EXPLORATIONS: SCIENCE SCULPTURES BY CHRISTINA LORENA WEISNER
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We must always begin by asking questions, not by giving answers. Science is the opposite of knowledge. —Physicist Victor Weisskopf

Sculptor Christina Lorena Weisner finds and repurposes objects originally designed and fabricated as scientific instruments in order to explore complex relationships between objects, humans, and the natural environment. While doing so, she draws parallels between the vast and the microscopic, the subjective and the objective, the organic and the technological. Her work invites viewers to consider the deep geological time of water, rocks, and the landscape and to reflect on the more fleeting existence of living beings through objects, technology, and the process of discovery.

The formal attributes of the original instruments—their utilitarian colors and simplified shapes imposed by their intended functions—are as important as maintaining connections with their original uses. Both are incorporated into the new objects they become when Weisner reuses them to make her art. A gathering of seismometers, for example, continues to respond to faint vibrations and distant tremors, but the arrangement of thick glass hemispheres (dictated by the need to withstand tremendous pressures at ocean depths) may now conjure up completely different associations, such as altars, offerings, or musical instruments—the latter underscored whenever the sculpture rings in response to a far-off earthquake.

Scientific objects inevitably refer to the processes of the scientific method. Both art and scientific experimentation are rooted in setting up situations through which one seeks to better understand the nature of reality. The scientific instruments Weisner has worked with are vehicles to reach a better understanding of complex natural phenomena such as techtonic shifts, meteorite strikes, or the flow of rivers. While her process is methodical, her work encourages inquiry that is necessarily inconclusive and open-ended for she is not concerned with reaching concrete conclusions or proposing answers so much as suggesting questions that may generate platforms for cross-disciplinary modes of thinking and possibility.

Christina Lorena Weisner is an Assistant Professor in the Department of Fine Arts at the College of the Albemarle in Elizabeth City, North Carolina. She holds a Bachelor of Fine Arts in Sculpture and Bachelor of Arts in World Studies from Virginia Commonwealth University, and a Master of Fine Arts in Sculpture and Ceramics from the University of Texas at Austin.

Clockwise around gallery from entrance:

Four and a half minute video loop
Christina Lorena Weisner discusses her Ocean Bottom Seismometers sculpture. Produced by the Information Technology Program at the College of the Albemarle, Elizabeth City, North Carolina. Funding provided by "support from an anonymous component fund" of the North Carolina Community Foundation Innovation Grant, College of the Albemarle.

From Christina Lorena Weisner's Studio
Old postcards, maps, sketches, print-outs, concept drawings, images found in old books, and other materials that served as inspiration for works in this exhibition, including Shock Metamorphism: Proof that a Meteorite Impact Formed the Ries Crater, Inverted Geodesic Dome, and Trass Zement: Irregular Polyhedrons in the Expanded Field; 500 Years After Dürer.

Shock Metamorphism Project
The Shock Metamorphism Project includes multiple components inspired by an ancient meteorite impact. 14.4 million years ago, an incoming asteroid left a crater in western Bavaria that now surrounds the old imperial town of Nördlingen, Germany. The crater went "undiscovered" until 1960, when American geologist Eugene Shoemaker determined that the materials used to build the walls of Nördlingen's medieval Saint Georg's Church included locally-quarried blocks of stone containing coesite, a mineral typically formed only during the

immense shock pressures associated with a meteorite impact. Before this, scientists and local people alike had always thought the vast circular depression in which Nördlingen lay had been created by ancient volcanic activity.

Twenty-five miles from Nördlingen is the town of Steinheim, nestled in a much smaller depression called the Steinheim Basin. Apparently the half-mile diameter asteroid that caused the wide crater at Nördlingen had its own little moon, about the size of a six-story building. Both slammed into the Earth at virtually the same instant, with a force corresponding to 120 million times the energy released in the Hiroshima atomic bomb. Silica liquefied by the impact and tossed up by the blast hardened in the air and rained down several minutes later in what is now the Czech Republic, 275 miles away. The resulting green glassy mineral (now called moldavite) has been collected and fashioned into jewelry since the 18th century. At Steinheim one can also find “shatter cones” with radially-grooved surfaces formed through the shearing movements set off by the compression of the rock in the shock wave of the impact.

The Ries Crater is also Europe’s only known diamond deposit. Scientists have estimated that Nördlingen and the surrounding area contain approximately 72,000 tons of the gemstone, created when the asteroid hit graphite-bearing gneiss rocks in the region. Unfortunately, the diamonds in the Ries area are so tiny they can only be seen under a microscope. The very largest found so far measure only about a third of a millimeter.

The Shock Metamorphism Project was a response to all these sudden changes that occurred at this decisive moment in time, when the Earth’s surface was deformed and the stones themselves were subjected to such radically altered conditions that they were transformed into something different from what they had been before. When the Ries impact occurred, prehistoric apes, ancient aardvarks, distant relatives of elephants, and ancestors of deer, giraffes, warthogs, and antelopes were roaming central Europe, suggesting that the climate of the Nördlingen region was more like modern-day Kenya than Bavaria.

The Shock Metamorphism Project resulted in a suite of interrelated pieces in this exhibition. Each is a response to a different aspect of the site and its origins:

- Inverted Geodesic Dome 2014
- Shock Metamorphism: Proof that a Meteorite Impact Formed the Ries Crater 2014
- Trass Zement: Irregular Polyhedrons in the Expanded Field; 500 Years After Dürer 2014
- Progenitors Present 2014
- Untitled 2014

Case captions

Parts removed from undersea seismometers, a maquette for envisioning a way to mount electric solenoids, and prototype and fabrication components hint at Christina Lorena Weisner's working process in creating her 2017 sculpture, Ocean Bottom Seismometers.

Rock thin-sections, mounted on glass and ground optically flat, for study with electron or polarizing microscopes. Standard thickness is 30 microns (millionths of a meter).

Suevite with an embedded "melt bomb" of rock liquified by a meteorite impact in southern Germany 14.4 million years ago.

"Shatter-cone" structures produced in rocks subjected to intense shock, found only at meteorite impact and nuclear test sites.

Suevite samples.

Maquette for solving design of Christina Lorena Weisner's 2014 sculpture, Inverted Dome.

Inverted Geodesic Dome 2014

Steel, suevite stone containing melted material, microscopic diamonds

The sculpture mimics the concave form created in the earth by the meteorite impact, as well as the front of the shockwave preceding the asteroid only nanoseconds before it hit. The dome also rises like a satellite dish, the kind of device typically used to route information from Earth to outer space and back, and like the dishes of radio telescopes used to explore the far reaches of space. It is anchored in a piece of suevite that was quarried near Nördlingen, Germany, and shaped with hand chisels sometime between 1750 and 1850.

Untitled 2014
Ten-minute loop of footage from the NASA Dawn mission's orbit of the asteroid Vesta, paired with footage of the Wendeltreppe (spiral staircase) in the St. Georg Church in Nördlingen, Germany, made of suevite

The duration of the film loop approximates the duration of time during which the Ries Crater was formed. In the first thirty seconds, the impact created a massive pit, eight miles wide and nearly four miles deep, which lasted only a few seconds. Over the next five minutes, the sheer walls of the pit began to slump and collapse in until it formed a crater more than sixteen miles wide and half a mile deep. For the next five or six minutes, debris thrown up into the sky rained down on an area of central Europe roughly the size of Arizona and New Mexico combined. The explosion would have exterminated every living thing above ground within a hundred miles.
Nowadays, as one ascends the winding stairs of Nördlingen's St. Georg Church tower, one is physically encased and surrounded by 14.4 million year old suevite, the local building stone. Globs of once-molten rock, known as "melt bombs," are visible in the stone walls of the church, which was founded in 1427.

NASA's Dawn mission marked the first time a spacecraft orbited any celestial bodies inside the main asteroid belt. Dawn encircled the asteroid Vesta from July 2011 to September 2012, yielding the best asteroid photos ever taken. Then, in March 2015, it went on to achieve orbit around Ceres, where it continued to provide data until November 2018. The asteroid that formed the Ries Crater had a "stony achondrite" composition much like Vesta's.

The film of Vesta was provided by the Deutsches Zentrum für Luft und Raumfahrt; the Wendeltreppe (spiral staircase) was filmed by Filmmore Nördlingen.

493 V-Fin 2012

Metal, fiberglass, resin, lead, Plexiglas, water, plastic, paint

The 493 Vehicle of Instrumentation, better known as a 493 V-Fin, is a high-speed, dihedral-winged device designed to be towed behind an ocean research vessel. These are typically equipped with sonar to send out signals that reflect from the sea floor to provide detailed images of the ocean bottom and sub-bottom, but they also make it possible to tow scientific instruments at precise depths for a wide range of other applications, including measuring water temperature, salinity, chlorophyll levels, and plankton counts.

In this sculpture, a 493 V-Fin hangs from one end of a rotating beam, counterbalanced by a cube filled with water of an equivalent weight (about 125 lbs.). The beam rotates on a vertical and horizontal axis so that whatever action affects the water is reflected in the V-Fin's positioning. This action corresponds to greater forces and processes such as gravity, evaporation, weather, space, and time.

The forms often expressed in scientific instruments are not necessarily new, modern inventions, but often are some of the oldest forms found in nature. The 493 V-Fin, for example, has the same rounded triangular shape as the head of a Tiktaalik, an extinct lobe-finned fish that lived 375 million years ago during the late Devonian period. Both instrument and fish utilized this shape for the same function, i.e., to make it possible to maneuver at depth with a minimum of resistance, while remaining parallel to the ocean surface.

Progenitors Present 2014

Compressed particleboard, paint, metal, cement residue, silicone

Situated near their progenies (the four poured concrete forms) are the two "progenitors:" the molds used to make them. Built of particleboard and sheet metal, each exhibits the marks of process and contains the logic necessary to effectively produce another form from itself.

An impact crater is essentially a concave mold with an absent or transformed progenitor. The process by which the concrete forms were created mimics the systemic relationship of cause and effect.

Trass Zement: Irregular Polyhedrons in the Expanded Field; 500 Years After Dürer 2014
Märker “Trass” Concrete, suevite inserts exhibiting four stages of shock metamorphism, microscopic diamonds
Four geometric forms cast in “Trass” concrete are based on the irregular polyhedron pictured in Albrecht Dürer’s 1514 engraving, Melencolia I, and make reference to the Pythagorean assumption that nature can be reduced to mathematical relationships. For Dürer, this eight-sided form may have been meant to represent the stuff of the universe. The measurements of the irregular polyhedron in his print are based on the golden mean, while these forms also mimic the crystalline structures of calcite and quartz, two of the most abundant minerals on Earth.

The samples embedded in one plane of each of the Trass Zement polyhedrons contain quartz—in this case, shocked quartz—with inclusions exemplifying the four stages of progressive shock metamorphism that affected and transformed the pre-existing rocks of the Ries region as a result of the incredibly intense conditions caused by the meteorite collision.

The title of the sculpture grouping refers to a product of Märker Zementwerk GmbH, a cement factory located in the town of Harburg along the crater rim. “Trass” is the local name for volcanic tuff, long thought by both scientists and cement workers to be the composition of the regional rock before it was attributed to a meteorite impact.

Shock Metamorphism: Proof that a Meteorite Impact Formed the Ries Crater 2014
Paper, inkjet prints, wood
Twenty-four photographic images of rock samples from the Ries Crater, taken with the aid of a polarizing microscope and a scanning electron microscope, show mineral microstructures that can only be formed by the immense shock pressures of a meteorite impact. The images are all

produced from thin sections of rock, 30 mm slices so slim that light can pass through, exposing the compositional framework. This provides clues to the formation of the material.

From Christina Lorena Weisner's Studio
Sketches, print-outs, concept drawings, images found in old books, and other materials that served as inspiration for works in this exhibition, including 493 V-Fin and Ocean Bottom Seismometers.

Ocean Bottom Seismometers 2017
Plexiglas, glass, metal, plastic, wood, smart TVs, Raspberry Pi, Arduino, computers, custom-built electronics
The United States Geological Survey (USGS) estimates that millions of earthquakes occur throughout the world every year. The vast majority go undetected because they occur in remote areas or are of very small magnitude. Each year, the National Earthquake Information Center (NEIC) locates and records about 20,000 earthquakes (slightly more than fifty a day) that register 2.5 or greater on the Richter scale.

The nine glass hemispheres in this piece are equipped with electric solenoids that strike them whenever they are activated by real-time seismic activity somewhere in the world, responding to live data provided by the USGS and NEIC as indicated on the upper monitor. The number of strikes (tones) corresponds to the nine magnitudes on the Richter scale. Four tones, for example, signals a magnitude four earthquake.

One of the hemispheres houses a working seismometer that also records local floor movements caused by visitors present in the gallery and displays them on the lower monitor.

These hemispheres once served as protective containers for ocean bottom seismometers that were deployed in the Aleutian subduction zone off the coast of Alaska (where very large earthquakes occur and where huge oil deposits have been identified), in the Pacific depths near Taiwan, and were used to map the Chicxulub Impact Crater, buried under sediment at the bottom of the Gulf of Mexico near the Yucatan peninsula. Most paleontologists believe that the Chicxulub Crater resulted from the meteorite that caused the extinction of nearly all dinosaurs, with the exception of those that evolved into birds.

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