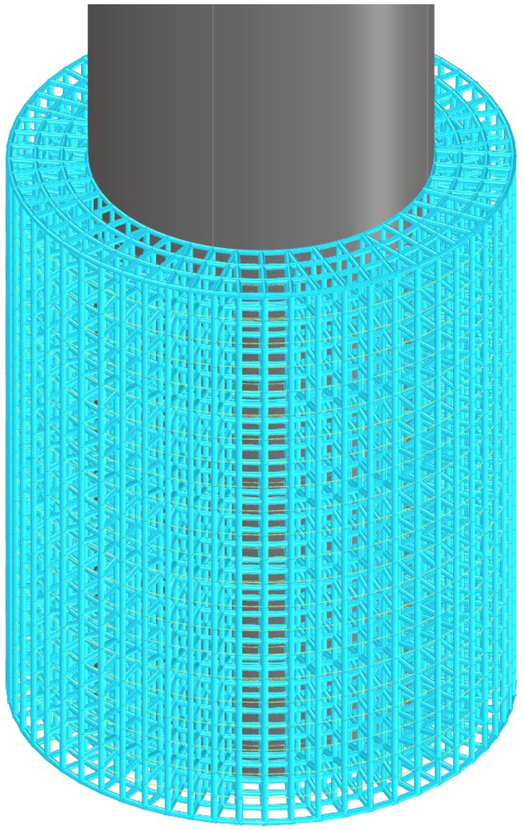
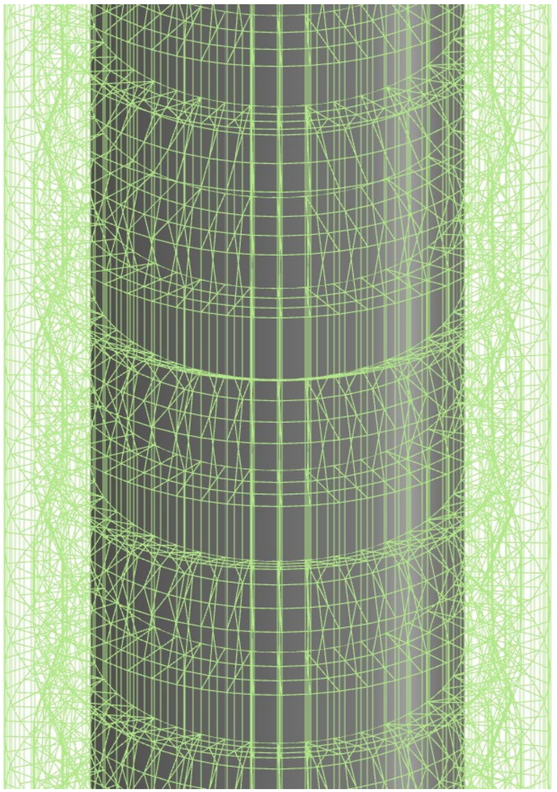
Designing with our Simulation Tools

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Initial Tests
Simulation Results

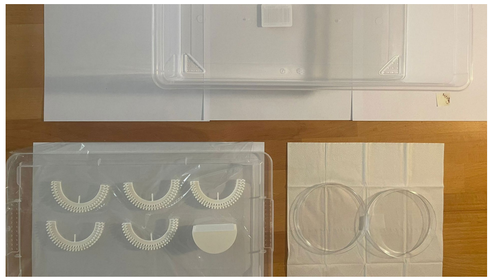


Slime Mold growth throughout the lattice structure

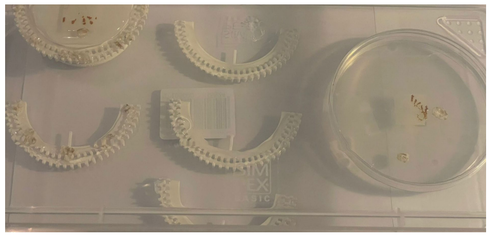
The Biology of Physarum Polycephalum - Feedback Mechanism

The slime mold's progress is carefully documented, with a focus on which food sources are reached at each layer and depth. Visual comparisons between the digital and physical models help identify any discrepancies and refine our understanding of slime mold navigation.The structured design allows for detailed observation of how slime mold navigates complex environments. This can lead to discoveries about its problem-solving abilities and decision-making processes. Food sources are placed at varying depths within each layer, adding a three-dimensional aspect to the feeding pattern. This placement simulates the complexity and depth of Corinthian column carvings, requiring the slime mold to explore different vertical levels to reach the food.

Food Source Placement:

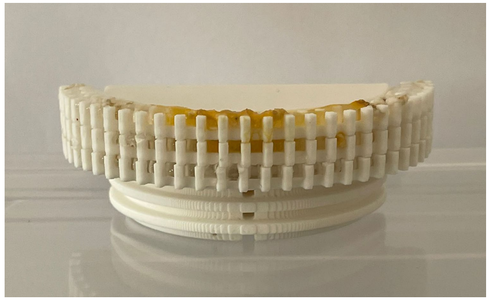






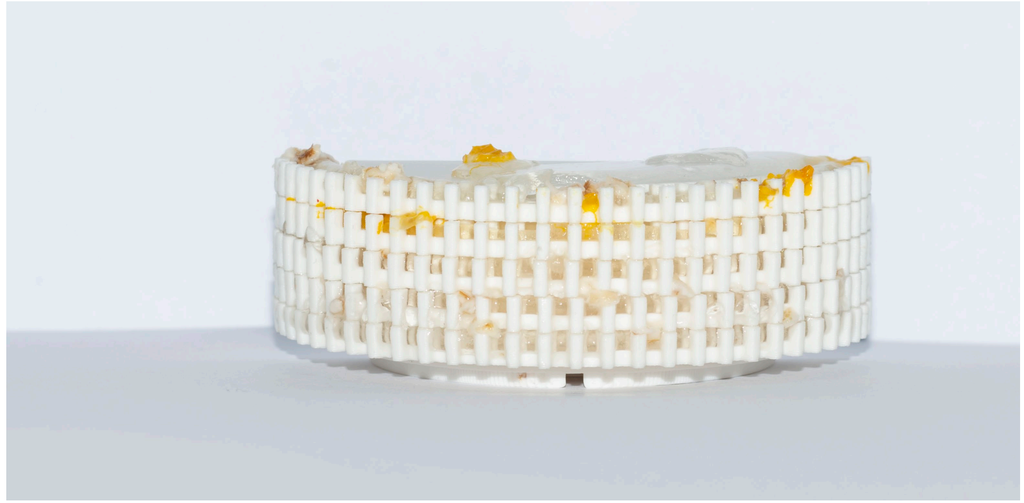










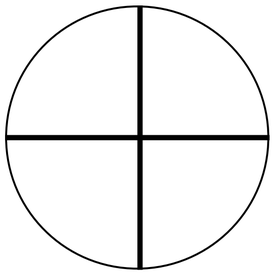




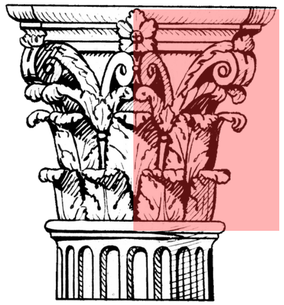
Predictive Models and Practical Application

Our design uses the classical elegance of Corinthian columns to guide slime mold's exploration and feeding patterns. The intricate structure and layers of these columns provide a systematic approach to studying slime mold behavior in a controlled environment. By combining the architectural beauty of ancient columns with modern scientific inquiry, we create a visually appealing and scientifically rigorous framework for our experiments.

5 Layers:
The food sources are arranged in patterns inspired by the decorative motifs of Corinthian columns, such as acanthus leaves and scrolls. The design incorporates five distinct layers, each inspired by the different levels of a Corinthian column. These layers provide a structured framework that mimics the vertical progression and complexity of the column design.



Top view

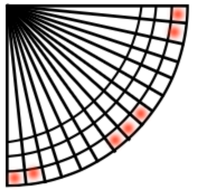


Front view

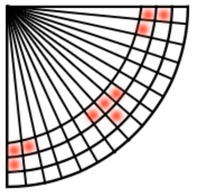
Predictive Models and Practical Application

Each of these layers represents a distinct environment or set of conditions under which the slime mold operates. The red dots in these layers are strategically placed to act as food sources, enticing the slime mold to grow towards them. In the digital simulations, we have modeled these columns and the placement of food sources, mirroring the physical setup as closely as possible. The goal is to observe how the slime mold navigates through the digital environment to reach these food sources. By doing so, we can predict the slime mold's growth patterns and compare them with actual growth in the physical columns.

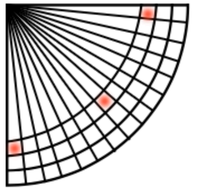
Depth and Intricacy:
Each layer varies in depth and intricacy, reflecting the ornate and detailed carvings typical of Corinthian columns. This variation introduces different environmental conditions for the slime mold to navigate.



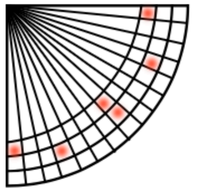
Layer 5 Top



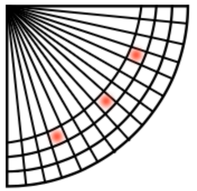
Layer 4



Layer 3



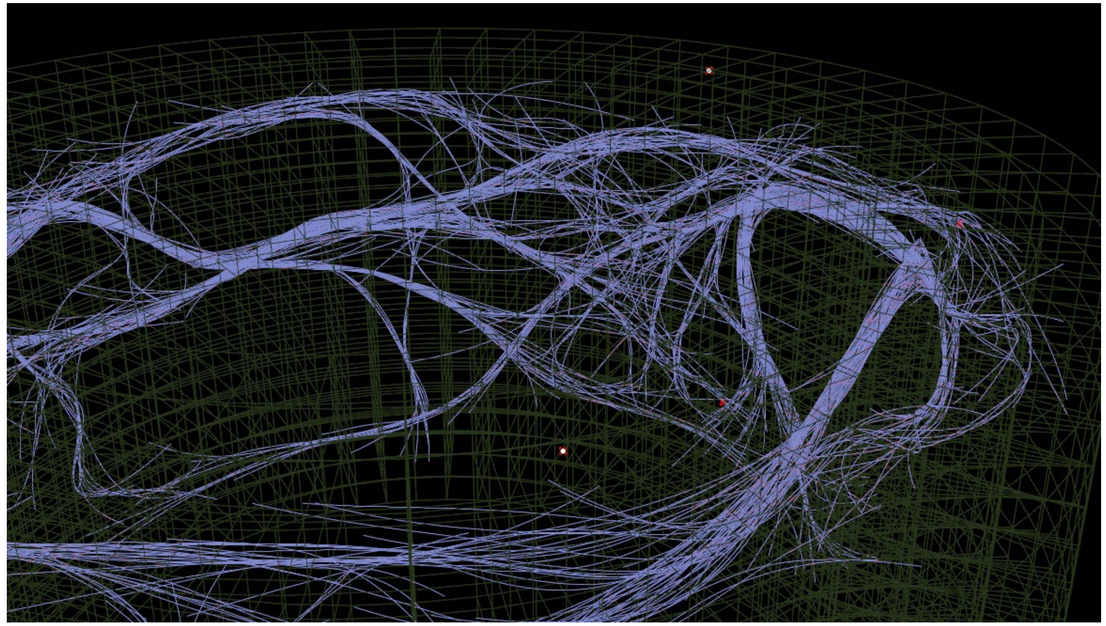
Layer 2

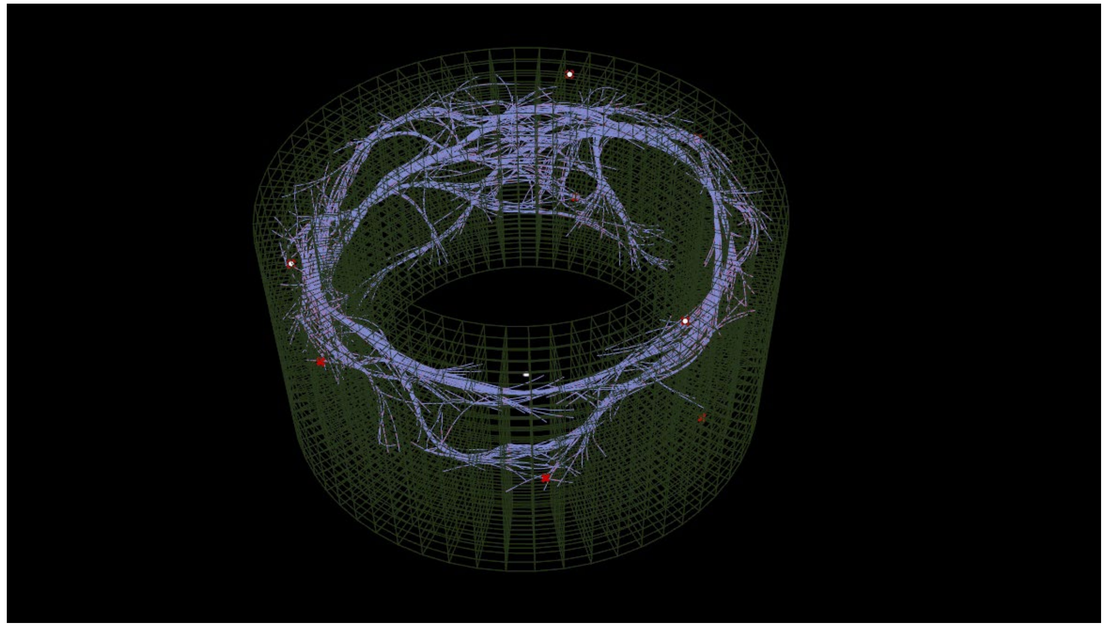


Layer 1 Bottom

Designing with our Simulation Tools

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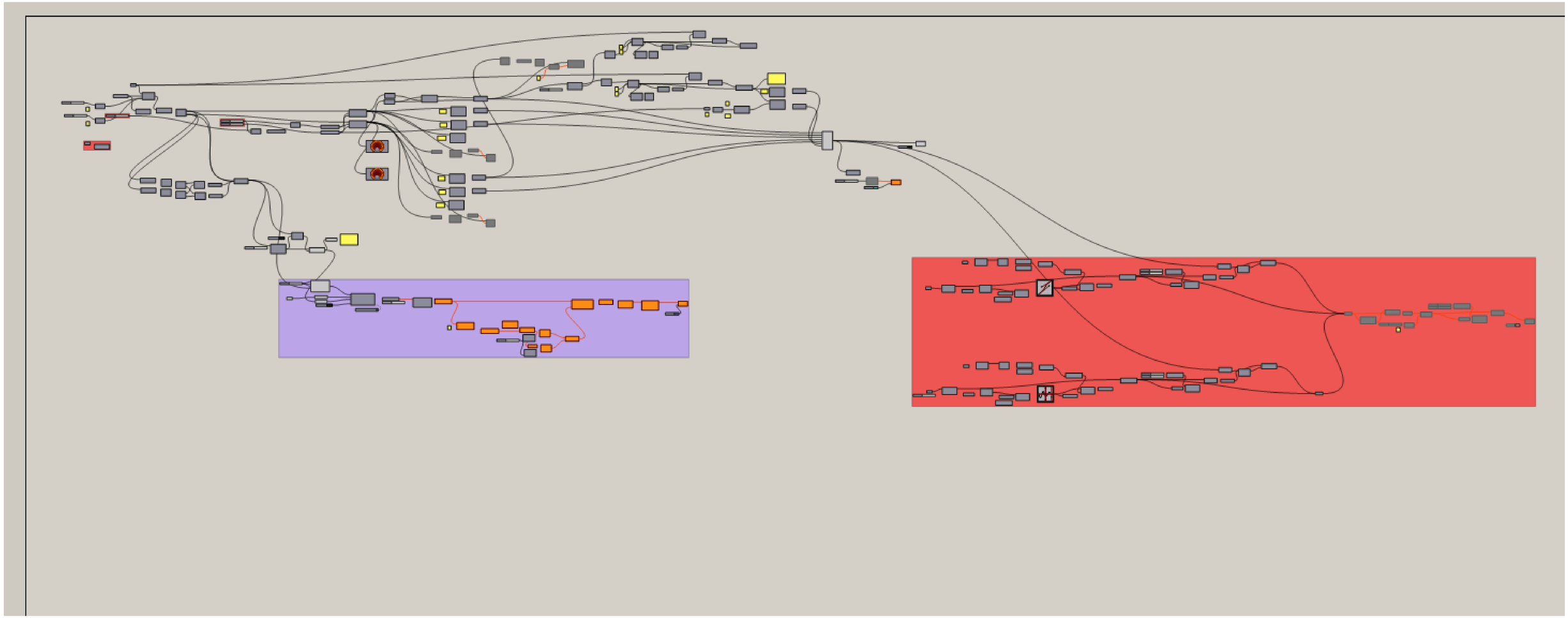




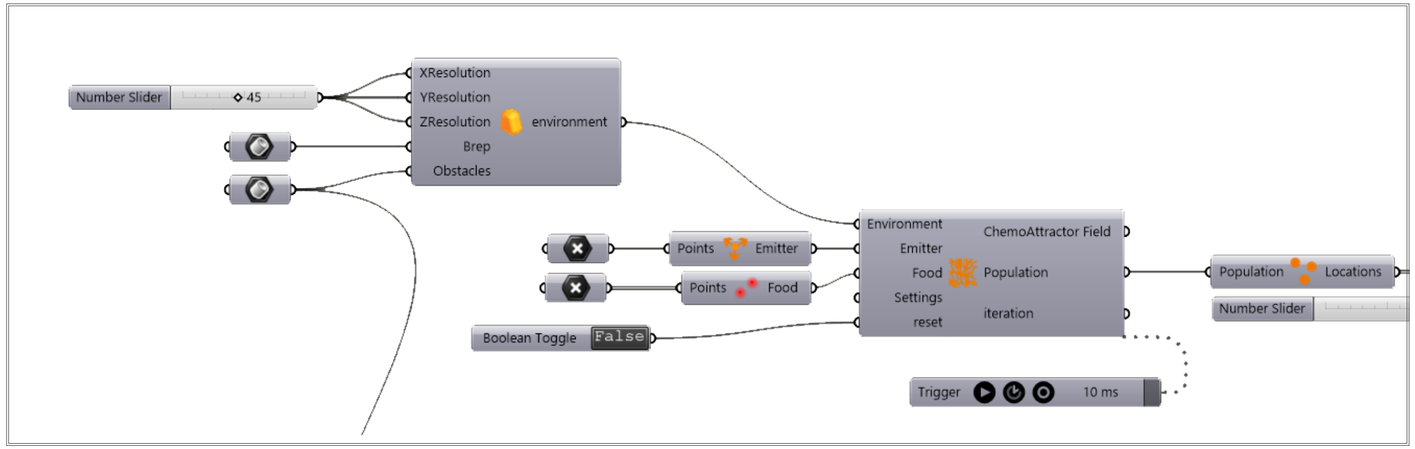
Slime Mold growth throughout the lattice structure

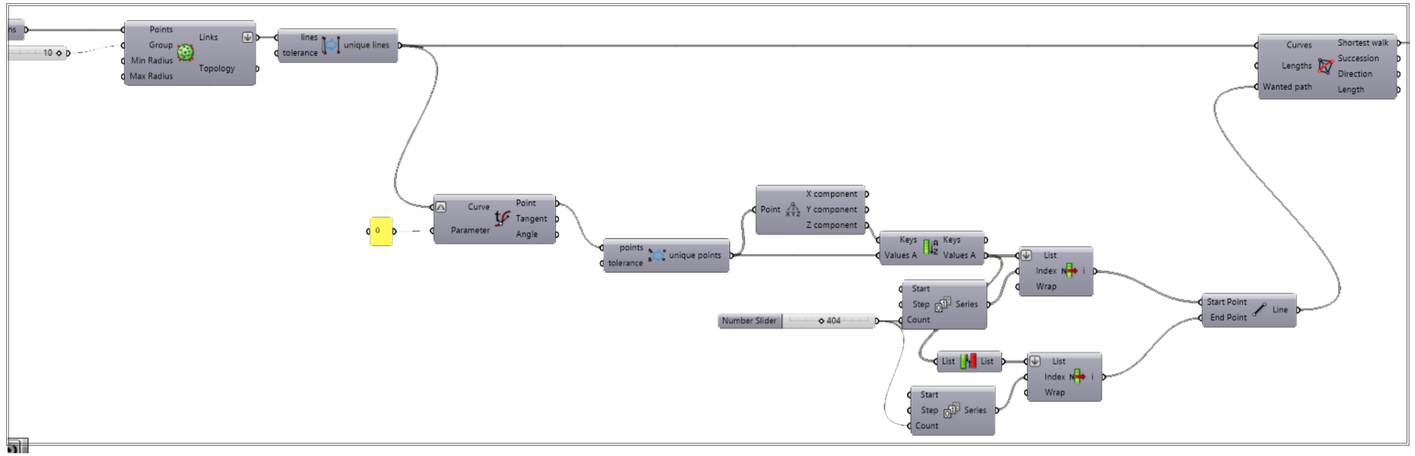
Initial Tests

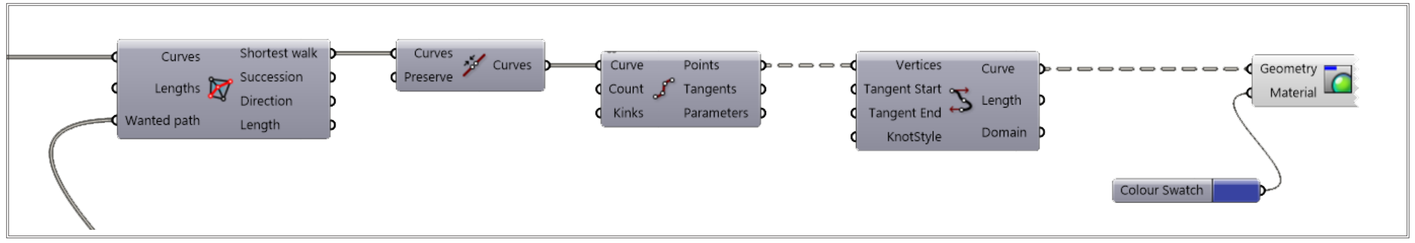
Simulation Code



Initial Tests
Simulation Code







Predictive Models and Practical Application

When examining the code used to simulate this type of growth pattern, the tools are quite user-friendly. An input of "food" points and "emitter" points act as the point A and point B the pathfinding algorithm is to solve between and an environment of "Brep" geometry acts as the basis for collision. After the solver produces the clouds of points for each iteration over time, the code generates a cluster of lines which are then approximated, averaged, and interpolated are grenerated and act as the basis for which the hierarchy of the column capital is formed. The curves are then flattened and forced into a shortest walk algorithm, interpolated again, and then visualized for examination. Each moment in time during the itertive process of the script can be valid as an assessment of the column structure by the code, so the process is as ephemeral as the organism itself.

Structural Investigation:

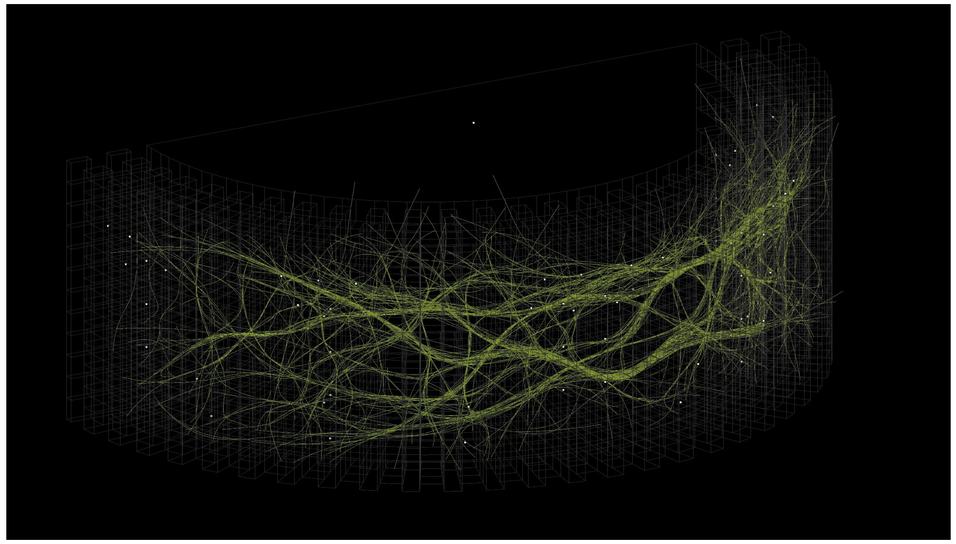
The simulation excels in analyzing the broader structural patterns and characteristics of slime mold growth. It helps us understand the general rules and principles that govern the organism's behavior, such as its network formation, efficiency in finding food sources, and adaptation to environmental changes. By examining these structural qualities, the tool provides insights into the underlying mechanisms of growth and development, which can be valuable for theoretical and conceptual studies.

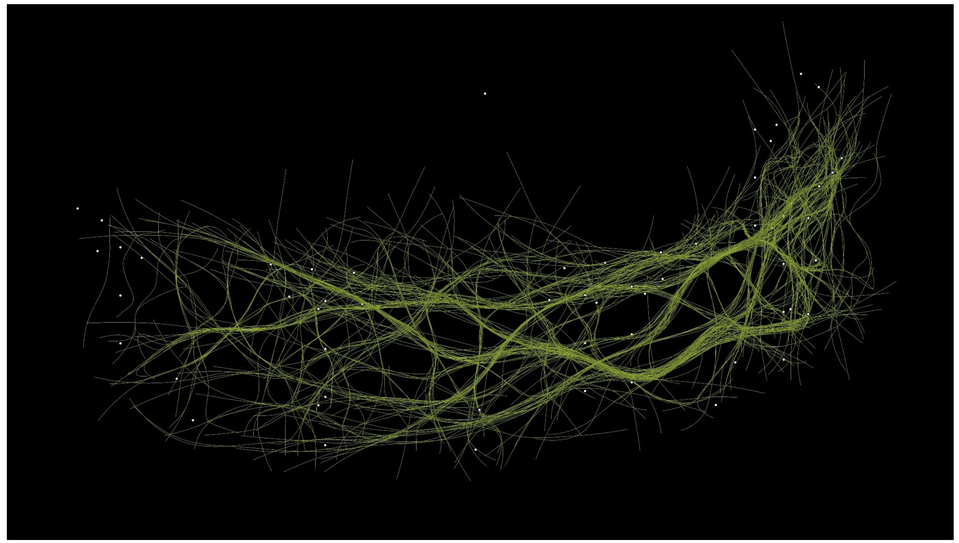
When used to fit mathematical models to the observed behavior of Physarum Polycephalum, the simulation tool is quite effective. It allows to test hypotheses and refine models that describe the organism's growth dynamics. This form-fitting process helps validate and improve mathematical representations of the slime mold's behavior, contributing to a better theoretical understanding of its growth patterns.

Predicting Growth Patterns:

The tool falls short in predicting the exact growth trajectory of a single organism in real-world conditions. The complexity and variability of individual slime mold growth, influenced by numerous environmental factors, make precise predictions challenging. Each slime mold organism may exhibit unique behaviors and responses that are difficult to replicate accurately in a simulation, leading to discrepancies between predicted and actual growth patterns.

Real-world experiments provide critical data that capture the nuances of slime mold behavior, which simulations alone cannot fully replicate. Thus, physical trials remain indispensable for validating and refining our understanding of the organism's growth.





Predictive Models and Practical Application

As we have discovered, the simulation tool we had access to is much less of a tool that should be used to predict the individual growth of one organism of Physarum Polychephalum and more of a tool to investigate the structural characteristics inherint to the quality of growth of the organism. If using it for the purpose of form-fitting with the mathematical breakdwon of the organism, it is successful. However, fot the purpose of cross-referencing with an existing trial to evaluate accuracy, the simulation tool is decidedly not a replacement for a real-world test.



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