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## Art and Science: Creative Solutions

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Long before the scientific and artistic disciplines were established, humans tried to solve the riddles of the universe. Mysterious events and strange phenomena were explained in stories that took the unimaginable and made it understandable. These myths form the basis of our culture, and give us clues to the investigative nature of the human psyche. We pose questions to find answers for what we do not know, for what we can only imagine. Sometimes we look for proof, sometimes we rely on faith. Artists and scientists continue the investigative process started eons ago. Each group may not ask the same questions or be interested in the same solutions, but the curiosity, the need to question, and an involvement in a creative problem solving process are common grounds. Increasingly, there are new problems to solve while many of the ancient ones still remain.

The three elements defined earlier make up a small part of this mutually creative problem solving process. In *Advice to a Young Scientist*, Nobel Laureate Sir Peter Medawar<sup>i</sup> notes that these elements are true for anyone engaged in “exploratory activities.” His advice to the young scientist includes the development of desirable “virtues” such as application, diligence, a sense of purpose, the power to concentrate, to persevere. He also stresses the need for experimentation, both as a form of thinking and as a practical expression of those thoughts. The scientist experiments in a lab or in the field; the artist might experiment in the studio, the street, or the stage. The six artists in this exhibition, *Art and Science: Creative Solutions* are all engaged in exploratory activities that take them to the overlapping worlds of the studio and the laboratory. Book artist Daniel Kelm and photographer David Goldes were both practicing scientists before they became artists; sculptor Robert Lawrence and photographer Thomas Allen each continue artistic and scientific practices that began when they were children investigating natural phenomena; printmaker Elizabeth Hart and ceramic sculptor Elizabeth Crawford both process the abstractions of science through the specifics of personal relationships. All of these artists build their own connections between the known and the unknown. Each investigation follows a different set of problems and methodologies.

Scientist, philosopher and artist Daniel Kelm turned to the ancient study of alchemy to synthesize his interests in physical and intellectual matter. During the Middle Ages, alchemy involved the quest for the philosopher’s stone, the universal cure of diseases, and the transmutation of base metals into gold. The alchemist perceived that the workings of the physical environment were extensions of a mental process. Mind and body were regarded as a connected unit. During the Scientific Revolution of the sixteenth and seventeenth centuries, that unity was dissolved into a hierarchical philosophy of mind over body. In the years he taught organic chemistry, Kelm experienced firsthand the dominance of the intellectual over the physical. Leaving academia, alchemy provided “a historical model of a physical existence infused with spirit.”<sup>ii</sup> Kelm combines ritual with the physical in his sculptural bookwork *Templum*

*Elementorum [Sanctuary of the Elements]*. The work is informed by Kelm's experiments with alchemical materials and their referents-air, earth, water and fire. These elements are represented in four brass-covered books, housed separately in glass cylinders. Symbols for each element's associated metal, season and planet are inscribed on the cylinders. They are arranged with Fire at the center, a reminder of the reverence accorded it by the medieval alchemist. The sense of ritual is continued inside the books, where Kelm uses ceremonial language to introduce each element. He weaves the words together with pop-up and printed symbols for the materials used to make the piece- iron, copper, solder and flux. The unified intellectual and spiritual matter is embodied in the physicality of the book. Although the references may be archaic, Kelm uses them to build a relationship to the present. The work is a complex mediation on the material world we live in and the meaning we ascribe to it.

Elizabeth Hart strikes a balance between science and superstition in her multicolor prints. The scientist has expertise, but not necessarily all of the answers. They may be found in the authority of folk remedies or faith healing. The need for balance was brought home when Hart's mother was in a major car accident. In *The Resurrection*, Hart interprets the medical technology that saved her mother. The multilayered screenprint also depicts the emotional bonds between family members. A winged female figure rises to the top of the composition, not as an angel but as a moth seeking the light, or a human in a near-death experience. Medical diagrams of the internal organs of the body counter the spirit world. These physical and spiritual symbols rise above images of root vegetables, seen in cutaway views growing in the ground. The roots are a visual metaphor for the familial connection between a mother and daughter. The imagery is layered like floating bits of information and emotion in a collaged landscape. They interconnect to tell the whole story. *The Healing Machine* series of woodcuts is about the intersection between the rules of science and home remedies. She seeks to correlate the emotional and intuitive side of human nature with the scientific and rational side. We see the overlap in the images of strange gadgets, such as a gizmo wrapped in tinfoil to gather energy rays. There is an antiquated look to the work that stems from Hart's interests in old woodcuts and outdated science books from the 1950s. The work conveys a sense of bogus science, a fascination with quaint ideas that have proven false but continue to resonate beyond the limits of exact science.

Thomas Allen also turns to old science books as a source, not for the images but for the stories inherent in them. Science in these books is used to explain the natural events that once were the domain of creation myths. The cultural stories are also woven into children's science books, and Allen's attention to science began with those childhood tales and a home chemistry set. Mixing colored chemicals in test tubes, Allen was more interested in the surprising results than in demonstrating principles. He works in the darkroom the same way, experimenting with selenium toned papers, various developers, fogging and negative manipulation to get the desired effects. The photographs have a deceptively simple appearance that are a reminder of the models used to teach children the concepts of science. In *The Earth Is...* a book is opened to a page picturing the planet earth; a spiral of turned pages curl under the open page, literally depicting orbital rings around a center nucleus. Shadows cut the orbit into night and day, demonstrating the effect of light and the revolution of the planet. The paper spiral sits atop the flattened book; it can be seen as a pedagogical device to explain the difference between a flat world concept and a round one. Once the round world is established, the rings might be

seen as the expanding edge of the universe, our knowledge expanding along with it. Allen's darkroom philosophy is similar: We can't know everything ahead of time, we need time to discover. He is a tinkerer who maintains a sense of wonder both in the process and the results.

The foundation for David Goldes' large black and white photographs was laid in his childhood curiosity about natural phenomena. His work reflects an adult's view of a child's wondering. Goldes followed this interest in science all the way through a master's degree in molecular genetics from Harvard University. Working as a molecular biologist at the Medical School by day, he took photography classes at the Boston Museum School at night. He discovered that the academic approach to science gave him more information than he really wanted. The answers curbed his curiosity and did not leave enough room for his own questions. The triptych, from the *Waves, Particles, Etc. Series*, shows his need to set up problems and find solutions. When Goldes stages "natural events" with light and water in the studio, it is akin to the home scientist mixing potions to see what magic they will make. In all three images- *Cone of Light*, *Radiating Bulb*, and *Magnifying Glass*, light falls over surfaces in darkened rooms; smoke transforms the beam of light into a radiant object; shadows and reflections interrupt the experiment taking place. Scratches on painted glass act as reverse lenses while a magnifying glass focuses a light beam and alters its form. Unexpected projections spill into the void, becoming new evidence that alters the original hypothesis. The deep, rich black of the photographs draws us into the hushed stillness of these very active spaces. The light is no longer just illumination, but a symbol of knowledge and information. Beyond a simple demonstration of cause and effect, the work is about the paradigm between theory and perception, what we think we know and what we can only guess at. As Goldes put it, "Each generation approaches physical phenomena in the world, and tries to explain it with the information of that age. Our wager in life is how to bridge the physical and the informational. How do we keep track of our own biology and our perception of things which are not in the intellect?"<sup>iii</sup> The work is a series of quiet questions and mutable answers, shifting through light and over time.

In his video installations and sculptures, Robert Lawrence scrutinizes genetic engineering to ask pointed questions about knowledge, value systems and biological destiny. Reflecting a background in humanities, he positions his work to study the effects of technological advancement on humankind. Where the scientist has to prove one hypothesis, Lawrence uses research and hypotheses to broaden the field of study. Current discoveries in genetic engineering reach beyond the laboratory into the grocery store, the operating room and the womb. In the installation *Post-Synthetic Prototype A: Brighter Bodily Fluids*, Lawrence presents an experimental science station that implies the alteration of a life form is taking place before our eyes. A video monitor pulses with the heartbeat of pumping blood; a rope and pulley is the low-tech circulatory system that connects the life source with the energy source. An electrically wired sheet of copper charges a field of seed corn. The mechanical, the electrical and the biological have become one continuous system. The unbroken circuitry indicates a transformation that at first glance is familiar, but in truth masks a stranger. The corn has transformed into a mysteriously altered substance. Seed corn, used in both food products and industrialized goods, is a recurrent material in Lawrence's work. It acts as a metaphorical warning: after thousands of years of selective breeding, all corn is domesticated and cannot survive in the wild. While some changes in nature may take millennia to occur, with

genetic engineering natural processes and forms can be altered with a cut and paste computer program. Lawrence makes us aware of this easily missed occurrence. An additional series of small lab experiments/sculptures with fluids and corn are included in the exhibition. Attached to each is a *Recommended Procedure*, a written directive that turns the issues back to the viewer. The application of this technology brings up many new questions, affecting who we are, what we might become, and why we value what we do. Lawrence implies that passive acceptance of these rapid technological changes makes each one of us part of the lab experiment. The work invites us to take notice before an unalterable transformation has taken place.

The ceramic sculptures of Elizabeth Crawford are testimonies to another kind of change. Crawford uses geology as a metaphor for both human and environmental transformations. The spheroid rock forms stand mute until, like paleontologists, we split them and discover the hidden fossils. They reveal a record of human activity and proof of its existence. *Fossil: form* is a large white egg of clay that opens to life-sized hands forming the volume in the lower half. The fingers appear as rock formations that have been smoothed by water, wind and sand. The sharp points have eroded away, just as time, experience and relationships impact human geology. The top half is hollowed out in the exact negative shape of the hands. It is as if this clay geode were formed from the inside out; we crack it open to discover its secret. Crawford began the body of work during a five-week wilderness camping trip to New Mexico. She found clay deposits on site, and did a firing every other day. The resulting smaller pieces are so true to their material starting place that it is easy to forget that these are constructions and not found rocks. When opened, many of the flatter planes have photographs formed over the surface with Liquid Light emulsion. One has a photograph of a trilobite fossil; on the opposite side is a photograph of a mouth. The lines and forms mirror each other, with the protrusions of the trilobite's exoskeleton echoing the slight opening of the human mouth. In another, layers of imagery are equated with the strata of rocks, complete with the folds and uplifts in geological structure. A topographical view of the rock gives way to an image of a woman in the distance, picking up what looks like the same rock. Crawford asks herself the question, "What am I excavating?" and her own response is, "The enormity of change." The landscape may be larger than human scale, but these fossils provide small-scale evidence of the huge process of personal and environmental change happening around us all the time.

Artists and scientists respond not only to change, they are crucial to making it happen. Questions that incite change, whether they are formed in the studio or laboratory, take an active imagination and the willingness to follow the queries into unknown territories. As Daniel Kelm wrote, "To imagine something is to create a world, to open to new potential, to set the stage for a leap of faith." The search may lead to an answer or conjure up a new set of questions. The artists in this exhibition examine issues and problems through their imaginations, research and art making. The results of their work are the perfect blend of art and science: creative solutions.

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<sup>i</sup> Medawar, Sir. Peter B., *Advice to a Young Scientist* (Harper and Row, New York, 1979)

<sup>ii</sup> Kelm, Daniel E., "Prolegomena to any Future Discussion of My Bookwork," (*Abracadabra*, Journal of the Alliance for Contemporary Book Arts, Los Angeles, CA. Spring 1995)

<sup>iii</sup> Goldes, David. From an interview by Karen Wirth, November 12, 1995