

SEASONS OF THE MOON

THE MONTHS OF TISHREI - CHESHVAN

Tishrei-Cheshvan 5760 / Sept. 11, 1999 - Nov. 9, 1999

If you own a CD or cassette player, try the following experiment: Turn up the volume until it won't go any further. (Before you do this, take out the disk — this experiment will not work if you have perforated eardrums.) Nothing is playing on your CD now — right? So what you are hearing is — nothing. Right? I doubt you'll hear nothing. You'll hear noise. A lot of noise. Noise, however, is a subjective term. One man's music is another man's jumbo jet. You could say that you are listening to electrons singing. Every transistor, every resistor, every IC has its own "song." When you apply a current to it, it sings.

BLOWUP

There was a famous film in the sixties in which a photographer unwittingly photographs a murder. While analyzing "proofs" of a park scene, he sees something under a tree that he can't quite make out. He goes back to the darkroom and proceeds to make larger and larger enlargements of this little piece of film. In the end, his trained photographer's eye detects a human body under the tree, but to the audience in the cinema the picture looks like a *pointillist* abstraction filled with dots. Film is made up of silver crystals. If you blow-up a negative enough, the image will yield to the background fabric of the film itself: The "noise" of the photograph. Or is it its "song?"

THE SONG BEGINS WITH A BANG

When Bell Labs built a giant antenna in Holmdel, New Jersey, in 1960, it was part of a very early satellite transmission system called *Echo*.

However, two employees of Bell Labs, Arno Penzias and Robert Wilson had their eye on the Holmdel antenna for quite a different purpose. They realized that it would make a superb radio telescope.

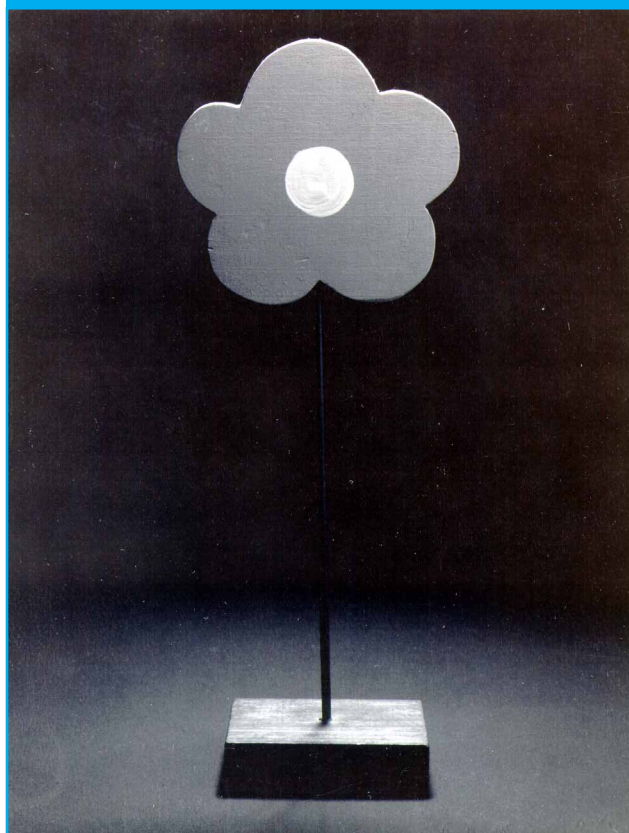
At first, they were disappointed. When they started their research, they couldn't get rid of a background "noise." It was like trying to tune into your favorite radio program and it being obscured with static. This annoyance was a uniform signal in the microwave range which seemed to come from all directions. Everyone assumed it came from the telescope itself.

They checked out everything, trying to find the source of this excess radiation. They even pointed the antenna right at New York City — there's no bigger urban radio "noise" than the Big Apple. It wasn't urban interference. It wasn't radiation from our galaxy or extraterrestrial radio sources. It wasn't even the pigeons. Penzias and Wilson kicked them out of the big horn-shaped antenna and

swept out all their droppings.

The source remained constant throughout the four seasons, so it couldn't have come from the solar system. Nor could it be the product of a 1962 above-ground nuclear test, because within a year that fallout would have shown a decrease. They had to conclude it was not the machine

THE SOUND OF SILENCE



THE SOUND OF SILENCE *continued*

and it was not random noise causing the radiation.

What was it then that they were hearing? Eventually they came to the staggering conclusion that what they were hearing was the very first moments of the creation of the universe.

THE SONG THAT HAS NO BEGINNING

The discovery in 1963 of the cosmic microwave background of the Big Bang was proof that the universe was born at a definite moment.

In the 1950s, there were two theories about the origin of the universe. The first was called the Steady State Theory. It had been put forward by Hermann Bondi, Thomas Gold and Fred Hoyle, and it held that the universe was homogeneous in space and time and had remained like that forever — in “a steady state.” This was essentially what Greek culture had posited — that the universe was *kadmon* — that it had always existed.

The rival, and at the time, more controversial theory sought to incorporate the expansion of the universe into its framework. Edwin Hubble had shown in 1929 that galaxies are moving away from one another at remarkable speeds, implying that the space between galaxies is constantly expanding. A few physicists led by George Gamow had taken this notion and argued that the separation between galaxies must have been smaller in the past.

If one extrapolated this idea to its logical conclusion, it meant that, at one point in time, the universe had been infinitely dense. Using the laws of physics, Gamow and his colleagues were able to show that this point — which was also infinitely hot — corresponded to the moment of creation. Everything in the universe had emerged from this incredibly dense and hot state in a cataclysmic event astronomers call “the Big Bang.”

The conflict between the theories was resolved by Penzias

and Wilson when they discovered that the mysterious radio signal was cosmic radiation that had survived from the first moments of the universe. It was proof of the “Big Bang.”

We know when “Big Bang” happened. In the Talmud, Tractate Rosh Hashana, we find: “Says Rabbi Eliezer, the world was created in Tishrei.” As we say in the prayers of Rosh Hashana, “*This is the day of the beginning of Your works, a remembrance of the first day.*”

AND THE SONG REMAINS THE SAME

A CD player playing nothing — electrons singing. A giant blow-up of a photograph — the song of silver crystals. And the most distant and cold whisper of the Song of the world’s creation.

If you open up certain prayer books, you’ll find at the beginning *Perek Shira*, literally “Chapter of Song.” In a few pages, *Perek Shira* lists the quintessential aspects of animal, vegetable, and astronomical life in the world. Some say this esoteric and mysterious text was authored by King David, others attribute it to one of the sages of the Tannaic era, but one thing is clear, the elements of terrestrial and extra-terrestrial life in *Perek Shira* are referred to as being elements of song.

There is no silence at the center of things. Descend beneath the superficial descriptive level of any medium, be it in sight or sound, or listen to the center of the universe itself and you won’t find silence — you’ll find song. That song is the sound of every rock and bird, of every electron and star doing the bidding of its Creator.

“*Praise Hashem from the heavens, praise Him in the heights... Praise Him, sun and moon; praise Him, all bright stars. Praise Him, the most exalted of the heavens... Let them praise the name of Hashem for He commanded and they were created. And he established them forever and ever. He issued a decree that they will not change.... Praise Hashem from the earth, sea giants and all watery depths. Fire and hail, snow and vapor, stormy wind fulfilling His word...*” (Psalm 148)

THE HEART OF SILENCE

*There is no silence in the heart
of silence
No waves that sail
No clouds dissolving
No idea as wide as the sky blue
Just the faithful constancy
of Is.*

The publication of Seasons Of The Moon is made possible by the generosity of Jill Sinclair and Trevor Horn