









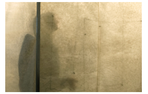


The exhibition ***The Sound of Cells Dividing*** includes two large-scale installations, ***Sound Wall*** and ***Cellular***, created over the last year for the Western Gallery at Western Washington University. These works, which refer to both architectural and biological cells, are my attempt to understand, represent and experience cellular formation. The forms, sound and images that make up this work are a result of working closely with several research scientists who have generously allowed me to observe and use their research. Both works rely on physical interaction; these are performance spaces for the viewers to listen, touch and occupy in order to understand the relationship between our senses, internally and externally.

SOUND WALL — The cell, the smallest unit in a living organism, houses genetic code. Both an object and a vessel, it is a site of activity that is never static or complete. The term *cell* comes from the Latin *cellular*, a small room. Historically the architectural cell is duly a space for reverent solitude and meditation, or captivity, and confinement. The biological association was given by the British scholar Robert Hooke in 1662. The first to use microscopic magnification to study and render cellular structure, Hook noted that cork cells resembled the small rooms monks lived in. His etchings of magnified organic forms published in "Microphlia" in 1665, revolutionized the way in which biological organisms were understood. Optics and magnification have continued to give vision to the previously unseen and have changed our understanding of interior systems.

Most recently, nanotechnology, particularly the AMF (atomic force microscope) pioneered by James Gimzewski, Professor of Chemistry at UCLA and Andrew Pelling, Associate Professor of Biophysics at the University of Ottawa, have enabled researchers to touch and to listen to cells. Like the blind reading Braille or a hand touching a pulse, the needle of the AMF can touch and feel the vibrations of cells less than half the diameter of a human hair. The new area of study is called sonocytology which uses the atomic force microscope (AFM) to feel a cell in the same way a needle was used to feel the pattern of vibrations pressed into vinyl records. Gimzewski and Pelling have found that cells with cancer or other diseases emit a very low and strained frequency while healthy cells produce a more pleasant sound. Sonocytology has proven to be a noninvasive way to detect disease. In 2007, Gimzewski used nanotechnology to demonstrate that metastasized cancer cells are softer than healthy cells. The study represented one of the first times researchers have been able to take living cells from human cancer patients and use nanotechnology to determine which were cancerous through touch.

Through touching and hearing rather than only seeing, an entirely new way of studying a form—that of the multiple sensory knowledge—has been born. This ability to discern cellular soundings has ultimately revolutionized the understanding of cellular gestation, division and the relationships within the interior architecture of our body.

When I learned of this phenomenal research done at UCLA, I began to consider touch and sound as vital elements in creating a work about cells. Over the past two years I have spent time listing to and learning about the sounds of cells, and the pace and visual nuance of cell division. As a result, I created the work Sound Wall as a physical, multi sensory experience. Using the main space of the Western Gallery as a vessel, I designed three cellular spaces—one, 7 x 14 x 8', a second 6 x 12 x 8' and a third 8 x 4 x 8'—for the viewers to move in and out of. These minimal cubic forms are layered, one in front of the other, so that one can see the physical ratio of the three spaces simultaneously. The spaces, made from handmade Abaca paper are illuminated from the interior to create a lantern-like effect. When inside the space the viewers bodies project distorted shadows as they feel and listen to the sounds of cells dividing and emanating from tiny speakers embedded in the walls of paper.

The sound one is hearing and feeling are five tracks of healthy to damaged cells dividing and dying, layered with my own recording of a Monastery Cell, and family conversations. I was permitted the copyright for these five recordings by Andrew Pelling. The sound recordings used for this work range from rhythmic to strained. The pitch of each is so distinct that even the untrained ear can sense the sound of heath and distress as one moves through and touches the thin handmade paper walls.

I chose to make this work with handmade abaca paper, because like the cellular walls, it is both translucent and penetrable. Both paper and cells are vehicles that hold and convey fundamental information on the interior life of others. Abaca paper, made from palm leaf since the 14th century, has been traditionally used for letter writing, drafting, typewriters and rope making—all materials used for communication and uniting. It has remarkable tensile strength, which made it possible to cast 4' x 8' panels, sew them into large wall sections and frame them into aluminum structures.

In order to make 4' x 8' sheets of paper I poured thoroughly beaten pulp on to a 4' x 8' cedar silkscreen frame system. A very thin sheet of plastic lined the frame so that once the pulp was poured in, the plastic could be removed and pulp could flow over the silk evenly. The processes of pouring and the bonding and drying of pulped plant fiber is evident in each sheet that makes up the walls of this work. As a result, the paper looks very much like the cellular wall one sees through the microscope.

SPECIAL THANKS
Sarah Clark-Langager, Director of Western Gallery, for giving the opportunity to show this work; **Andrew E. Pelling**, Assistant Professor of Bio Physics, Department of Physics, University of Ottawa, for his sound recording of the cells; **Steve Black**, Professor of Biology, Reed College and **Allison Egar**, Research Assistant for Steve Black, for the films of the blastopore; **Michael Flashman**, Fabrication Assistant for help with all fabrication and papermaking; **Helen Hebert**, Artist and Papermaker for training in papermaking; **Tony Moreno**, Web and Video Specialist at Reed College for assistance with editing; **Orin Baslof**, for photography.

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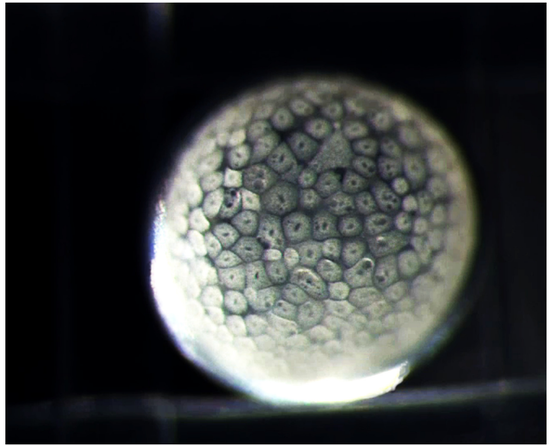
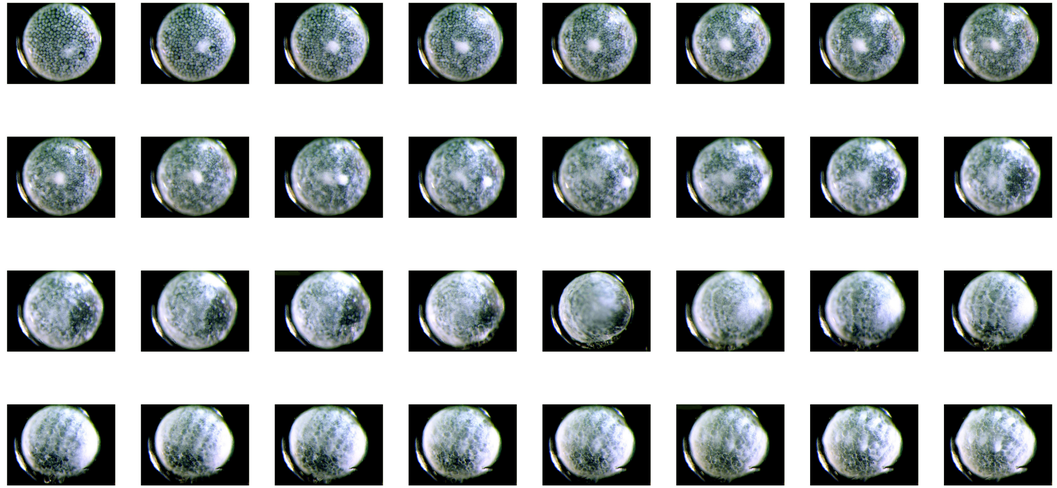
GERALDINE ONDRIZEK

THE SOUND OF CELLS DIVIDING

WESTERN GALLERY, WESTERN WASHINGTON UNIVERSITY, BELLINGHAM
September 28 – November 25, 2009





CELLULAR — Since 1996, I have been looking at and making artwork about the dynamic process of cell division. This preoccupation began with a personal encounter. I had witnessed the incredible phenomena of growth and destruction of diseased cells.

This fall, when I asked a colleague Steve Black, Professor of Developmental Biology and Zoology at Reed College, if he had any images of gastolaztion he could share, an entirely new world was opened to me. Most images we see of biological specimens are flat and still, but the inventions of the stereomicroscope with film capture technology has enabled researchers to capture images akin to how our eyes see, in three dimensions and in motion. The stereomicroscope has made it possible to record the physical form and the inner workings of a cell. This is vital technology in the fields of embryology, fertilization and the understanding of cellular anomalies.

Steve's lab uses three-dimensional photographs and film capture technology to understand the cellular mechanics of gastrulation, the process by which a spherically symmetrical egg is rearranged to have axes such as an inside and an outside; a front and a back; a top and a bottom; a right side and a left side. From these films, they can compare different species and development as it occurs.

Cellular is a film of several blastopores, or a multiple cell embryo projected onto an 8 x 8' semi translucent semitranslucent screen occupying half of the smaller exhibition space at the Western Gallery. Each segment of the film is a result of more than 200 hours of still images of each embryo made with Atonics Micro fire digital cameras mounted on Olympus stereomicroscopes and made into a film using Astor IIDC imaging software. Steve Black and his research assistant Allison Egar provided me with films of the blastopore and allowed me to work with them to make a film of endless development. To make my film, I edited 10 different films of gastrulation to overlap and repeat the phases of development just before a recognizable body is evident. Watching an endless loop of an egg development and cells dividing is meditative. It looks like we are witnessing the beginning of the earth's formation or plate tectonics. The pacing is nervous and then fluid. Each egg's gestation is unique, even though it is the same species. The blastopore, or a multiple cell embryo, is what all creatures begin as. The conditions and the health of the egg determined its survival. This extraordinary phenomenon happens continually and without us knowing.

A set of prints made from the film Cellular occupies the walls of a smaller space next to the film. To make this set of prints, I worked closely with Allison Egar, to record the major stages of gestation, looking at the subtle, but developmentally significant events in each. Throughout this process, it became increasingly clear to me that early embryonic development is flexible, with considerable variation observed even within a single genus.

GERALDINE ONDRIZEK is an artist and professor of art at Reed College in Portland,Oregon. For the last twenty years she has created architectural scaled works which house medical and biological information. Since 2001 she has worked with geneticists and biologists to gather images of human cellular tissue and genetic tests relating to ethnic identity and disease.

While on sabbatical in 2008–2009 Ondrizek exhibited her work and lectured at Columbia College in Chicago, The Royal College of Art and Goldsmiths College in London, The University of Washington in Seattle and The Conference for Art and Society in Venice, Italy.

In 2006 Ondrizek won the Oregon Council Award. Whitman College produced a one person exhibition and catalog in 2007. Ondrizek has been an artist in residence at CAMAC in France in 2008, Gasworks in London in 2003, the Women's Studio Workshop in New York in 1998, Anderson Ranch in Snowmass, Colorado from 1990-1992, and the Mattress Factory in Pittsburgh in 1989. She has shown her work at The IMSS Chicago, Carnegie–Mellon University, The Portland Art Museum, the Hillwood Museum in New York, PDX Contemporary in Portland, as well as other places. Reviews of her work have appeared in *The Chicago Tribune*, *Art Week*, *Art News*, *The New York Times, The Oregonian*, and the *Sudduetch Zietung*.

WESTERN WASHINGTON UNIVERSITY — College of Fine and Performing Arts

Sarah Clark-Langager, *Director*
Western Gallery

Hours: Monday–Friday 10am–4pm,except Wednesday 10am–8pm; Saturday 12pm–4pm.Closed Veteran's Day
For information: 360-650-3900