

sisters, our ancestors. And what a joy of recognition when we realize how like us they were!

We have in this book devoted attention to some of our ancestors whose names have not been lost: Eratosthenes, Democritus, Aristarchus, Hypatia, Leonardo, Kepler, Newton, Huygens, Champollion, Humason, Goddard, Einstein—all from Western culture because the emerging scientific civilization on our planet is mainly a Western civilization; but every culture—China, India, West Africa, Mesoamerica—has made its major contributions to our global society and had its seminal thinkers. Through technological advances in communication our planet is in the final stages of being bound up at a breakneck pace into a single global society. If we can accomplish the integration of the Earth without obliterating cultural differences or destroying ourselves, we will have accomplished a great thing.

Near the site of the Alexandrian Library there is today a headless sphinx sculpted in the time of the pharaoh Horemheb, in the Eighteenth Dynasty, a millennium before Alexander. Within easy view of that leonine body is a modern microwave relay tower. Between them runs an unbroken thread in the history of the human species. From sphinx to tower is an instant of cosmic time—a moment in the fifteen or so billion years that have elapsed since the Big Bang. Almost all record of the passage of the universe from then to now has been scattered by the winds of time. The evidence of cosmic evolution has been more thoroughly ravaged than all the papyrus scrolls in the Alexandrian Library. And yet through daring and intelligence we have stolen a few glimpses of that winding path along which our ancestors and we have traveled:

For unknown ages after the explosive outpouring of matter and energy of the Big Bang, the Cosmos was without form. There were no galaxies, no planets, no life. Deep, impenetrable darkness was everywhere, hydrogen atoms in the void. Here and there denser accumulations of gas were imperceptibly growing, globes of matter were condensing—hydrogen raindrops more massive than suns. Within these globes of gas was first kindled the nuclear fire latent in matter. A first generation of stars was born, flooding the Cosmos with light. There were in those times not yet any planets to receive the light, no living creatures to admire the radiance of the heavens. Deep in the stellar furnaces the alchemy of nuclear fusion created heavy elements, the ashes of hydrogen burning, the atomic building materials of future planets and lifeforms. Massive stars soon exhausted their stores of nuclear fuel. Rocked by colossal explosions, they returned most of their substance back into the thin gas from which they had once condensed. Here in the dark lush clouds between the stars, new raindrops made of many elements were forming, later generations of stars being born. Nearby, smaller raindrops grew, bodies far too little to ignite the nuclear fire, droplets in the