Wandering among the ghosts in Dresden, searching for the letter "L"

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"I envy you lads," the Englishman said. "You lads are leaving this afternoon for Dresden—a beautiful city, so I'm told. . .you needn't worry about bombs, by the way. Dresden is an open city. It is undefended, and contains no war industries or troop concentrations of any sort."— Kurt Vonnegut, Slaughterhouse Five, 1969.

"There were so many corpses, that German soldiers gave up burying them and simply burned them on the spot with flame-throwers."—Kurt Vonnegut (1922-2007), recalling the aftermath of the bombing of Dresden that he witnessed as a prisoner of war (POW), February 15, 1945.

Visit Dresden on an overcast winter day and the ghosts will be sure to find you. Amidst some of the most formidable gothic structures in the world, buildings that once gave the city the title "Florence of the Elbe River," you can almost feel Dresden groan under the strain of its history.

The massive Cathedrals and public buildings stood for decades. Then came February 13, 1945.

Throughout the war, the sophistication of bombing techniques had been evolving for both the Allies and Nazis--bigger planes, more bombs, and greater casualties. In Europe, it reached its peak that winter day on the Elbe.

Years before I set foot in Dresden, I'd visited Coventry, England. Located in the industrial north, it was best known for its local heroine, Lady Godiva, who supposedly rode through town in her birthday suit to protest high taxes. The story also goes that an unlucky young chap (as the Brits would say) named Tom, 'peeped' at the naked figure too long, and either went blind or was struck dead, depending on who you want to believe. His name has been associated with voyeurism ever since.

Coventry later became known as the Detroit of England, manufacturing the nation's automobiles. By 1940 it had been converted to wartime production. The Nazis, who had been ruthlessly bombing London for months, were determined to take out Coventry's capacity. On the night of November 14, 1940, they launched *Mondscheinsonate,* Operation Moonlight Sonata.

515 German bombers crushed the city, leaving even the Cathedral of St. Michael in ruins. Nearly seven hundred people perished, the number kept low only because thousands were able to hunker down in underground shelters.

The bombing was so complete, so utterly devastating, that the Nazi propaganda machine invented a new verb to describe it--*"koventrieren,"* or in English 'to coventrate', meaning "to annihilate or reduce to rubble".

Up to this point, the British had bombed primarily military targets. But now the gloves came off for both sides. Massive bombing, without regard to civilian populations, became the order of the day.

This brings us to Dresden.

From a military perspective, Dresden was neither a troop center nor a manufacturing hub. Arguably, it was railroad crossroads at best, far removed from British or American fighting. Most Germans thought it was the last place they'd experience a concentrated bombing.

Of course, they were wrong. On the night of February 13, 1945, the first wave of British Lancaster bombers struck, over 700 in all. By morning, the city was in flames. Then came the Americans.

Over 316 B-17 bombers hit the city on the 14th. They returned on the 15th. By now Dresden was in ruins.

Over 4,000 tons of bombs struck the city. Most German air defenses had been transferred elsewhere, and to say the city was a sitting duck would be an understatement.

No one knows how many were killed. Estimates range from 20,000 to 100,000. More than Coventry. Probably fewer than Tokyo. The city was packed with refugees. The Russians were pushing rapidly from the east, and those fleeing the advance were pouring into the city. Just how many is impossible to say.

Why Dresden? Some say it was because of the city's railroad access. Others claim intelligence indicated the Germans were going to establish a defensive bulwark in the city, and that the bombing could aid the Russian advance to the east.

Still others claim it was also meant to impress, and maybe even intimidate the Russians. One Royal Air Force (RAF) memo issued to its airmen included in its justification for the bombing "...incidentally to show the Russians when they arrive what Bomber Command can do."

The bombing created what is commonly called a "firestorm." Flames so hot, so all consuming, they suck every oxygen molecule into the inferno. Those who aren't burned to death suffocate from breathing the dead air.

The heat was so intense that bomber crews 16,000 feet above the city were drenched in sweat as their planes were tossed about by the updrafts.

The firebombing of Dresden remains controversial to this day. Some called it a war crime. Some said it was justified. It was war. These things happen.

Walking around the city, I tried to ask the ghosts, but they weren't talking.

Which brings us to Kurt Vonnegut.

A 22-year-old Army scout, Private Vonnegut was captured at the Battle of the Bulge, and ultimately sent to Dresden to labor as a POW. He and his fellow captees were

housed in a damp underground cavern that had previously been used to store butchered beef.

Schlacthof Funf, it was called. Slaughterhouse Five. The prisoners were confined there when the bombing started. They didn't emerge until the 15th, and suddenly confronted the aftermath. Vonnegut would later recall the landscape looked like the surface of the moon—except there were bodies everywhere.

Vonnegut, of course, later became a celebrated author, but it took him nearly twenty-five years and multiple shredded drafts to tell the story of Dresden. For those who haven't read it, it's a disjointed, dizzying story of Vonnegut's alter ego, Billy Pilgram, who also survives the bombing of Dresden, only to become "unstuck in time," moving backward and forward, even reliving his own death years later.

There's also flying saucers and alien abductions, but I won't spoil it for you. In short, it's exactly the kind of book you'd expect from a gifted science fiction author, who almost certainly suffered from undiagnosed post-traumatic stress disorder (PTSD).

Today, Coventry and Dresden consider themselves to be sister cities. Both have been rebuilt. Stone by stone. Brick by brick. And they share the same pain.

But neither will ever be the same.

Which brings us to the Drake Equation. And the letter "L."

Like most American kids, Frank Drake was fascinated with the thought of life on other planets. Later, as an astrophysicist, he decided to try to calculate the odds that such planets existed, and whether they could ever communicate with us.

It became known as the Drake Equation. For the benefit of any math geeks, you can find it at the bottom of this post. The equation didn't deal with UFOs or little green men, but rather with the likelihood that radio waves or some form of communication could reach us here on earth.

The equation took all sorts of factors into consideration. How many planets are out there? How many can support life? And what fraction of those go on to develop civilizations capable of transmitting messages into space?

Then Drake added one final question to the puzzle— what is the average **length of time** a civilization can actually transmit such messages (the letter "L" in his equation). Is it forever? Is it a million years?

Or does a civilization that reaches such a point only flourish for the blink of an eye before it destroys itself?

With radio telescopes and deep space probes that can map the known universe, we are just beginning to define most of variables in the Drake Equation.

All except one. What is L? We don't have a clue.

An English veteran of the First World War once said that the only redeeming aspect of his time in the War was knowing that it had been so terrible, so utterly horrifying, that such a war could never happen again. Of course it did.

The weapons of the Second World War put those of the First to shame. High altitude bombing. Massive tank warfare. And of course, the atom bomb.

The war also saw the world's most highly sophisticated effort on the part of one group of people to exterminate another group of people from the face of the earth.

Since the war's end, our civilization has seen many advances: miraculous medical discoveries, the internet, global travel.

We've also developed intercontinental ballistic missiles (ICBMs), hypersonic missiles, nerve gas, and biological weapons. And of course, the hydrogen bomb.

In Rwanda and elsewhere, the determination of one group of people to utterly destroy another group purely for the sake of who those people are, continues to play itself out. We've even given it a name: genocide.

This brings us back to Dresden.

As 2025 looms, countries are again posturing, threatening, and arming themselves to the hilt. Leaders are demonizing those within their own borders and beyond. Nationalism of all stripes, with its 'us against you' extremism, is rapidly growing throughout the world.

How many of those extraterrestrial civilizations reached precisely this point before blowing themselves up? How many reached this point, only to step back at the brink and move away from their destruction?

What direction will we take? What will be the L variable in our own equation?

Who knows? But these are the kinds of things a 73-year-old Midwesterner thinks about as he wanders the streets of Dresden. Listening for the voices of ghosts.

So it goes.

And (as promised) The Drake equation:

$$N = R_* \times f_p \times n_e \times f_l \times f_i \times f_c \times L \quad N = R_* \cdot f_p \cdot n_e \cdot f_l \cdot f_i \cdot f_c \cdot L$$

Where

N = the number of civilizations in the Milky Way galaxy with which communication might be possible

and

R_* = the average rate of star formation in our Galaxy.

f_p = the fraction of those stars that have planets.

n_e = the average number of planets that can potentially support life per star that has planets.

f_l = the fraction of planets that could support life that actually develop life at some point.

f_i = the fraction of planets with life that go on to develop intelligent life (civilizations).

f_c = the fraction of civilizations that develop a technology that releases detectable signs of their existence into space.

L = the length of time for which such civilizations release detectable signals into space.[6][7]

Happy New Year, everyone. Please be safe.