms, how. Since historical context is often important, I take a few side trips to fill that in, too.

This book contains lots of stories and paints his mathematical accomplishments in broad strokes. We sometimes present more detail and delve a bit further into Whitney's strategy toward establishing his results, but skipping such areas won't disrupt the main flow of his story, and we'll alert the reader in these cases. References in the bibliography are provided for experts. The aim of this book is to tell some of the surprising stories and facts about him, introduce readers to his ideas, and reveal some of his geometric insights. Full proofs of some of his most important results can involve a multitude of details, and Hassler knew only too well that the devil is in the details. In this book, the devil gets only an occasional cameo appearance.

It is a pleasure to acknowledge the help, advice, and support from many people. In the MAA, not only was Don Albers an early cheerleader for this biography, but his careful reading of the manuscript has resulted in many valuable suggestions. Steve Kennedy, Don's successor at the MAA as Acquisitions Editor, as well as Jennifer Quinn, have been equally supportive, and Jim Tattersall together with the other members of the Spectrum Board have all offered extremely helpful advice. In the final stages of the manuscript, Underwood ("Woody") Dudley worked his magic, giving the book a meticulous reading; he made the biography flow more smoothly and pointed out errors as well as various inconsistencies. I am greatly indebted to him. In addition, Hassler's five children—James Whitney, Carol Whitney, Marian (called Molly) Melhuish, Sarah (called Sally) Thurston, and Emily Whitney—as well as his widow Barbara Osterman, have all shared with me stories, reminiscences, and insights that help to paint a fuller picture of Hass. Also, my great appreciation goes to Beth Whitney Thomas, the daughter of Hassler's oldest brother Simon: Her detailed knowledge of dates and facts about the large Whitney clan was crucial in keeping these things accurate. I also want to express a huge "Thank You" to Sally. As the Whitney family archivist, she has preserved correspondence to and from Hass spanning some 40 years, as well as hundreds of family photos. She spent innumerable hours sifting through printed photos and family slides, sending me photographs of dozens of them from which

I'd make final selections. She also provided many stories and insights about Hass that could come only from a close family member, and these helped fill out a fuller picture of him. Importantly, she also read multiple versions of the manuscript, correcting mistakes and checking with other family members when necessary. Her very generous time and sharp eye for detail has greatly improved the book. Finally, I am greatly indebted for input on the AMS side from Sergei Gelfand and Christine Thivierge, as well as Kerriann Malatesta, whose careful and thorough work transformed my manuscript into a beautiful volume. My heartfelt thanks to all!

Keith Kendig
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