

## Hybrid Forms (2015)

Andy Lomas

<http://www.andylomas.com/>

### Artist Statement

Hybrid Forms is a new work created for ECAL 2015, and represents the latest stage in a series of work called Cellular Forms. Inspired by Alan Turing, Ernst Haeckel and D'Arcy Thompson, these works use simplified biological models of morphogenesis to explore the generation of complex three dimensional structures.

Each form starts with a small initial ball of cells which is incrementally developed over time, adding iterative layers of complexity to the structure. The aim is to create forms emergently from the interactions between individual cells, exploring generic similarities between many different shapes in nature rather than emulating any particular organism. The process reveals universal archetypal forms that can come from growth-like processes rather than top-down externally engineered design.

Cell division is controlled by accumulated nutrient levels. When the level in a cell exceeds a given threshold the cell divides, and various parameters control how both the parent and daughter cells re-connect to their immediate neighbours. Rules can also be adjusted for how nutrient is created, such as by being randomly uniformly created by each cell, or by incident light rays creating nutrient in cells hit by photons. Nutrient can also be allowed to flow to adjacent cells. The simulation process is repeated over thousands of iterations and millions of particles, with typical final structures having over fifty million cells.

A number of internal forces affect the structures, including linear and torsion springs between connected cells. Additional forces repel cells that are in close proximity but are not directly connected. This creates tensions within the structures that induce them to change shape dynamically, with surfaces naturally folding into complex organic forms.

In these 'hybrid' structures diversity is introduced by using two cell types, with different parameters controlling things such as rate of growth and the forces that mediate interaction between the cells. This causes many different types of complex structures to form as regions with different cell types interact with each other.

A wide set of variations arise from small changes to the rules governing the systems, with selection of forms based on aesthetic considerations rather than optimizing a conventional fitness function. All resultant motion as well as shape is genuinely emergent, since the simulation rules only dictate interactions between adjacent cells in the structures.

### Medium

Four high definition video streams with accompanying audio. 16 minutes.

### Biography

Andy Lomas is a digital artist and Emmy award winning supervisor of computer generated effects. Cellular Forms is the latest part of Morphogenetic Creations: a series of work which explores how complex organic structures, such as those seen in nature, can be the emergent generative products of growth processes.

In 2014 Cellular Forms won The Lumen Prize Gold Award, as well as the Best Artwork Award from the A-Eye exhibition at AISB-50, and an Honorary Mention from the jury at the Ars Electronica Festival.

He has had work exhibited in over 50 joint and solo exhibitions, including SIGGRAPH, the Japan Media Arts Festival, the Ars Electronica Festival, the Los Angeles Center for Digital Art and the Centro Andaluz de Arte Contemporaneo. He has work in the D'Arcy Thompson Art Fund Collection, and was selected by Saatchi Online to contribute to a special exhibition in the Zoo Art Fair at the Royal Academy of Arts.

His production credits include Walking With Dinosaurs, Matrix: Revolutions, Matrix: Reloaded, Over the Hedge, The Tale of Despereaux, Avatar, and he received Emmys for his work on The Odyssey (1997) and Alice in Wonderland (1999).