THE EARLY YEARS

My first memory of a career plan dates back to the age of seven or eight, when I was much enamored with Paul Winchell, Jerry Mahoney, Edgar Bergen, and Charlie McCarthy and wanted to become a professional ventriloquist. At that time I was living in Tahawus, New York, a small mining town in the Adirondack Mountains which subsequently was moved (in 1963), to the nearby town of Newcomb[1]. For many years Tahawus was perhaps the nicest ghost town in the Northeast, but much of it is now dismantled. Fortunately I did not continue with the goal of becoming a ventriloquist since the job market these days for such talent is even weaker than for mathematicians. I became interested in astronomy and for several years wanted to be an astronomer. From the ages of nine to thirteen I lived in Lynchburg, Virginia. One of my friends knew a woman named Mrs. Cochran (who I thought of as an elderly person). Mrs. Cochran saw that I liked mathematics (though at that time I had no special interest in the subject), so she taught me the standard synthetic algorithm for finding the square root of a positive real number x. If $y = a_{i+1}10^{i+1} + a_{i+2}10^{i+2} + \cdots$ is the approximation thus far, then the next digit a_i will be the largest integer such that $(y + 10^i a_i)^2 \le x$, or

$$10^{-2i}y + 2 \cdot 10^{-i}a_i + a_i^2 \le 10^{-2i}x.$$

This rule seemed like complete magic to me. I understood why the analogous synthetic algorithm for division ("long division") worked, but I had not the slightest understanding of the square root algorithm. Why, for instance, the mysterious factor of 2 in the term $2 \cdot 10^{-i}$? I asked Mrs. Cochran about this, but she only replied that I would understand it when I was older. I have no idea whether she actually understood it herself. I did spend lots of time computing square roots and trying to impress my parents that I could determine whether a positive integer was a perfect square.

About that time I became aware of a copy of the CRC *Handbook of Chemistry and Physics* in our house, which my father used for his work as a chemical engineer. There was a section on mathematics, most of which was completely incomprehensible to me. However, in there appeared the synthetic square root algorithm and the corresponding algorithm for the cube

[1]For the history of Tahawus, see L. A. Gereau, *Tahawus Memories 1941–1963*, Hungry Bear Publishing, Saranac Lake, NY.

root. (Did anyone actually use this horrible algorithm?) If the square root algorithm was mysterious, then the cube root one was utterly mind-boggling. This to me was the ultimate arcane mathematical mystery which would be forever beyond my comprehension.

At the age of fourteen I moved from Lynchburg to Savannah, Georgia[2]. Shortly before then I had switched my main interest from astronomy to nuclear physics. In my first day of school in the ninth grade at Wilder Junior High School I sat next to a classmate named Irvin Asher. (He later went on to obtain a B.S. and Ph.D. in physics from M.I.T., moved to Israel, and died in 2010.) He was totally absorbed in a complicated mathematical computation. I asked him what he was doing, and he explained (though of course not in these terms) that he was working out the synthetic algorithm for finding higher roots than the cubic! He had already worked out fourth through eighth roots (say, since I don't remember exactly) and was now working on ninth roots. (He was essentially computing the coefficients of the polynomials $(x+1)^n$. Needless to say we were both unaware of binomial coefficients and the binomial theorem.) It seemed to me that I had a transcendent genuis for a classmate — at the very least equal to Newton and Einstein. This experience on the one hand was a jolt to my ego (since I had always been the top math student in my class), and on the other stirred up an interest in mathematics. I became determined to learn as much mathematics as I possibly could. It was on this fateful day that I was bitten by the mathematical bug and became incurably infected.

My first step in my mathematical self-education was to purchase the Barnes and Noble *Outline of College Algebra* and read it in several weeks. I then started reading every popular or recreational book on mathematics in the Savannah Public Library and the Savannah High School library. Thus began my journey in the realm of mathematics.

[2]In case anyone is curious, here are the details of where I lived as a child. I was born in Manhattan in 1944. At the time my mother was living with her parents in Larchmont, New York, while my father was overseas during World War II. When my father returned we moved to New York City, where my father worked for my mother's father trying to set up a wire business. Around a year later my father got a job with National Lead Company in Tahawus. About seven years after that I moved to Arlington, Massachusetts, and in a little over a year to Lynchburg. Then after four years (in 1958) I moved to Savannah. After I graduated from high school in Savannah, my parents moved to New Martinsville, West Virginia; Marietta, Georgia (a suburb of Atlanta); Sparks, Nevada (a suburb of Reno); and finally Englewood, Colorado (a suburb of Denver). My father (now deceased) kept moving or being transferred to different chemical plants.