

Weaving, Chromosomes and 3D Printing

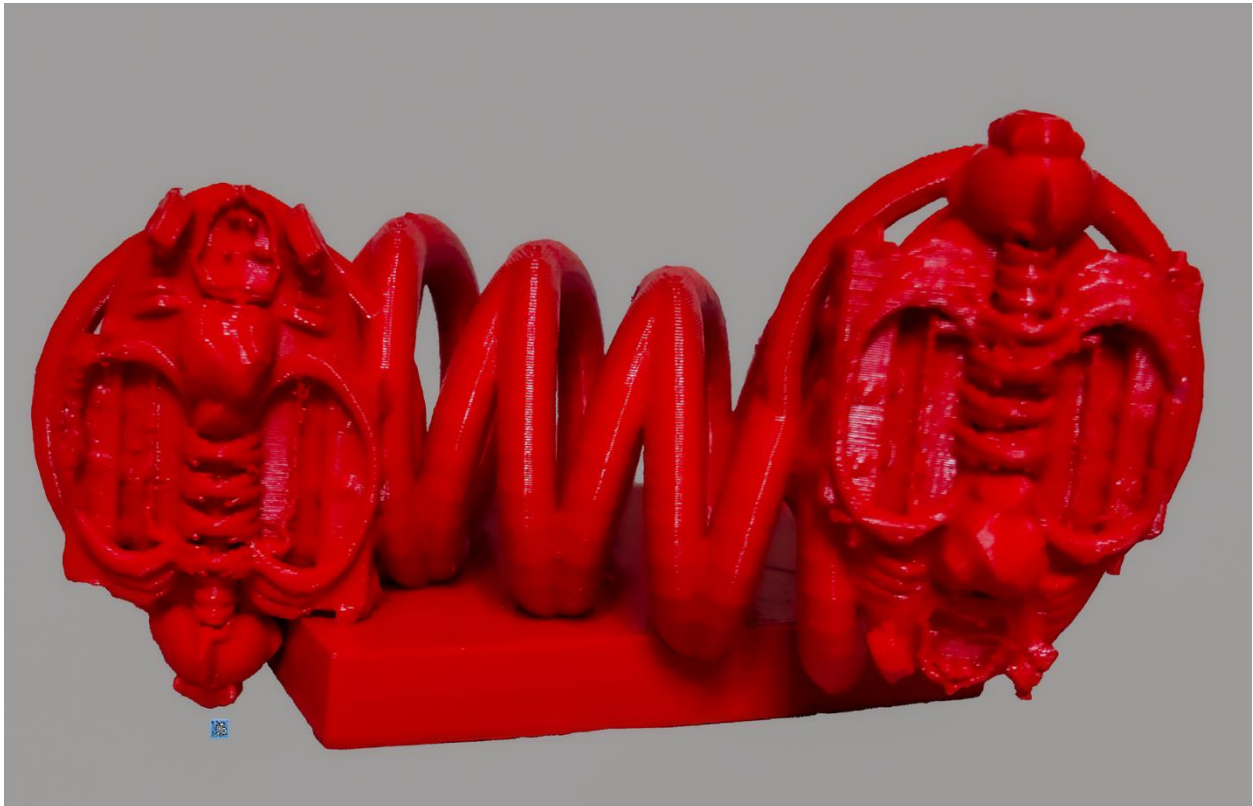
By Fred Truck

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Weaving, Chromosomes and 3D Printing

The Jacquard Machine, patented by Joseph Marie Jacquard in 1804, is a punch-card device fitted to a loom to industrialize weaving. Charles Babbage, owned a portrait of Jacquard woven in silk on a Jacquard machine-fitted loom. Inspired Babbage used the punch cards idea to feed his own Analytical Engine (1837) data. This was the initial step in the computer revolution we know today.



This is a photo of my thermoplastic-micro sculpture **Red Chromosome**. It represents the 2 coils of a human chromosome. I personified each strand with heads based very loosely on the Mayan Sun God, Kinich Ahau.

A thermoplastic-micro sculpture is a 3-dimensional print of a 3D drawing made in software on a home computer. I used Blender. These

sculptures are necessarily small, and though small, take a lot of time to print. Here are the pertinent stats:

Size: 5.3" x 5.09" x 4.18"

Easy Red PLA filament (a thermoplastic used in 3D Printing)

Time to print: 6 hours 46 minutes

Printer: Ender 3 SI Pro

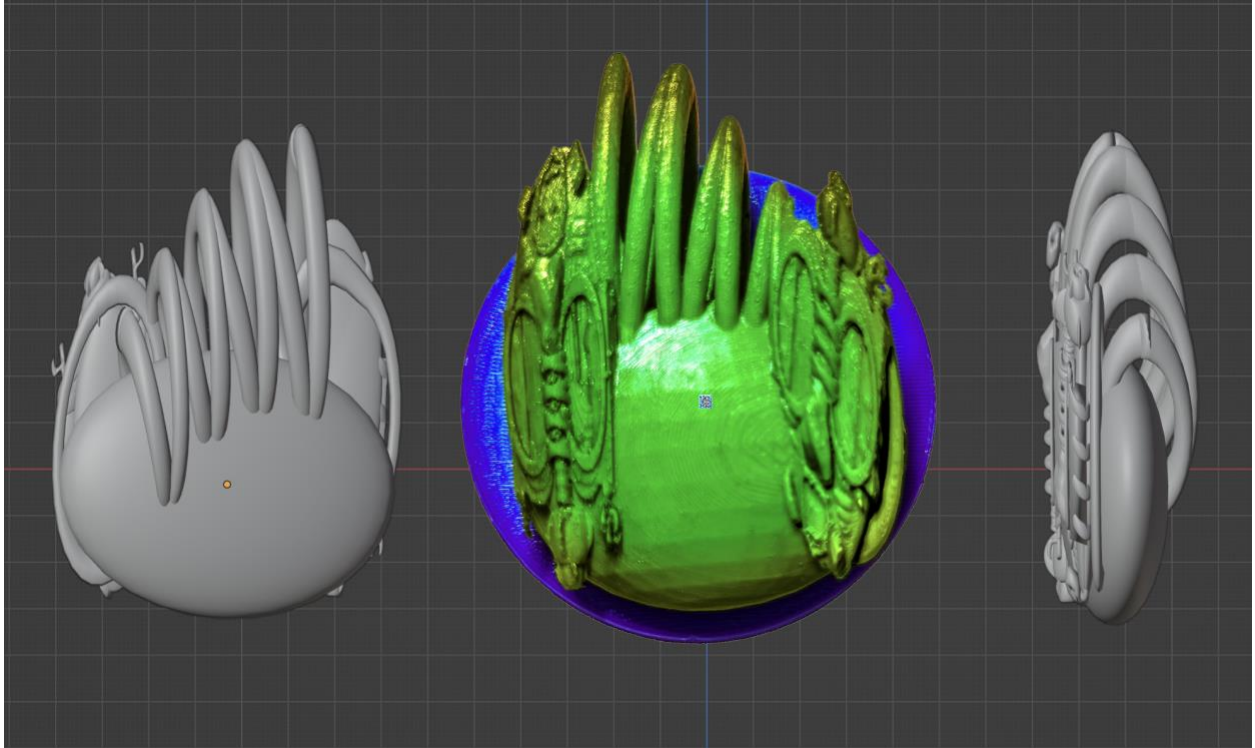
Below is a photo showing how the Red Chromosome is constructed from a 3D Blender image by the printer. Turning the sculpture over, you can see the pattern of the weaving clearly.



This thermoplastic-micro sculpture embodies the connection between the loom and the tightly wound double helix strands of DNA. “Both involve **paired and repeated structures** forming a continuous, stable pattern.”—Chat GPT.

Despite the apparent differences, the combination of biology and the mechanical loom can result in amazing new forms. Usually, sculpture is conceived of as an art of subtraction, removing material to reveal the hidden form in a block of wood, stone or metal. Thermoplastic-micro sculpture sets off in a different direction, adding filament to construct a new object.

An exciting new future beckons.



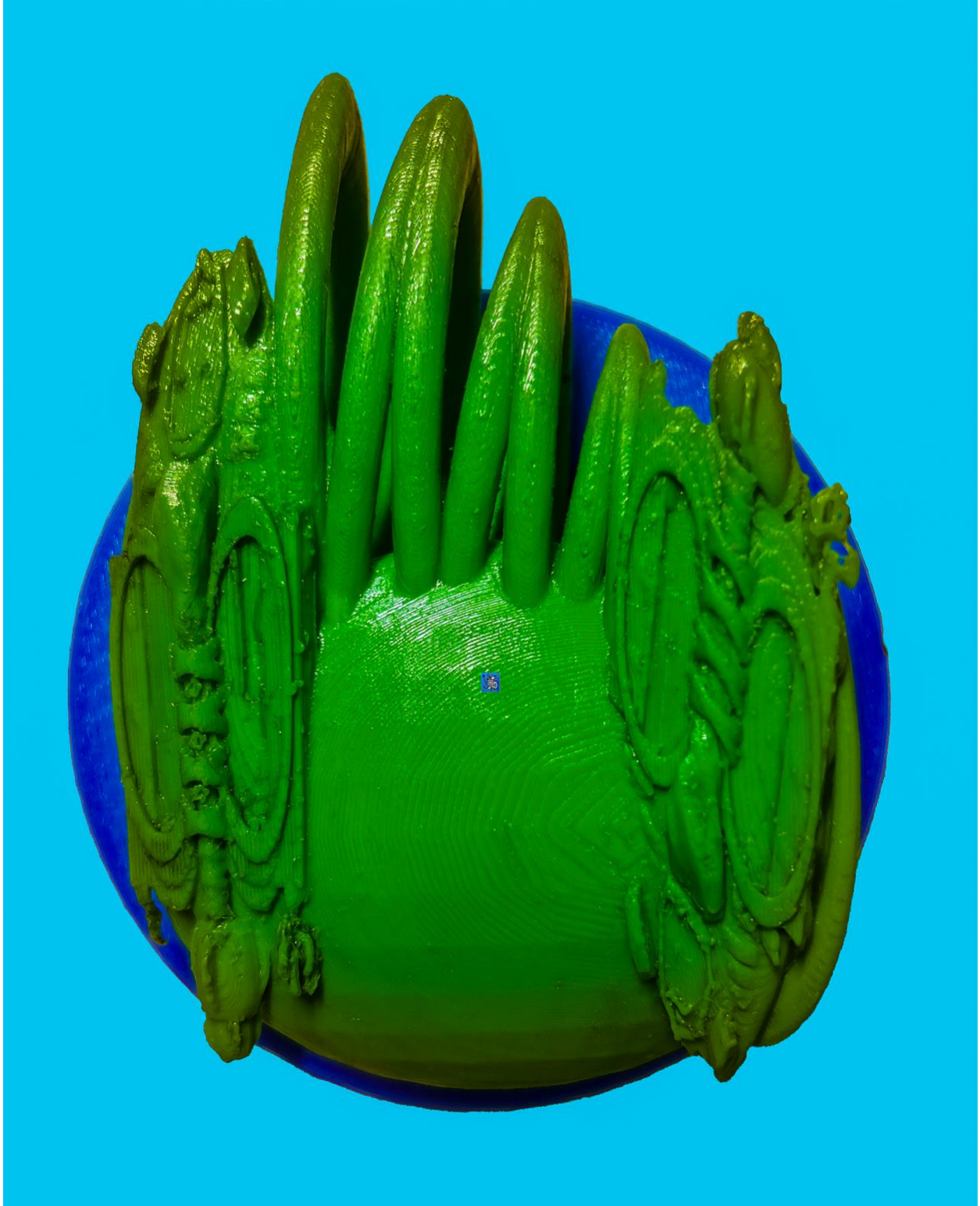
Solar Orbit

By Fred Truck

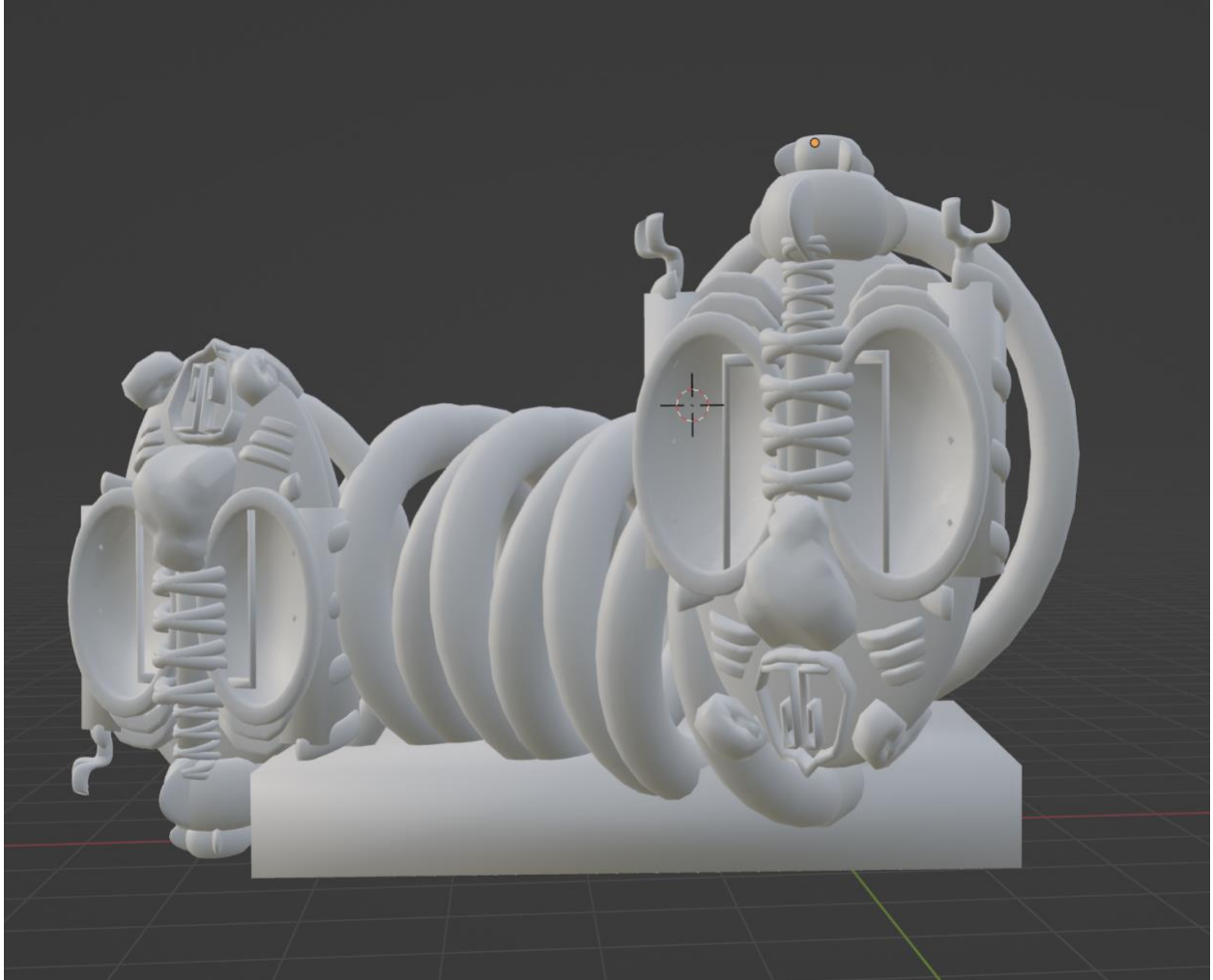
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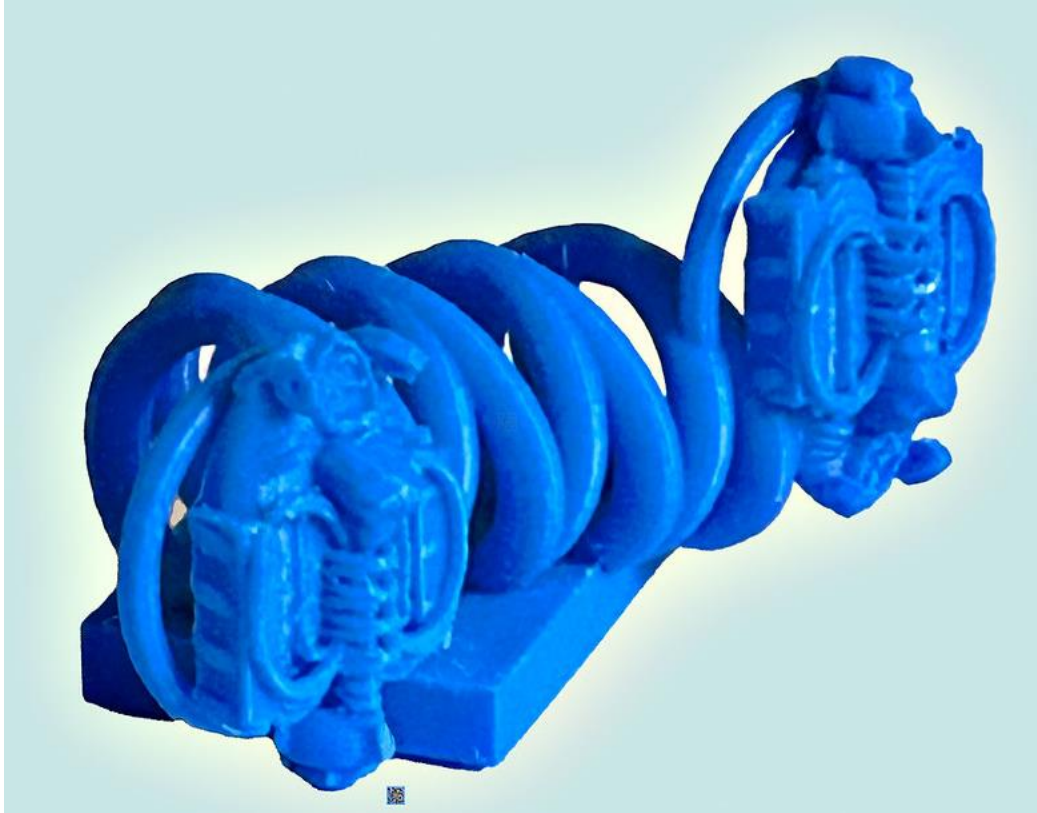
The sculpture above, which I call **Solar Orbit**, is a development of many similar images I've rendered in PLA plastic, all based on this 3D design:



This design represents the 2 strands of a human chromosome, each strand having its own head based loosely on the Mayan Sun God. The front head is Life, but the back head though exactly the same as the front head, is upside-down. It is a Death Head.

Digital Blue Chromosome

This PLA sculpture is my version of a human chromosome, complete with double helix DNA coils. In the picture below, the back head (the one furthest from you) is in the normal position, but the front head (closest to you) is upside down. The front head is a Death's Head.



I made quite a few different sized versions of the Chromosome always in different colors, but something bothered me...

For one thing, both the Sun Heads are expressionless, too calm.

What was missing in this small sculpture, I felt, was the sense of struggle. Initially, I imagined the struggle would be the Live head trying to free itself from the primeval goo surrounding it as in the yolk of the cosmic egg. Then, increasing the sense of a fight, I saw the combat as being between the two heads for dominance.

One of the great advantages of 3D drawing on the computer is that due to the very plastic nature of the digital objects you draw, you can stretch, pull, squash, punch or otherwise deform the objects as if they were clay. This is how I brought expression to the solar heads. But mostly only the Live head. Death doesn't change too much...

Traditional sculpture is mounted on a pedestal.

–*Mobiles, traditionally invented by Alexander Calder. A **mobile** is a type of kinetic sculpture constructed to take advantage of the principle of equilibrium. It consists of a*

number of rods, from which weighted objects or further rods hang. The objects hanging from the rods balance each other, so that the rods remain more or less horizontal. Each rod hangs from only one string, which gives it the freedom to rotate about the string. An ensemble of these balanced parts hang freely in space, by design without coming into contact with each other.

--Wikipedia

Solar Orbit is not a mobile. It can move, but motion is imparted to the sculpture by an observer, not the wind. It is a 3D object that embodies the concept of a simple, familiar rotation in 2 dimensions, occurring within a plane around a point.

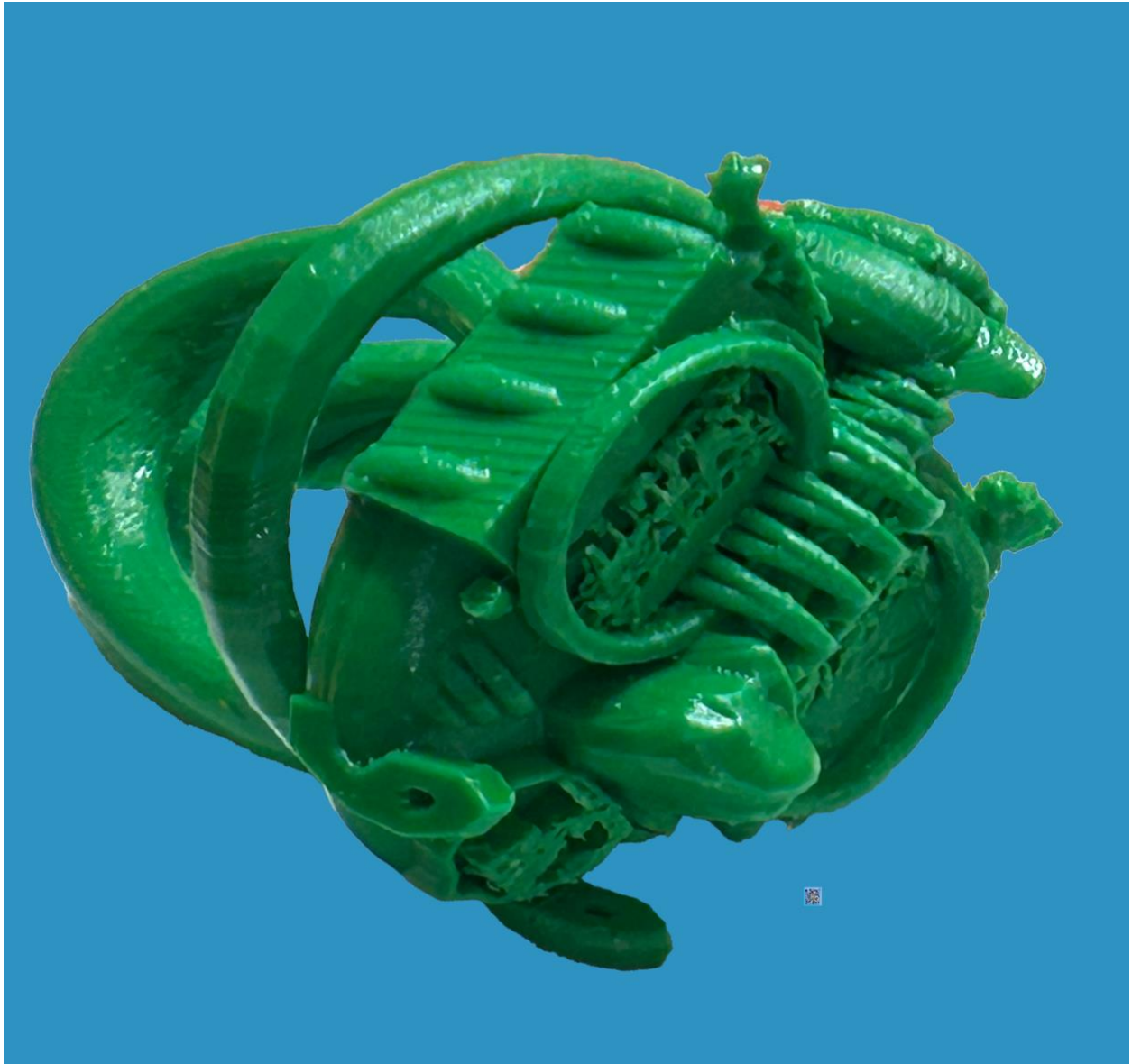
I mounted the PLA sculpture on a digital blue turntable I printed in PLA. I downloaded the files from Thingiverse:

<https://www.thingiverse.com/thing:3027027>. They were authored by ToriLeighR.

I reduced the size of the turntable to make it proportional to the sculpture.

As for the sculpture itself, the Life and Death heads retain their reversible natures in rotation, but the body of the double helix Chromosome remains the same up or down.

Sleeping Chromatid



“A chromatid is half of a chromosome that has been copied.”—Wikipedia. Each half contains a replica of the complete chromosome.

Sleeping Chromatid is an expansion of ideas I introduced with my previous thermoplastic-microsculpture **Solar Orbit**.

If this is so, where is the Death Head?

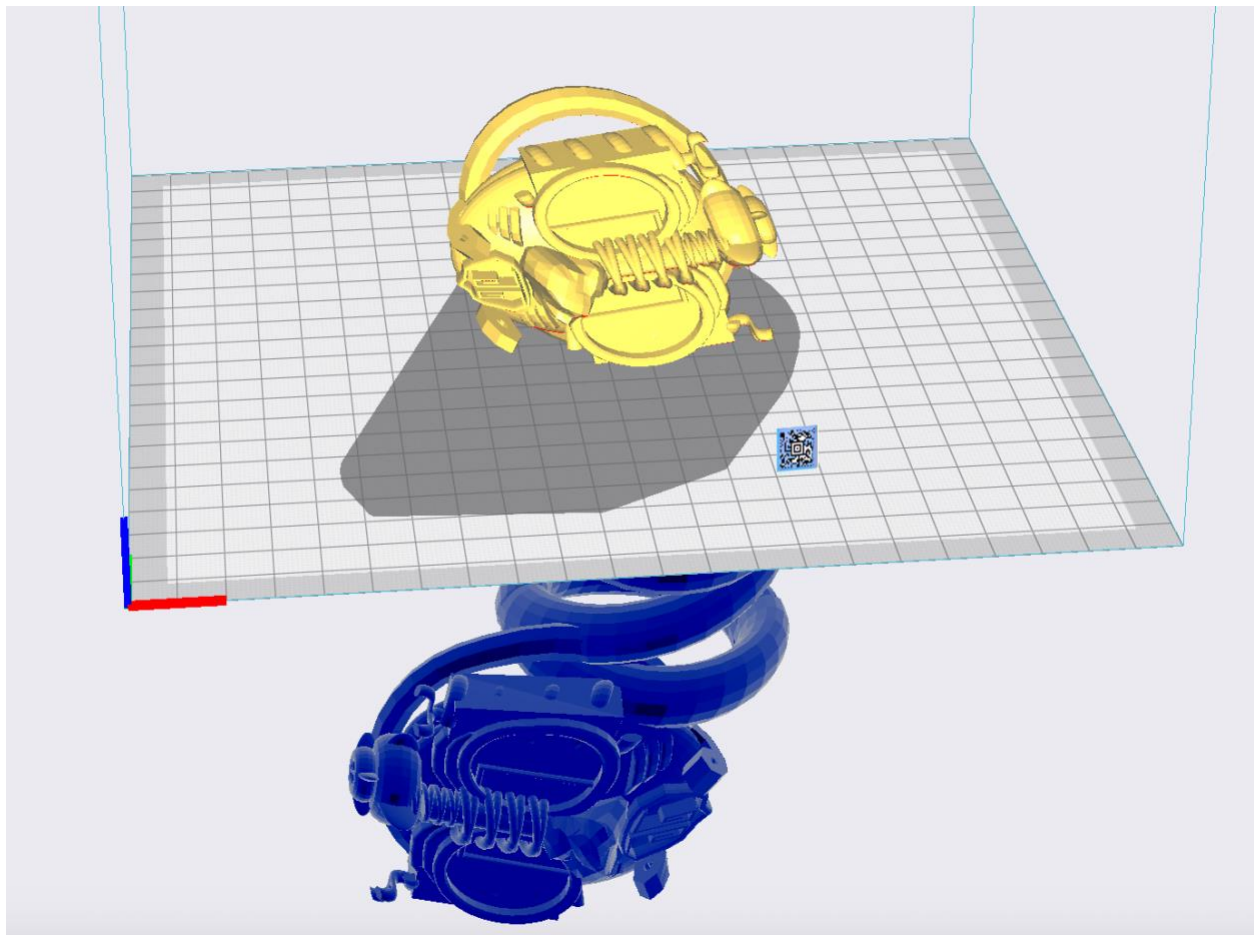
The Front Head is asleep. It's not aware. It is unconscious, just as those of us living are naturally unaware of death.



The Death's Head seen here is the same as the Front Head above, but it is rotated more or less 180 degrees. It is not upside down that it knows of. It is asleep.

There are other small differences between Life and Death revealed here: Death is less refined, more scratchy. There are rough parts seen here that are not visible in the unrotated primary image. The main difference between the two heads is one of consciousness. The Front Head is blissfully unaware of the Back Head which is likewise unaware of the Front Head.

Rotating the sculpture isn't the same as rotating a 2D image in case it will be 3D printed. Here's how rotation's done:



Everything above the grid is printed, but everything below the grid remains invisible but understood.

Unlike the **Solar Orbit**, the **Sleeping Chromatid** sculpture has no pedestal or a turntable. It rests on the Front Head or the Back Head, depending on your point of view.