

## Hydra

*Hydra* presents a living map of the mortality rate of the SARS virus COVID-19 in the US from March - October 2020.

The deadly viral spread is mimicked by the unique networking properties of *Physarum polycephalum* or: slime mold, an unusual single-celled organism. It has the special ability to create a network similar to a road map, depending on where the feeding-points of food sources as porridge oats are set. *Physarum polycephalum* shows some extraordinary behavior, that we would describe, translated to our human terms as being intelligent. For example, the microorganism can find the fastest way out of a complicated maze effortlessly. In scientific research slime molds are used to make prototypes of massively-parallel amorphous computers - *Physarum machines*- claimed to be capable of solving problems of computational geometry, graph-theory and even logic and the creature's navigation talents inspired a range of software implementations of novel approaches towards the design of communication and transport networks. Despite its complete lack of neurons the creature is also capable to anticipate periodic events and to optimize difficult trade-off decisions and even basic forms of learning.

But slime molds, though comprising only a single cell and seemingly having the mentioned unusual abilities, act simply on the chemical structure of attraction and repulsion and habituation, when repeatedly exposed to an innocuous repellent.

The above named features are used to create living maps of the deadly COVID virus spread in the US.

To create the installation, we made an 11cm-wide map of the US from agar, to generate a moist substrate for the slime mold. We added slime mold and an oat-agar food source to the first 10 counties to reach 1000 cases of COVID-19 per day, at the corresponding time when each region first reached this milestone. The concentration of the food source added to each region was scaled to the infection count in that area, with heavily infected regions receiving more food. The slime mold was then allowed to spread out unabated from these centers of infection to burst out and dominate the map. For the final film generated from a 50 hour experiment, with shots taken in intervals of 30 seconds, we used retiming video editing tools to merge the film into a compact artistic format.

We use sound tools to mimic ultrasound referring to experiments on moving microorganisms.

The slime mold mimics the exponential spread of an even smaller creature:

The behavior of a virus in a much larger biological system: us humans.

Viruses are dead matter, a string of RNA, which is thought to be a precursor of the double stranded DNA. To become alive the RNA or DNA strings must get into a host - a bacteria, animal, or human - to attach to a cell, intrude it and then take over the protein system for its own replication. This "hack" will damage or destroy the host over time.

Interestingly, current research and technology mimic the same "concept" of the virus by controlling the flow of information in a cell and a biological system to fight the disease and control the virus by vaccines using genome editing tools such as CRISPR Cas9 as well as mRNA technology.

Obviously "purpose" as biological goals play a role in the slime mold's simple life and the creature manages the necessary tasks to secure survival and to reproduce.

Physics describes the world in terms of atoms randomly bumping into each other but biological systems demand life-sustaining behavior and therefore involve solutions for goal - oriented tasks. How does such an orderly functioning structure align with physical concepts of randomly moving atoms obeying the physical laws of nature?

Various models have shown that self-assembly and certain simple rules allow for the development of intelligent structures of different degrees of complexity, but still the origins of the

evolution of life are subject of speculations of different kinds.

Taking the “intelligent designer” out of the equation evolution itself appears as an diversifying selective system. It seems to behave in some respect like a kind of “optimization function” into a wide range of niches playing out under the pressures of the surrounding environment into a large range of adapted intelligent solutions.

In the hierarchical order of biological living systems, humans still consider themselves as the crown of this evolution, superior to all other creatures. This position of power is only grounded on the superiority of human intelligence, that evolution brought about.

But in fact they are much more violable and in tackling problems they are also much less rational than they like to see themselves. In such respect, a wealth of examples can be observed and the map relates to both of these aspects too.

Human seem to struggle to cope with dangers that are increasingly more complex and abstract.

While the purpose of our lives plays a huge and vital role in our self concept and how we label our direct surrounding, the world and the universe with us in it, our role in that very universe seems much less important than we used to think, at least in any cosmological terms.

Creatures like viruses and molds not only were present on this earth a long time before us, but they will most likely also outlive us.

The creation of the dynamic chronological and proportional growth patterns is based on the Johns Hopkins COVID data collection.

The installation reflects the overwhelming health crisis that confronts the US in the unabated spread of this deadly virus. The slime mold could have been restricted by repulsive salt barriers or bright light gradients. These would represent an analog to measurements to limit the spread of the disease.

Their absence figure as the silent horror of the installation.

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