

Watchers of the Skies

by John Dobson, 1983

One of the problems of human knowledge is that the world which we see from the surface of this planet on a sunny day bears almost no resemblance to the universe at large. Our Earth is made of iron and rock, but the universe as a whole is mostly hydrogen. The actions which we see on the surface of this Earth run mostly on sunlight, but the universe runs on gravity. What we see here are continents, oceans, rivers, lakes, mountain ranges, forests, tundra, and prairies. But the universe at large is mostly gas, partly condensed by gravity to galaxies and stars, and lightly sprinkled, here and there, with interstellar dust. The dust is made from hydrogen in the bellies of the stars, and scattered through the galaxies by the explosions and the stellar winds of stars much bigger and much hotter than our sun. But the dust is scarce, and, like our bodies, the rock on which we live is made of these dusts. It is a collector's item. The heavier elements, such as iron, have sunk to the center, overlaid with the rocks of the mantle and the crust and a thin veneer of water and gas. Since the age of this museum piece is pushing five billion years, by now the water soluble compounds of the surface rocks have leached into the water layer, making the oceans salty. The saltiness of our blood is the saltiness of the ancient sea, some four hundred million years ago ...we can think of our bodies, even now as little bags of sea water, hung out on a clothesline of bone, gulping oxygen directly from the gas layer above us, and shambling out across the rocks to gaze with starry eyes, through the blackness of night, at the vast expanse of the universe beyond.

Even the oxygen we breathe is freed by sunlight, through the instrumentality of our photosynthetic relatives, first by the blue green algae in the sea, and now by the green leaves of the forest. Even the rain is driven by sunlight. But the universe at large has a reducing atmosphere, and it is without rain and without sunlight. It is very cold, very dark, and very lonely, trying desperately to fall together by the seemingly inexplicable attraction of the particles for each other. Even the radiation of the sun is driven by this attraction. It has pushed the central temperature up to some fifteen million degrees Celsius, and it is only because its gravitational collapse has been slowed by the nuclear fusion at its core that the sun has bathed our Earth with its warming rays for nearly five billion years. Only this delay has made possible our long genetic development till we were able to climb out of the water and gaze in wonder at the starry sky of night. Although we, as living organisms, owe both our existence and our long genetic development to the sun, its dazzling brightness prevents us from seeing the universe by day. The blueness of the daytime sky is not the color of the air, but simply the shorter wavelengths scattered from the sunlight by the gas layer above us. And that gas layer by night, unlit by the sun, is sufficiently transparent so that through it we may gaze into the far reaches of the universe. Because of this unfortunate discrepancy of what we see here by day and what we can see by night, some of us, with the willingness to serve, have banded together to help make it possible for other human dwellers on this planet to see the universe at large through telescopes at night... The human population of this planet now numbers in the billions, so the problem of making it possible for all those people to see and understand the universe in which they live has reached staggering proportions. If there were a thousand groups dedicated to this service, or a million amateur astronomers, worldwide, they might tackle the problem with some hope of success. Billions of eyes are waiting. Let those who are willing do what they can! Some might wonder why amateur astronomers go to such trouble and expense to transport telescopes so far from park

to park. It is simply because the universe at large can no longer be well seen from the cities. Just as the Sun's light is scattered by the atmosphere by day, just so the light from cities is scattered by the atmosphere by night, making it virtually impossible to get a good view of the universe beyond the confines of our little solar system where the objects are both close and lit by the Sun. In order to see into the depths of the universe, it is necessary to get both the telescopes and the observers far from the glow of city lights...but seeing alone is not enough. It is only a beginning.

We must also understand what we see, and that has a history. Understanding rests on a foundation of concepts and information coming down to us from the past, albeit not the very distant past. It is not from the first few hundred million years after we came ashore in the swamps to look around, because in those distant days and nights the concepts which we feared, and the information which we gained, could not be transmitted from generation to generation...the written word, by which concepts and information are largely transmitted in what we proudly think of as the Age of Science, are only a few thousand years old...our great gain in those earlier times was in our genetically transmitted capabilities. By the early demise of those with poorer eyes, we gained visual acuity, and by the early demise of those with smaller brains, we improved our capacity to understand. It is that capacity which sets us apart amongst the watchers of the skies.