

ONTOLOGY OF AN IMAGE

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Life begins with cells. That is the first chapter of every book on biology. Life is cells. Life has no existence before the cell. That is to say, it goes something like this: “Cells are basic units of structure and function for all living organisms and the structural order in cells forms the basis for properties of life including interaction with environment, movement, energy processing, growth, reproduction and evolution.” The cell appeared as image, as diagram, until it became represented in some more technological manner, which is, not to say photographed, strictly, but digitally apprehended. Recently, I have seen a human cell and its contents shimmering in purple, pink, green and yellow, and blue. What I have seen is “an image of a cell” made by a biomedical animator, Evan Ingersoll, in association with biological chemist, scientific visualization researcher and artist, Gael McGill. Its lateral view shows the internal segments of a cell: perceptible are the cell wall, Golgi apparatus, mitochondria, endoplasmic reticulum, and hundreds of protein structures and membrane-bound organelles. It is a Eukaryotic cell, which is found in humans, animals, fungi, and plants. The rendering of the cell—which can be clicked on, enlarged, manipulated, its aspects highlighted, its pathways and movements delineated—is an effort to recapitulate the myriad pathways that are mobilised in signal transduction, protein synthesis, endocytosis, vesicular transport, cell-cell adhesion, apoptosis, and other such biological processes. If we engage with this image, we can see ourselves at work, or perceive work and process underway inside ourselves in our smallest parts, the minimum point of life—or, if the cell is not us, and this one is not, of course, directly, then what we see is something that has not been seen before, in all its intricacy, and we should feel some intimate relation to it, if only because it has made so much effort to please us. Do we see the cell? Do we see something that is like the cell? Is the cell an image? Or do we see instead a diagram come to some sort of life, a model painted, dressed in some way? Is this what is presented to us: something known in itself that has been converted into something to be known by us?

There is no cell that has these colours in this way. These wild colours, these sparkling effects. Like blossoms and golden

threads and polystyrene crumbles and plastic flecks. There is no cell that comes to us like this, backlit on our devices with nothing surrounding it but the blackness or whiteness of its frame, the frame of liquid crystal in whatever flex you have chosen. There is no cell that appears to our eyes with each part defined and distinct and awarded a different colour, contrasting to maximum effect with those around it. The colour on this cell is a device that improves the clarity of seeing, for understanding and for its beautiful effect. This image is an image. This image is only an image. Or it is not an image. A cancer researcher at Stanford, Mahjabin Noorji, called it the “most detailed model of a human cell to date.” It is a model. It is not an image. But it is made using imaging technologies. It was produced out of datasets from technologies that can gain access to the smallest areas. These technologies include X-ray microscopy, which can perceive a form, if it can be crystallised, and scatter X-rays to outline its structure by implication. It encompasses nuclear magnetic resonance imaging, which produces image information through measuring the absorption and emission of energy in the radiofrequency range of the electromagnetic spectrum. It uses cryo-electron microscopy, a flash freezing procedure that fixes tiny biological structures in glassy ice. What all these technologies produce are timeless, spaceless images, or detached from singular time and space, because the image that results is a composite of many images, thousands of 2D snapshots of the object to be visioned, caught in random orientations, across many times. These things to be brought into the world of image do not inhabit it, if that image world is dependent on light. What is seen by the electron’s capacity for sensing is smaller than the wavelength of photons, and thus is imperceptible to human vision. There is a process, many processes at work, in which, mysterious to our sense of things, electrons interact with nano-scale components, and retrieve something from that encounter. These processes in their multiplicity are brought back to the computer software: Digizyme, the visualisation company responsible for the cell ‘landscape,’ founded by Gael McGill, used Molecular Maya custom software, Autodesk Maya, and Foundry Modo to import, model, rig, populate, and render all structural datasets in three dimensions. All this software power becomes our route to seeing what has been seen in the realm of the unseeable. And then the word of aesthetics piles in—as bold colouring is applied, ostensibly, in the name of labelling. That notwithstanding, it is also in the name of making it attractive for the purposes of gushing through social media—a process that also affects many

humans and commodities. The image of a cell has a title, and this might lead us to think it is more like a painting or an artwork than a photograph. It is called “Cellular Landscape Cross-Section Through A Eukaryotic Cell.” This is a landscape. It belongs to the tradition of landscape painting or landscape photography or film. Its enlargement is an invitation to linger within somewhere that has been envisaged and framed by the artist.

This image of a eukaryotic cell is an image with a referent, to which it bears a relation, shares a name and a sense of itself. That relation, or sense of itself, has become conceptual, and distinctly aesthetic, in the sense that it has become beautiful, attractive to the eye, composed, constructed, enhanced, and made into something akin to historical and humanised nature. This aesthetic of vivid colours and various textures means it turns metaphorical. It looks like Delhi on the nights of Diwali, with twinkling lights, so say the people who discuss it on social media and pass it around their circles so that it makes ever greater ripples in the digital worlds of discussion and entertainment. It looks like a theme park, with the most elaborate of roller-coasters and water chutes and confetti blowing all around. It looks like the world in the future, with monorails and organic-styled buildings. And there were arguments on social media about whether this intricate design—like a city with museums and infrastructure and parks and housing and music venues—was evidence of the order and complexity of intelligent design or was proof of the messy organicism of nature evolving in bizarre and contingent ways. And this is an image of the tiniest of things that can become more than a city and more than a fairground. The image portrays what seems to be a world and it is an operative image, as is Google Earth. In Google Earth, the cosmos becomes small, able to be manipulated on a smart phone. This image, conversely, takes the smallest part and discovers in it a cosmos. We can click on any part and it will enlarge itself and allow us to wander amongst far-flung ruins of this landscape that is so thoroughly mediated by technology—not least the ruins of our sense of vision, of what an image is and how we might apprehend it.

These new microscopy technologies of multidimensional imaging have made it possible to research structure and process—to bring cell behaviours to light, while tracking of epithelial morphogenesis has revealed things about cell migration and interactions, and morphodynamic processes have been identified in epithelial closure, tissue elongation, nervous system

morphogenesis, stem cell maintenance, and tumour progression. Fluorescent transcriptional reporters are introduced into samples in order to produce signals and biomarkers so that pathway activities and various types of cells and parts can be monitored—an image within that to be imaged, then, for purposes of analysis. Microscopes achieve finer detail and automated image analysis circumvents the human eye to enable rapid screening. What ontology then—what is the being, the existence, the presence of this image that is not an image, this thing that can be seen that cannot be seen, this flatness that is three-dimensional, this colourful confection that has no colour, the pattern that is recognised automatically and does not surface as image for us? What ontology? What image?

And I struggled to respond to this question: “What is the ontology of the image?”. Ontology has such a dense aura hanging around it. Ontology seems to ask about something so fundamental that it cannot be accessed without heavy baggage, without extensive quantities of philosophical knowledge and a commitment to classification, which then insists—contra my inclinations—on being disaggregated from the messiness of processes and the contingencies of partiality. But then it all resolved itself into itself as I realised that for those who look into the cell through these imaging methods ontology is relayed as something crucial. Cell ontology is a structured controlled vocabulary for cell types. Fundamental to the field of bioinformatics, ontology is the process of outlining, defining, labelling and networking everything that is known about a subject in a hierarchy of terms and relationships. These subjects are known through their imaging, which changes over time, but which is the vector of knowing both what exists in them and, as the imaging develops to include time and dimensionality into its capacities of visioning, what processes and relations exist. Unregarding of the decoration and confectioning that is a necessary adherence to the image-model after it has made its passage into the world, ontology for them, its maker-modellers, is a tool for the development of shared understanding. Ontology for those who work on data imaging in Life Science is a mode of description of metadata for an integrated database of optical and electron microscopy. It involves identifying concepts and proposing a way of classifying that which appears in terms that can be understood by all who are concerned with it.¹ Ontology is a name for a very good description—such that all that is factual might become theory, as

Goethe put it. Ontology's processes begin by making a diagram with labels. Ontology is a model of all that is pertinent about the image-model. The image works only in as much as all its parts are identified and labelled. The image's ontology is a combination of factors divided into labelling within the concepts of Biosample, Screening, Image, Instrument, and Experimenter. The image-model that images life today is distributed across these various objects, conditions, locations, and moments. Would the aesthetic mediations, the colours and titles and functionality, feature in this cataloguing? It is unclear. If such an image-model as the landscape of a cell is operative, it is operative in many ways and for various purposes. Its ontology concerns us, if we wish to use it to learn or analyse, but it concerns us too, if we want to know the distance between what is envisioned and what it envisions for us. What might all the preceding suggest for our—and others'—sense of ontology? For we catch this ontology at the point when it is moving somewhere else. It is shifting from description into design. Cells are known and databased in order to facilitate bioengineering in synthetic biology. Modelling of the forms detailed in the image of the cell—or less pleasingly aestheticized versions of the same—are used within machine learning to develop predictive bioengineering, in the quest for biofuels and increased crop yields, the combatting of disease, synthesis of drugs, non-meat meats, or other biomaterials. Ontology leads to a revolution in the image, to its hitherto unattested existence as and in the future, after becoming, in the realm of the yet to become, the logical discourse of what will be.

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- 1 See, for example, Satoshi Kume, Hiroshi Masuya, Yosky Kataoka, Norio Kobayashi, "Development of an Ontology for an Integrated Image Analysis Platform to enable Global Sharing of Microscopy Imaging," October 2016, Conference: ISWC2016 The 15th International Semantic Web.