10. The “Galactocentric” Revolution

Make no little plans; they have no magic to stir men’s blood…
—Daniel Burnham, Chicago architect

At the end of the 19th century, the largest telescope in operation was a refractor 40 inches in diameter. It ruled for a few years into the 20th century, when it was surpassed by the 60-inch reflector—called the first “modern” telescope—of Mt. Wilson Observatory. By the century’s end, the distinction of the world’s largest telescope would be shared by two giant reflectors, Keck 1 and Keck 2, on Mauna Kea in Hawaii, with mirrors 394 inches (10.4 meters) in diameter, while its most productive and awe-inspiring would be the Hubble Space Telescope, a 94.5-inch (2.4 meter) reflector orbiting in outer space above the tumultuous sea of the atmosphere of the Earth.

The man who oversaw the transition from the era of great refractors to that of great reflectors was George Ellery Hale. Undoubtedly the greatest astronomical entrepreneur of all time, Hale always dreamed big. He built the largest refractor of the refractor era, and the first great reflector of the reflector era. He surpassed the latter with an even larger reflector, and at the time of his death, he had dreamed up—and raised funds for—an even larger one. Each telescope he dreamed up and brought into realization would be used by astronomers to push farther and farther into space. By the middle of the 20th century, those telescopes had surveyed the Milky Way and its sister systems, and had set cosmology, hitherto an arena for inconclusive speculation, well on the road to becoming an exact science.

The tale of how all this came about begins with a devoted father’s extraordinary gift to an extraordinary son. George Ellery Hale was a child of the “Gilded Age,” a scion of Chicago’s wealthy aristocracy. He was born in
Chicago in 1868, three years before the Great Fire that destroyed much of the city. His father, William Hale, “with the boundless energy and tenacity his son would inherit,” contributed mightily to building a new Chicago. In place of “everlasting sham, veneer, stucco, and putty,” a city of massive steel edifices, the forerunners of modern skyscrapers, rose on Lake Michigan. William Hale built the elevators that made the skyscrapers of Chicago possible.

By contrast, Hale’s mother, Mary, lived as a virtual recluse. She was always of delicate constitution. The nature of her illnesses is not clear, but one of George’s earliest memories was “of the upstairs bedroom where his mother, a semi-invalid with thin lips, firm chin, and brown eyes deeply set in her gaunt face, spent most of her time.”

George inherited his mother’s high-strung temperament, Calvinist brooding, and depression, in combination with his father’s expansive optimism and superhuman drive for achievement. While his father approved of George’s strivings after success, his mother fretted over him and worried about his stomach troubles, backaches, and fainting spells. At the nearby Oakland Public School, where George began his education, he was frequently sick, and after an attack of typhoid, which his doting parents blamed on the school, they decided he must never return. At the age of 12 he was sent to the private Allen Academy, halfway between the Hales’ rented home in Kenwood and the center of Chicago.

Already in his pre-adolescence George Ellery Hale became a precocious dabbler in science, and was busy making observations with small microscopes and telescopes. All this activity worried his mother; she feared that “with his intensity and precocity, he would burn himself out early.” Nevertheless, when young George decided he couldn’t live without his own research laboratory, he persuaded her to turn over to him the small room where she kept her dresses. In this “shop” he set up a Bunsen burner, batteries, and galvanometers, and carried out thrilling chemical experiments such as pouring hydrochloric acid on zinc to form hydrogen gas.