

STAND UP AND BE COUNTED—YOU'RE A STAR!

by Rabbi Eliyahu Hoffmann

Hashem spoke to Moshe in the Wilderness of Sinai... Take a census of the entire Assembly of the Children of Israel... (1:1-2)

The Jewish nation is likened to the star. Hashem accounts for each star by number and by name (see Yeshaya/Isaiah 40:26), so too each Jew is precious, and He counts him by number and by name. [See Rashi, Shemos/Exodus 1:1]

Launched by NASA in 1990, the Hubble Space Telescope (HST) is a space-based telescope that has helped expand our understanding of the massive universe in which we live. From its position 380 miles above the Earth's surface, it sends video images that allow us glimpses of areas we could until now only dream of, if that.

Recently, scientists unveiled humanity's deepest ever peep into the visible universe. From the ground, the spot of space they studied seems empty and desolate. But when Hubble focused its sensitive eyes there for a million seconds, 10,000 galaxies came into view, some more than 13 billion light years away! It's the farthest that 'human eyes' have ever seen.

A 'light year' is a measure of distance. Don't be misled by the word 'year,' which is normally a unit of time. Light years measure distance.

When astronomers use their telescopes to look at stars, the distances covered are gigantic. For example, the closest star to Earth (besides the sun) is approximately 24,000,000,000,000 miles (that's 24 trillion, or 38,000,000,000,000 kilometres) away. (Yes, the closest star.) There are stars that are billions of times farther away than that. When you start talking about those kinds of distances, a mile or kilometre isn't a practical unit to use because the numbers get too big. To measure really long distances, we use the light year. Light travels at 186,000 miles (300,000 kilometres) per second. Therefore, a light second is a distance which is actually 186,000 miles. A light year is the distance that light can travel in a year, or, $186,000 \text{ miles/second} \times 60 \text{ seconds/minute} \times 60 \text{ minutes/hour} \times 24 \text{ hours/day} \times 365 \text{ days/year} = 5,865,696,000,000 \text{ miles/year}$. A light year is a distance 5,865,696,000,000 miles (almost 6 trillion miles, or 9,460,800,000,000 kilometers) away. Travelling at the speed of light (which would get you around the world about 5 times per second), it would take you about 6 years to reach the closest star in the sky.

Just like we can divide the earth up into cities, provinces, countries and continents, the universe too has its sections. Scientists refer to these sections as galaxies. The section of the universe that houses

the earth, sun, and the moon is known as the galaxy of the Milky Way.

From the earth, we can observe as many as 8,000 of the Milky Way's stars with our naked eyes, although it's not practical to see more than about 2,500 from any particular spot. But that's only a fraction of the Milky Way's stars.

How many stars does the Milky Way actually house? It's impossible (for us) to count, but scientists estimate between 100 and 200 billion stars. Keep in mind that some of these stars are as big as the sun, some even bigger, and some are smaller.

The Milky Way is an 'average sized' galaxy, as far as galaxies go. It's not huge, nor is it tiny. So just how many of these galaxies, give or take, does the universe contain?

This is a question that until the advent of Hubble was difficult to even to ponder. Once Hubble's 10,000 galaxies came into view, however, a bit of extrapolation can give us a very approximate answer to this question. If one image can reveal 10,000 galaxies, just how many galaxies are there? How many "billions and billions" of stars actually light the night sky?

Hubble scientists say their mind-boggling picture is like a "core sample" of the universe. Imagine you're looking through an 8-foot-long straw; each galaxy of the 10,000 you can spot from out of the straw's other end is a different distance from the Earth.

How many 8-foot-long straws would Hubble have to 'suck' the universe through in order to 'taste' the entire sky? According to the experts, about 12.7 million. (The plucky telescope would need about a million years of uninterrupted time to make the images, too.) Assuming each of those 12.7 million straws sucked in another 10,000 galaxies, we'd have about 127 billion galactic neighbours. Multiply the Milky Way's 100 billion stars by 100 billion galaxies, and you get at least 10,000,000,000,000,000,000,000 stars!

I've often wondered: The universe is immense beyond our wildest imagination. But why did Hashem create such a massive universe if we are anyways destined to live our lives within the (relatively) microscopic dust-speckle of a galaxy in which we find ourselves?

One legitimate answer is that Hashem created the universe with such vast immensity in order to leave us in awe of His wondrous creation, and as a tool to enhance our ability, however limited, to ponder gadlus ha-Borei (the greatness of its Creator).

Perhaps now, however, we have yet another insight. We are the stars. Just like it's almost impossible to get our heads around the vastness of the physical world—the numbers simply boggle our minds—it is likewise impossible to comprehend the greatness of our Nation. Remember this, though: The stars are identified and recognized only by the light they give off. A star with no light is just a black hole. The greatness of our nation, too, is defined by the 'light' it emits through the Torah it studies and the mitzvos it performs.

Here's something to ponder: There are 600,00 letters in the Torah, the Sages teach, corresponding to the 600,000 souls of Israel as enumerated in this week's parsha. Each Jew, one might say, has his letter in the Torah. Now a sefer Torah that's missing even one single letter is pasul—unusable. So too, every Jew must ultimately contribute to the purpose of our existence: To be a light unto the nations.

And this entire, massive, imponderable universe, the Sages teach, was created with one solitary letter—heh, the 'lightest' of the letters (in that it is more often than not silent). If this unimaginable creation is all the result of just one letter, who can fathom the value of each Jew who himself is a letter of the Torah. And who can imagine the greatness, and the reward, of those who dedicate their lives to the study of all the Torah's letters.

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