Late Holocene Period,
.04 Years

Two Years

MFA Thesis,
Electronic Integrated Arts

Woody Packard

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It's a cool windy day and I am running along Rt. 21 at what comes closest to rush hour in this little community, 5:30 in the afternoon. A quarter mile up the road is the high school, and across the road from it dart two dogs, narrowly missed by cars that travel by at forty-five miles per hour. A few seconds later they cross the road again, and again they avoid being hit. Two cars pull into the high school entrance, two women get out of the cars, and although they are too far away for me to hear anything but wind and traffic, I can see that they are trying their best to round up the loose dogs. I am bracing myself for the worst, for it seems there is little I can do to help the dogs, still being a quarter mile away and having no way to communicate with the women trying to catch them. But several hundred yards behind me I remember a man standing in his back yard, facing away from the road, shouting something which I could not understand. He could neither hear nor see the two women, who by now had collared the dogs and looked like they were trying to figure out what to do with them next. They could neither hear nor see the man in his back yard. I turned around and caught his attention, then yelled to ask if he was looking for his dogs, letting him know what I had just seen. He waved and moved toward his garage, and I turned back up the road to tell the women that the owner was on the way.

Active observation links information from the past with the unfolding present to allow us to draw new conclusions about our surroundings. Sometimes fitting the pieces together is easy and simply requires an observer in the right place at the right time to connect what seem like unrelated facts. Sometimes the process is deliberate and deductive, as in much of science. Often the links are not so obvious and become apparent only on a subliminal or intuitive level, requiring time and effort to draw out and articulate.

This is work in the practice of active observation that uses media recording to help in the perception of and sensitivity to time by allowing direct comparison—of change, of speed, of motion, from one season to the next, or in the discrepancy between a few video frames. I have been particularly interested in the means for understanding geological time by watching small details in my immediate environment. This work is a sample of the record I have made over the past year, presented in a way that I hope helps convey what I have learned by looking and thinking about the material. Some of what I have learned has been the process of learning a new vocabulary in a new language, for over the course of the year I have felt a vague hunch and some rough beginnings turn into a body of work, uncertain at times and exciting at others. Some of what I have learned has been about the subject of my images—land, moving water, rock that contains fossils. Some of what I have learned is the bigger story that these images represent, and why some images support that story and some don't.

Finally, some of what I have learned is technical—how to produce the imagery and sound, and which combination of medium and form proves successful in conveying certain kinds of information.

Along with looking at landscape over the progress of a year, in both still images and video, I have worked on several video pieces that concern memory, time's faint shadow left on the mind. Because I am working with recorded media, I can only look at the things that I am able to put in front of my camera. And because I am only able to make an observation on one subject at a time, I can only speak about that one instance with that one work. As a practical and logical matter, I cannot claim these to be universally representative, nor am I very interested in doing so. For the most part, I am interested in detail and peculiarity. The best I have been able to do is to say that these are observations on the way these things seem to me, even if they are not how things actually are.

The Questions We Ask

Alan Lightman, distinguished physicist and novelist, has remarked that the main difference between art and science is the kinds of questions that artists and scientists are interested in. He notes that science requires questions that can be proven true or false, while art does not seek that kind of proof. For Lightman, art requires emotional truth, a sense that what is told would be right under the particular circumstances. (Lightman 2009) In *Einstein's Dreams* he lays out thirty fictional scenarios that portray the consequences of time taking another form or obeying other principles than those we know. (Lightman 1993) Each story is consistent in itself, but each lacks a basis in either previous experience or the mathematical calculations on which Einstein based his theory of special relativity. Intriguing as each story is, the point made is that each dream was discarded in favor of the equally non-intuitive notion that light travels at the same speed relative to any observer, regardless of *their* speed. In this one case, Einstein was able to imagine the set of circumstances that allowed its possibility. In a sense, relativity was Einstein's myth to explain the contradictions that arise from putting different parts of what was accepted knowledge together and following the logical consequences of where the results fail to mesh. Only later was his theory proven true by observation.

With *Einstein's Dreams*, Lightman is not explaining relativity. He is telling us how it is possible for Einstein to have imagined relativity, and that it was as much a creation of the mind as the other thirty unprovable stories. Unlike these fictions, there

was something behind relativity that Einstein could sense even before the theory was complete or the experimental evidence was in. By framing the publication of his theory in the context of these dreams Lightman is giving us a feel for the process that begins with intuition and ends with articulation. Key to that process is the time it takes for even brilliant minds to process information.

Recorded observation yields many discoveries, and among them is the ability to detect small change over time. Much of the work for this thesis concerns a recognition of "deep time"[1] that comes from the observations of the incremental change that has happened in the formation and rearrangement of rock, earth's original recording medium, as it has been moved around on the earth's surface. Just as Lightman's stories do not explain relativity, this work does not explain deep time, but it does take a look at how we are likely to get a sense of it. Although there is imagery of rocks and the use of words that refer to geological eras, this is not an explanation of geology or of the scientific notion of deep time. Some of it is an explanation of what it is like to be out in the world experiencing the evidence that can give you that sense. Some of it focuses on the type and scale of time to which we humans are the most sensitive. Some of it takes advantage of the foibles and inaccuracies of my own observation technique, revealing unintentionally small bits of emotional truth. All use small, local, idiosyncratic events and places to help assemble a sense of a larger whole that confirms on an emotional level what has been shown factually by observation, experimentation, and calculation.

In the end, I hope to give a sense of the power that time has to multiply the effect of small events and the power that media has in recording those events for later comparison. I hope as well to draw your attention to what is quite literally under your feet.

1 Siegfried Zielinski, author of *Deep Time of the Media* and one of this year's Gertz lecturers at Alfred University, credits John McPhee in *Basin and Range* for this term (McPhee,) (Zielinski, 5)

Closest To Home

Trust in observable events and an understanding of long periods of time finds its way into many current areas of discourse. Although the original suspicion that the earth was very old came from evidence that was seen with the eyes, that suspicion has been confirmed by an array of methods and instruments, from several radioactive dating techniques to measures of the rate of coral growth in ancient fossils, all of which approach an age for the earth very close to 4.56 billion years. This contradicts the historic interpretation of the teaching of several major religions' most revered writings, as well as the fundamentalist adherents to that teaching who sometimes place the age of the earth at six- or even four-thousand years. This issue alone is responsible for much of the publicly perceived rift between science and fundamentalist practitioners, and is at the very heart of the controversy over the teaching of evolution in public schools. Since long periods of time are required for species to go through the process of mutation and natural selection, the existence of evolution disproves the literal interpretation of the Bible's creation story. This, in turn, leads to a larger cultural controversy which can be summed up with the questions: Do you accept the evidence of observation, or do you accept traditional beliefs that are handed down in written and oral form? Do you value skepticism and rigorous standards of proof or do you value faith in what cannot be seen?

Doubting Thomas
—Mark Tansey

The answers to these questions act as a litmus test for attitudes toward other issues. If our view of time spans only a few hundred human generations it is hard to view environmental change for what it is—the sum of small individual actions multiplied by the leverage of time and population growth. Without a trust in objective observation or an imagination for the process of geology and evolution it is hard to have a sense of proportion for the impact of very recent human activity. Other beliefs, such as cyclical time or the end of the world with Armageddon, act to render as irrelevant the goals of environmental conservation and sustainability.

The practice of observation requires us to look outward, but in many ways the trend is just the opposite. In *Life on the Screen,* an account written in 1995, Sherry Turkle studies a generation of children (and adults) who have grown up in internet chat rooms. (Turkle, 177) This group develops their entire identity (or in many cases, identit*ies*) online by adopting the persona of their choosing, interacting with others who are doing the same, and quite often having severe difficulties dealing with the offline version of themselves. Fourteen years later there is instant messaging, social

networking, text messaging, internet gaming, Second Life, and twitter. At a time when we are facing some of the most difficult environmental issues we have ever faced it seems that for an increasing number of us our interest lies somewhere else, both inward and away from the evidence that can be seen in the physical world.

In *Landscape and Memory* Simon Schama explores the connection that various cultures have had with their native landscape, trying to describe "…a way of looking; of rediscovering what we already have, but which somehow eludes our recognition and appreciation. Instead of being another explanation of what we have lost, it is an explanation of what we may yet find." (Schama, 14) My sense as I write this in 2009 is that the connection most Americans have with the landscape around them has become slight, especially when compared to the connection of previous generations. Suburbanization and a culture of global media have homogenized our sensibilities and focused them both inward and away, so that our awareness of the landscape comes more from second-hand familiarity with our national park icons than it does from first-hand observation of local geographic details. Even basic map reading skills are being replaced with instructions from the calm voice of a global positioning system.

Identity is not the only casualty in the age of electronic connectedness. It seems almost too obvious to mention, but the practice of observation requires time and concentration, both of which seem hard to come by unless your practice includes a way to build these in to your schedule. It also requires that you be near something that you can consider to be interesting. One method I use to find all of these things is to move away from the car, the phone, and the computer under my own power.

All but two of these observations were found traveling on foot, either walking, running, or skiing. (My neighbor walked to my house for the recording of *Binocular Vision*; I drove my car into my back yard for *My Eclipse* so I would have a way to keep camera and laptop charged.) Like certain types of mental processing, travelling by foot takes time. This could be seen as a disadvantage, but for me this time is its primary advantage. I still drive a car when needing to cover distance quickly, but I travel by foot when I want to look closely. Especially when I want to look closely at landscape. When you travel by foot you are never moving too fast to stop, back up, or get down on your hands and knees, giving you the time you need to see detail, make connections, and to think. At the same time, and especially when you are

doing it in large doses, it is an effective way to get a gut sense of how to make large accomplishments with, literally, small steps.

Foot travel requires time, which you must make by giving up some other activity. It is an act of rebellion against a sense that time is not your own, a deliberate choice to move at your own pace. Once that decision has been made, it requires little investment in thought, though it often pays a good dividend. There are things that I think of while running or walking that never occur to me when I am sitting in front of a computer monitor wiggling my fingers.

Despite the pull of technology, I am still interested in what is happening in my back yard, and when I'm in Alfred, in the hills beyond. Over the years I have been looking closely and recording what I find, my perspective on what I have been doing has changed. While I once thought of myself as being an observer of the ordinary, more and more it seems as though I am a foreign correspondent, bringing back reports from places that are rarely visited. When asked in an interview why he continued to explore the substitution of symbols and objects in his paintings Jasper Johns noted:

> Well perhaps because it interests me I think of it as a complex subject. In part it connects with Duchamp's idea that an artist has only a few ideas and … he's probably right … one's range is limited by one's interests and imagination and by one's passion … but without regard for limitations of that kind, I like to repeat an image in another medium to observe the play between the two: the image and the medium. (Francis, 8)

Like Johns, I think of my interest in landscape as a complex subject, a mix of things living and long dead, preserved by the process that formed the ground we walk on, changing constantly at a rate we are forced to slow down for to notice. It is the blank canvas for the activity of our species, sometimes holding the mark of that activity for only a few generations before gradually pulling it back and covering it with the slow processes that continue without our notice. Committed as I was to year-long relationships with these sites, I realized at the end that the sites that interested me most were the ones that revealed the effects of human activity on the land.

On Observation

Recently I was talking with a colleague about some of the past year's work. In looking at a series of landscapes done over the course of the previous nine months he remarked that, having seen them in a different form earlier, he did not think they were nearly as interesting as they are now. I reminded him that the point of the series was to show the same view over a period of time, to show the process of change through weather, light, and the seasons. He nodded at me, as though waiting for me to finish the thought, and as if it were not clear why that would matter. I hesitated, then pointed out that the only way to show a year's worth of change is to spend a year documenting that spot, and that two months into that process there would not be much to show. I could see a light bulb go on, along with a bit of embarrassment. In a time of instant replays, computer simulation, and time-shifted media, it is easy to forget what it takes to show the passage of time with recorded media, and just as easy to overlook our interest in looking at the passage of time which we cannot personally experience—either because we were not in the right place to experience it or because we cannot go back to the time when that event occurred.

Whether it is a before-and-after the haircut picture or a photograph of your father as a child, there are many recorded images that time makes interesting or important. Recorded observations of change serve many purposes, from scientific documentation to historic reference. Regardless of this purpose they all satisfy our interest in seeing the effects of time.

Observation

> The time honoured topic, 'Is photography art?' misses the whole point of photography. One might equally ask, 'Is writing literature?' Photography now has such wide applications that it offers major contributions both to science and art.[1]

As much as any others I can think of, two traits mark the difference between ancient societies and our own science-and-technologically-based society. The first is a trust

1 This is a quote from an article that I read in 1977. I do not have the source for it, but at the time I realized that it was as good of an explanation as I had seen, so I copied (literally, onto 4x5 film) the extended quote from which this comes. I am taking the liberty of extending the meaning of *photography* here, and asking readers to include film and video too.

in observation as the primary means for confirming facts, as opposed to the acceptance of traditional beliefs and faith in inherited wisdom or religious belief. The second is a sense of time in the geological sense, where beliefs about the age of the earth are not hinged on an easily imagined multiple of our own life spans.

As a photographer for thirty-eight years, I happen to believe in seeing, the act of knowing the world by paying attention to the visual data around us and turning it into the evidence we use to form opinions. Although there are other ways to gather information, seeing is the most convincing for me. Formally, seeing is to "perceive with the eyes; discern visually… be or become aware of something from observation or from a written or other visual source …discern or deduce mentally after reflection or from information; understand" (Apple, listing for "see") Although it is not an infallible process, among the senses, sight is often considered to be the most trusted. The saying "seeing is believing" expresses this trust in the sense of sight. Science, "the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment" (Apple, Listing for "science") by being defined as depending on observation, relies on seeing for the basis of its credibility. In common speech we say "I see" to mean "I understand."

The word *observe* comes close in meaning to the word *see*, but with two differences. Unlike seeing, the definition of observe includes requirements for the attention or care when seeing, to take note of the substance of what is seen. It is possible to see something without taking note of it, so in this way observing is a more positive and active sense of seeing. The definition for observing can include the act of making known the substance of what is perceived. It is also easier to use "observe" when referring to information gained through the other senses, as when "John observed that it is colder this afternoon than it was this morning." John may have *seen* the temperature on a thermometer, heard the weather report on the radio, or simply felt the chill on his skin. Observations are now done using light from wavelengths that we cannot see, by radio waves, by listening under the surface of the ocean or to shock waves transmitted through rock. Not only do we use senses other than sight, but we use tools to extend and amplify these senses.

These senses, along with the help of magnification and amplification tools, are combined with our pre-existing knowledge to give us perception, the red meat of our observation. But perception itself comes in a round-about way, and it is not a "given" in our equation of what is true and what is not. Our senses are subject

to error, as when we are focused on what we are looking for and fail to see other important events.[2] (Noe) Just as important, our pre-existing knowledge can be either positive or negative in its influence. When we know much about a subject, this background information can cause us to discern differences and gradations that are not visible to those without experience. And while much is made of the value of "unbiased observation," observers who have no knowledge of the subject being observed can easily bring the wrong paradigm into play when they put the visible facts together with their existing knowledge. The other side of the coin is the fact that we are inclined to see what we expect to see, so that if we are experts and have a hypothesis that makes sense to us, our expectations are inclined to be the first explanation that we see. There is such self-consciousness about the potential for bias being introduced by observers that the form of the word used as a noun, observer, is often coupled with the word "just," to try in advance to dispel the notion that an observer had an influence on what took place. More often than not, it is better to acknowledge subjectivity and present the data for substantiation by others than to deny that subjectivity, as is done in many common situations.

This subjectivity in perception is often seen as a reason for the distrust of science, but it is really just one of science's challenges. Biases and human error are part of the process, "givens" that must be accommodated by other methodology because we simply have no other way of knowing factual things about nature. Science does use epistemological checks and balances to help ensure that scientists draw the correct conclusions from their observations. In science there are procedures used to design experiments that guard against bias or the introduction of false data. There are accepted standards of repeatability, and a system for the publication of methods and results that is open to public scrutiny before the conclusions drawn from experiments are accepted by the scientific community. Although there are cases of scientific fraud as well as cases where observers have simply been mistaken, to say that something is proven scientifically is to say that it can be seen, repeatedly, by anyone. But it is in defense of the possibility of this kind of bias that science is usually described and thought of as being deductive and reductionist, pruning essential facts and testing them, working from general observations and breaking them down

2 Alva Noe showed a video clip of people passing a ball back and forth and instructed the audience to keep an eye on the person with the ball. Practically everyone followed the ball as instructed, but nobody noticed the gorilla that walked through the background, right behind all of the other activity.

into small testable pieces to determine universal principles. In this way, science has made enormous discoveries and been able to tackle huge challenges. This part of science, what we learned in high school as the scientific method, relies on a hypothesis, a design for a falsifiable experiment, and careful "observations" or experiments, reporting of the results to either prove or disprove the hypothesis. This kind of observation is focused, defined and purposeful, and no doubt unfairly contributes much to science's reputation as a dry pursuit.

Observation and Memory

Once perceived, observations face the hurdle of memory. Stephen Jay Gould describes a trip he made to Queens to look for a spot that he had fond recollections of as a child. He remembered it as being a set of stairs with rusty handrails where he and his grandfather would stop and chat when he was a boy of about five. In his memory he could see the stairs to a side entrance of Forest Hills tennis stadium, where his grandfather would lay a piece of newspaper to keep his suit from getting dirty. On his return trip many years later he found the stairs, recognizing the view from where they used to sit. Behind the stairs was not the world-famous tennis stadium as he remembered, but the abandoned site of *Muller Bros. Moving & Storage*. Gould explains that he must have combined two childhood memories into one. He notes:

> Primates are visual animals par excellence, and we therefore grant special status to personal observation, to being there and seeing directly. But all sights must be registered in the brain and stored somehow in its intricate memory. And the human mind is both the greatest marvel of nature and the most perverse of all tricksters… (Gould, *Eight Little Piggies* 200)

Gould's anecdote illustrates what has been shown many times experimentally, that memory is malleable and subject to the influences of suggestion, distraction, and time.

Recording Observations

Both of these problems—subjective bias and memory fallibility—are lessened by the act of recording our observations. Even in its simplest form, the recording of observation is one of the distinguishing human characteristics separating us from

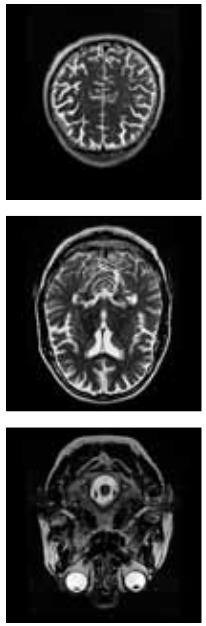
our nearest evolutionary relatives.

Historically, observations were recorded by writing down or drawing what was first seen, as Galileo noted the red spot on Jupiter with drawings in his notebooks. A written record allows us to check our own work, to take another look, to verify what might have been a quick judgement. It allows us to share our observations with others, and to have them check our work to see if it agrees with what they see when they look at the same subject. But even carefully written or drawn records have their limitations.

There is a fascinating set of astronomical illustrations showing four views of the Orion nebula at three different points in history. The first two are drawings, one by John Herschel in the 1830s, the other by William Parsons roughly ten years later. These are followed by two photographs, both made in 1979, one a black and white image made up of a single three minute exposure and the other a color image made of three one-minute exposures. Whether drawn or photographed, they each show a different aspect of the nebula and reveal the subjective nature of observation. In particular, the differences between the drawings are noticeable for the differences attributable not only to the technical superiority of later telescopes but to the drawing style of the observers. Even more remarkable are the similarities, given the difficulties that they faced:

> Though the Orion nebula is among the brightest in the sky, it is still intrinsically faint. Even moonlight renders it invisible. The nebula could thus only be seen by the dark-adapted eye, and the act of lighting a candle to transfer the visual memory to paper destroyed that adaptation for many minutes. The drawing and telescope image could therefore never be directly compared, unlike drawings made from microscopes, for example. This makes these images an interesting study in the subjective nature of the link between eye, memory, and sketch pad: despite both astronomers' determination to make a completely objective record, their results differ radically. (Malin, viii)

Within a few decades these observations, along with others, would be made and then recorded with a camera onto a progression of improvements in light sensitive emulsions, reducing the variation due to the scientist's style and skill as an illustrator. In looking at the two photographs of the same nebula taken in the same year at the



Stills frames from *MRI*

same observatory, it is clear that there are still creative and aesthetic decisions to be made, even in "objective" observation. It is also clear that science owes a great debt to media's ability to record our observations as we see them.[3]

Today that order—see and then record—is often reversed as we look at the recorded images of a universe first seen by satellite, at cellular structure first seen by the action of focused electrons on a sensitive emulsion. Science uses highly technological means of both "seeing" and recording to capture data that can later be interpreted. Sometimes this is simply a matter of magnification, as with the electron microscope or the Hubbel space telescope. Sometimes we are able to look at things that are simply not available to the eye, as with an MRI image of the brain or infrared images from space showing chlorophyll distribution across the earth's surface. In these cases, we "see" what has already been recorded. That data is then translated into a two dimensional visual space so we can look at it as an image that we can interpret. Our observations come from reporting back our perceptions of this recorded data, not the invisible original event.

Malin notes some of the other links that connect the sciences and the arts, among them the need that science has to present imagery that is attractive to aspiring young students and other sectors of the lay public. (Malin, x-xi) He does not note the many ways in which artists have now become dependent on science for its imaging, recording, computing, and networking technology.

Inductive Consilience

Gould describes another way to go about the problem of drawing conclusions about the natural world. In *The Hedgehog, The Fox, and the Magister's Pox* he writes about the process of inductive reasoning in science in an essay rebutting an opinion expressed in Edward O. Wilson's book titled *Consilience*. The word *consilience* was coined by William Whewell (who also coined the word "scientist" to describe a practitioner of science) in his 1837 *History of the Inductive Sciences* to describe the process of observing many seemingly unrelated facts that eventually, because of the connections made in the mind of the scientist, "jump together" to form a unifying explanation. The best example of this process is the jumping together of the many observations of Charles Darwin to form a theory of evolution. (Gould, *The Hedgehog,* 211) Gould's objection to Wilson's use of the word arises from Wilson's desire to

3 This account comes from an exhibition catalog of photography that crosses between the domains of art and science.

understand the humanities and religion with the methods of science, a method that Gould feels is not only inadequate for the task but that misses the whole difference and value in other (non-scientific) ways of thinking about human experience.

It is easy to see science as the reductionist process that is taught to us in grade school. It is much harder to acknowledge the very creative "jumping together" that needs to happen for progress to be made in the messier branches of science such as biology, psychology, or the messiest, sociology and economics. Here science comes closest to resembling the process undertaken when making the complicated links that are made in history, literature, and art. As in those domains, the case is made for the value of observation, in the active sense of the word, regardless of whether it fits into a tidy controlled experiment. Observation is the raw material for this inductive consilience, and without those observations there can be no "jumping together."

Observing Time

The second characteristic separating a scientific culture from a belief-based culture is an imagination for and an acceptance of astronomically-scaled time. Both of these come together in the understanding of geological time and its biological consequence, evolution. Geological time is the prerequisite for Darwinian evolution, for the changes that are ascribed to natural selection can only take place over enormous periods. For those fundamentalist creationists who oppose the teaching of evolution, the discrediting of geological time is the crucial step in overthrowing the solidity of evolution.

> Taken literally, the biblical measures of time were the day and the generation—time reckoned in millions and billions of years was unthinkable, because Scripture, it was then thought, proved it so. Not until the Enlightenment did observation and secular reasoning become widely accepted as an alternative to the Christian interpretation of nature, and modern science was born. But the habits of centuries were difficult to overcome. The process was slow and required difficult and fundamental shifts in both scientific and theological thought. Thus, the increase in the estimates of the age of the Earth represents the gradual liberation of concepts of geological time from the artificial limits imposed by the length of a human lifetime. (Dalrymple, 18)

Even without introducing the motivations of creationists, the perception of deep time is difficult. We seem to lack a convenient or inherent way to cope with explanations on a geological time scale. To begin with, there is not even a convincing agreement about how we perceive time in the ordinary scale of everyday events. Various views have it that we perceive time through a sense we have of simultaneity, through a memory association with other past events, from the comparison of short term memory with in-the-moment perception. One explanation is that we are genetically selected for dealing with the present:

> Now we are fortunate in that, although we only perceive the past it is, in most cases, the very recent past, since the transmission of light and sound, though finite, is extremely rapid. Moreover, although things change, they do so, again in most cases, at a rate that is vastly slower than the rate at which information from external objects travels to us. So when we form beliefs about what is going on in the world, they are largely accurate ones. … But, incoming information having been registered, it needs to move into the memory to make way for more up to date information. For, although things may change slowly relative to the speed of light or of sound, they do change, and we cannot afford to be simultaneously processing conflicting information. So our effectiveness as agents depends on our not continuing to experience a transient state of affairs (rather in the manner of a slow motion film) once information from it has been absorbed. Evolution has ensured that we do not experience anything other than the very recent past (except when we are looking at the heavens). (Lepoidevin, 1)

Geological time, measured in millions and billions of years, presents the added problem of imagining numbers that cannot be conceived of visually. Scientists routinely use numbers that are either extremely large or small, and they have developed a system of language to deal with these numbers in an abstract way. The stated reason for using scientific notation is to ease the burden of calculations made with such large or small numbers. But by abstracting these quantities and avoiding the need to visualize them, relying instead on their representation in scientific notation, scientists deal routinely with what many of us attempt to deal with by visualization. (Paulos, 218)

It seems that we have several different ways to measure time, and some of those ways depend heavily on our own memories, accurate or not, relatively ordered by sequence or noted by closeness to related events, keyed to places on the calendar or on the map. Knowing time that we have not personally experienced requires a logical leap that is made through observation, either made personally or passed through some kind of record. Geology is the study of those observations that reflect change over grand expanses of time. Most of geology's record is left in rock that is deposited, formed, and eroded over these unimaginably long periods. Paleontology's record consists of the fossils embedded in the more recent layers of the geological record. History is reliant on the cultural record, from books and papers to art and architecture. None of these examples bypass the difficulty of comprehending time. They only point to our next best option. Rather than sensing time itself, we are left to know the changes brought on by time's passage. At all time scales, and even time scales that fit well within the human lifespan, there is no substitute for recorded media to show change over time.

Observing Change Over Time

An article in the *New York Times* notes current relevance to global climate change of the observations made at Walden Pond by Henry David Thoreau starting in 1851. (Dean) The article explains how Thoreau's notes and observations, made for the purpose of publishing a book about his experience living in the woods, are now being put to use by climate scientists. Those notes contain detailed, dated observations on weather conditions, the appearance of leaves and blossoms in the spring, and other markers of annual seasonal progress, all of which can be compared to conditions today. Although many of these statistics can be obtained for later dates, there was no organized record-keeping for weather data in 1850. In the same story were a pair of photographs taken from the same angle in a cemetery, both on Memorial Day. The first, taken in 1868, shows trees with branches that are completely bare; the second, in 2005, show trees and bushes that are in full leaf.

Because we cannot see into the future, all observations of an expanse of time start with the uncertainty of the outcome. It may be possible that not much happens. It may be possible that the piece of the earth you are documenting drops into the Pacific Ocean. In my case, I had the possibility that the piece of Canacadea Creek that I was working on would be flooded by beavers. At about the time the beavers disappeared, new owners of the land cut a road next to the

creek with their bulldozer. Like much change, it was not something that could have been predicted. As with the jumping together of ideas that come from a variety of observations, one must make the observations in the spirit of trust that something interesting will come out of it. You cannot know what it will be.

Media and Structure

Media gives structure to observation, both from the rigor of recording onto a chosen medium as well as the intention that goes into the editing, storage and presentation of that recording. The intention of the presentation will determine its structure and the structure will limit or enhance the kind of meaning taken from the presentation. The same information can be presented with different structures to produce an entirely different meaning.

Because we have such a good sense of this intuitively, it seems almost too obvious to note, but the effectiveness of a presentation structure depends on an acknowledgement of the unreliability of memory and attention, either taking advantage of that unreliability or compensating for it. Mystery in cinema and magic on stage, two examples of the intention to conceal most of the whole truth, depend on this unreliability for their effect, along with the withholding of information, deliberate distraction, and allowing the viewer's mind to fill in the missing detail with logical but incorrect assumptions. When the intent is to reveal, the choice of structure depends on the aspect of the subject to be shown. Identifying that aspect will lead to the most effective presentation, for there is no substitute for direct comparison.

Astronomers assume that bodies which are very far away have an angular motion that is very slow, and that if they can detect motion in a star it is relatively close to us. They discover motion by making two exposures of a piece of sky at different times and layer one exposure on top of the other in register. The stars that are close are the ones that have moved from one exposure to the next. It is the direct comparison and the fact that everything else remains still that makes this needle-in-a-haystack kind of discovery possible.

Canacadea Creek
A year-long series. Printed together, you can make a direct comparison, one frame to the next. When the images are continued to the next page the sequence of incremental change is disrupted and

direct comparison is impossible. You must rely on memory to pick up where the continuous series of images leaves off to notice a road has been cut along the bank of the stream.

Science and Art

"It is an article of faith, among artists and scientists alike, that at some deep level their disciplines share a common ground" claim David Bayles and Ted Orland, the authors of *Art & Fear*. They describe that ground as being the gut sense of both scientists and artists that the world is inherently orderly. Maybe this is so, maybe not, but they are more convincing when they talk about the differences between the two domains, which, like Alan Lightman, they describe as being in the actual interest or the purpose of each domain's observations. Both science and art begin and base their work with observation, in the difficult and active sense of the word. The difference is in what is made of these observations. Bales states the "dry" opinion of science in claiming that scientists hope to find regular repeatable patterns that can be used to extract hypotheses, theories, and laws, while artists are more interested in the exceptions, nature's oddities, and the non-repeatable and non-provable aspects of our experience.

> While the scientist asks what equation would best describe the trajectory of an airborne rock, the artist asks what it would be like to throw one…The truths of life as we experience them—and as art expresses them—include random and distracting influences as essential parts of their nature. Theoretical rocks are the province of science; particular rocks are the province of art. (Bayles 104-5)

I am not as comfortable as Bayles is in mapping out the boundary between science and art. It is enough for me to acknowledge that there is a boundary and that there are differences between art and science (as there are between religion and science) that cannot be compromised because of the very nature of the two practices. I like the idea of appreciating differences much better than attempting to show similarity, and here is where Bayles' mapping scheme is useful. With theoretical rocks defined by science, it seems to me that it is only by additional observation that the artist distinguishes one rock from another, chooses one rock over another, and eventually devotes time and energy rendering one rock over another. This selective judgement seems to come unavoidably close to the issue of beauty, and hints at a practical definition that avoids many other arguable and slippery attempts. The rocks that are interesting, that you want to

spend time with, that you want to show to someone else, are beautiful.

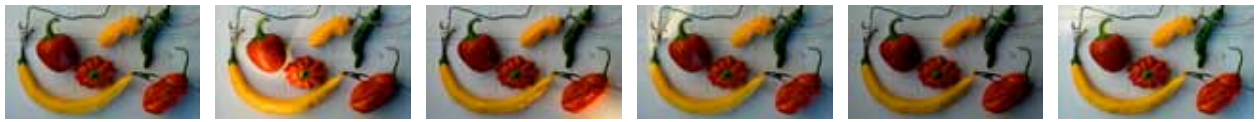
> It is true that art and science have diverged and now seem to lead separate lives. But as the links between them grow ever stronger, the once-empty middle ground is filling with people who recognize that science has much to contribute to the world of the artist and that aesthetic sensibilities are vital in creating and comprehending images from science.
> —Dr. David Malin (Malin xi)

Breaking Ground

A master's thesis does not hatch from an egg. It comes from a lot of stretching and groaning that is caused by learning new tools and languages. Here are a few notes on projects that have brought me from my first attempts to record video and sound.

Electric Peppers

This is a short animation that uses only light to create motion in the frame. Hot peppers, connected to wires in a nonsensical way, are lit from various directions with a small flashlight that pulses with the sound.

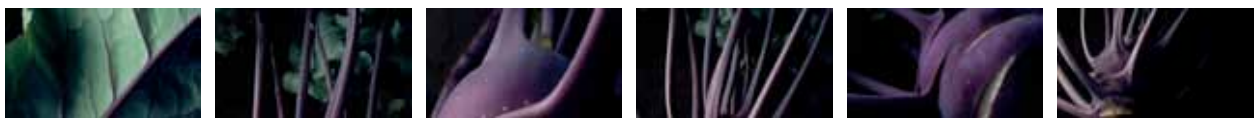


Daydream

A first attempt at the cinematic practice of time compression and an effort to see and record while moving—constantly.

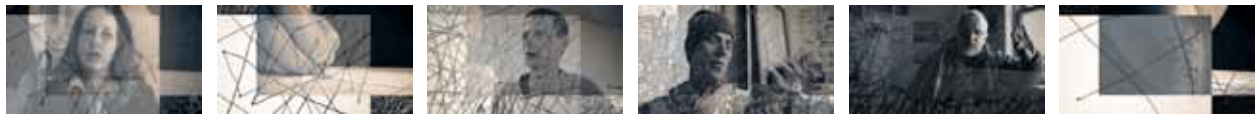
Brassica Oleacera (Party Cabbage)

Based on a ridiculous premise, that dinner noise could be mixed with very close footage of a kohl rabbi. This is one piece of video that time has made dear, for one of the friends' voices recorded here is no longer with us. She liked parties and she dressed in purple.



Line Drawing

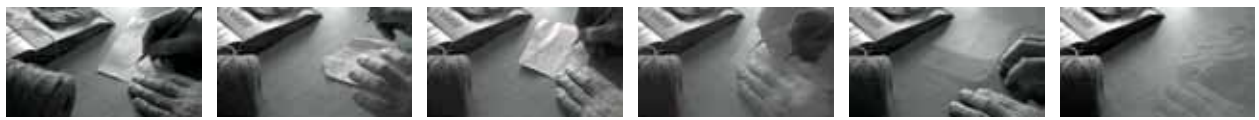
A series of interviews with artists about the practice of art, some hard lessons about sound recording were learned on this project. Another thing I learned is that there are a lot of different opinions about art.



Why I Am Late, *Storage*, and *Reminders* are a series concerned with memory and its loss, from the experience many of us have in setting things down and having them disappear within moments to dealing with real memory loss in family members. The truth is that people react differently to the experience, and their experience changes over time as the symptoms begin to interfere with their lives.

Why I Am Late

Reminders



Storage

The Cicada

A sound piece that uses text and video as narration, this operatic story is almost entirely true.

MRI

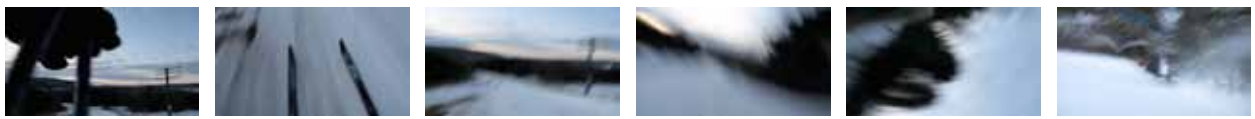
This simulation of an MRI scan of the brain experiments with the power of suggestion in the perception of time. A narrator warns us how long the sound that follows will last, suggesting anywhere between fifteen seconds up to nine minutes. Each loud banging sequence is exactly twenty seconds.

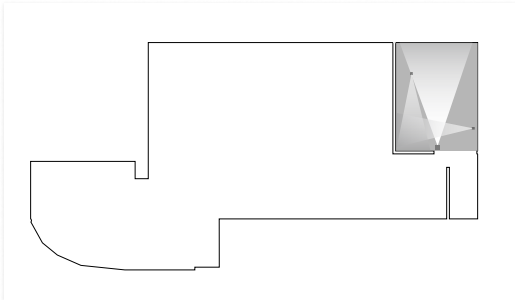
Commuter

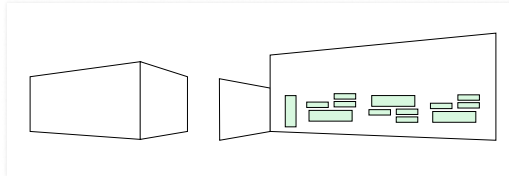
Made in an exchange program with students in the Central Academy of Fine Art in Beijing and shot by Bao Shi Hong, an ordinary commute from a Chinese perspective takes on a different feel when seen from the eyes of this foreign editor. Time pushes and pulls as attention focuses from one odd detail to another.

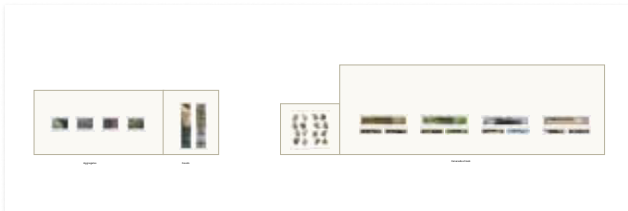
Downhill

The hazards and rewards of observation and media recording while you are also skiing down an icy road on a beautiful winter evening.









Thesis Work

I was warned by my advisors and I am old enough to know it for myself, but two years go by very quickly. I'm really not sure how it happened, but during that time it became clear which work was important to me and which work was not. In part it was because I have heard *so many* opinions about what I have been doing. In part it was because during that time I have had a chance to think about what I am interested in and about what makes sense to me, and to read (a small fraction of) the words of those who have ventured into similar terrain.

When it became time to know what this thesis show was about, I just knew. And like a jigsaw puzzle, the more pieces you put together, the easier it is to see how they fit and which pieces are still missing. While running, one week before starting to set up, I realized that the image that would be *Devonian Erosion, Angelica Creek* could offer one more comparison between human-scaled time and geological time. I had looked at that cut many times, and had shot it with my video "binocular pole cam," using the footage as the background in *Binocular Vision*. But now I saw it as a complement to the series of stream images that show one single year's erosion. The following day I shot the five pieces of *Devonian Erosion, Angelica Creek* as well as the last view of *Canacadea Creek 2008–2009*.

Time, useful for

so many things,

is necessary for

the incubation

of ideas and

the

connection

of

thoughts.

Annual Erosion, Canacadea Creek

Annual Erosion, Canacadea Creek
Canacadea Creek, 2008-2009

These are groups of images from a series of stitched panoramic views of one section of the stream that flows a mile upstream from the confluence of Canacadea Creek and Angelica Creek in Almond. The Canacadea snakes back and forth a few times before opening up to a quarter mile straightaway through the flat bottom of what is known as Whitney Valley. Over the course of the past two years I have gone there many times to see how the seasons are progressing, to look for fossils, or to sit and jot notes to myself. In March of 2008 I began to photograph from one spot on the bank of the stream, which I marked with a rock. I made five hand-held exposures which were originally intended for screen display across multiple computers.

Over time, the collection grew, the multiple computer application became obsolete after a system software upgrade, and I was left with a lot of still images that I did not know what to do with. At the same time a beaver began working just downstream of where I had marked my viewing spot and I imagined that the progression of the seasons that I started out with could get more interesting. It did, but not in a way I anticipated. While the beavers moved on to another location, someone began to clear the log pile, then began driving a truck along the stream. By the end of the summer there had been a bulldozer there to put in a smoother road, and more wood was taken out of the log pile. The rock I used to mark my spot was long gone, and I was not even sure where the original stream bank was. In February of 2009 the first of three floods came through and began to eat away at the remaining bank. By the time the third flood subsided all signs of the road were gone. Part of the channel had been re-routed around the log pile and the spot where I was photographing from was now well into the flow of stream, even at low water. In all, I have nearly forty views, some spaced a month apart and a few as close as a day or two together. Without setting out to do so, I have witnessed the changing of the stream's course and have recorded one small chapter in the process that has turned Himalayan-sized mountains into rolling hills.

The forty views of Canacadea Creek were edited down to the twelve in *Canacadea Creek 2008–2009,* where four groups of one 7½' print over two 44" prints are hung along the length of one wall. Thirty of these views are included as individual frames printed chronologically, one above the other, seven and a half feet vertically, in *Annual Erosion, Canacadea Creek*.

In all of these images there is a re-mapping of the scene resulting from the fact

that the images are stitched together from five overlapping exposures covering an angle that exceeds 200°. Unlike many panoramic images which are simply a wide angle image with the top and bottom cropped, the remapping that occurs here is similar to images made with the circuit camera, whose slit lens rotates in the opposite direction from the film as the exposure is made. With a circuit camera the remapping is continuous and not stepped as it is in these images. The stepping is not noticeable in these landscape scenes, which have no straight lines, but the remapping becomes apparent with the knowledge that the stream bank passes straight behind the photographer's position at the center of the image. The same view of an architectural subject makes both the remapping and the stepping clear.

The presentation of these images was meant to require both close and distant viewing, and to require that you absorb the scenes one small piece at a time. The four large prints are seven and a half feet long, making it impossible to see both fine detail and the whole scene at once. The two half-size prints beneath the large prints, forty four inches in length, offer even finer detail and hint at the many intermediate views that could have been shown. Each group shows one stage of the changes to the stream's bank over the course of the bank's erosion and also contains variations of weather and vegetation that happen over the course of the year. While there may be a sense that the seasons are cyclical, the evidence of the stream bed presented shows that time and geological process are not. Large rocks appear in view after view, only to disappear from sight. Logs beach, shift, vanish. The last image was made several days before this thesis show and documents the stream's new bank and the beginnings of its course change. One week later the landowner made another attempt to stop that course change, moving some more earth in to try to prevent the progress of erosion until the next hard rain.

Panoramic remapping of an architectural space.

Post script, April 29, 2009.
Another effort to control the flow of Canacadea Creek

May 3, 2008

April 2, 2008

April 23, 2008

July 17, 2008

May 19, 2008

August 29, 2008

November 10, 2008

October 25, 2008

February 6, 2009

February 12, 2009

February 13, 2009

April 9, 2009

Devonian Erosion, Angelica Creek

Route 21 crosses Angelica Creek at the south end of Almond, a few hundred yards above where it empties into the Canacadea. Follow it upstream past the fire department and another half mile beyond the softball fields, and you find that it has made a deep cut through sandstone and shale, exposing rock and fossils from the Devonian period, around 350,000,000 years ago. On top of this exposed cut timber is being cut and moved around on skidders. Below, the cause of the erosion, now running ankle deep a few dozen feet wide, trickles by at an unimpressive rate. The cut is around a hundred feet deep and although you could walk right beside it, it isn't a good idea. I have visited this spot a dozen times and have not seen it when there was not an intermittent rain of rock crumbling spontaneously away from the wall and plunking down from above.

The image shown here is cropped from the top of the solid cut to the stream at its base, leaving you with a sense that the wall could continue much higher than it does. In canyon country— Utah, Arizona, New Mexico—a cut of this height would not be worth noting. Here, in Almond NY, it is worth noting because right under our feet are the remains of sea creatures buried in silt and coarser sediment a fraction of an inch a year, to a height of hundreds of feet. The same fossils are found at the highest elevations surrounding Alfred—mostly brachiopods and crinoids, all sea creatures who did not live on the tops of hills. And after that long process of seabed sedimentation and the disappearance of the sea came the gradual wearing away of that thick layer of solid rock, to what we are left with now.

My favorite creationist explanation for all of these fossils is that God put them there because he wanted scientists to believe the earth is much older than six thousand years. He was very successful. (Prothero, 9)

The print is seven and a half feet high, stitched together from five exposures, and hung at a height that encourages both neck-craning and squatting. At practically every level there is more detail to see than the eyes will permit.

White Oak, 2008–2009

This is a one-year portrait series of a grand tree in Mendon Ponds Park, twenty miles south of Rochester. Like *Canacadea Creek, 2008-2009* it is a composite of several exposures, in this case three vertical frames, stitched together. The width of the tree and the proximity of obstruction required this approach. Although the panoramic remapping is less noticeable in these images than it is in the stream series, the effect is to increase the sense that the tree is enveloping the viewer.

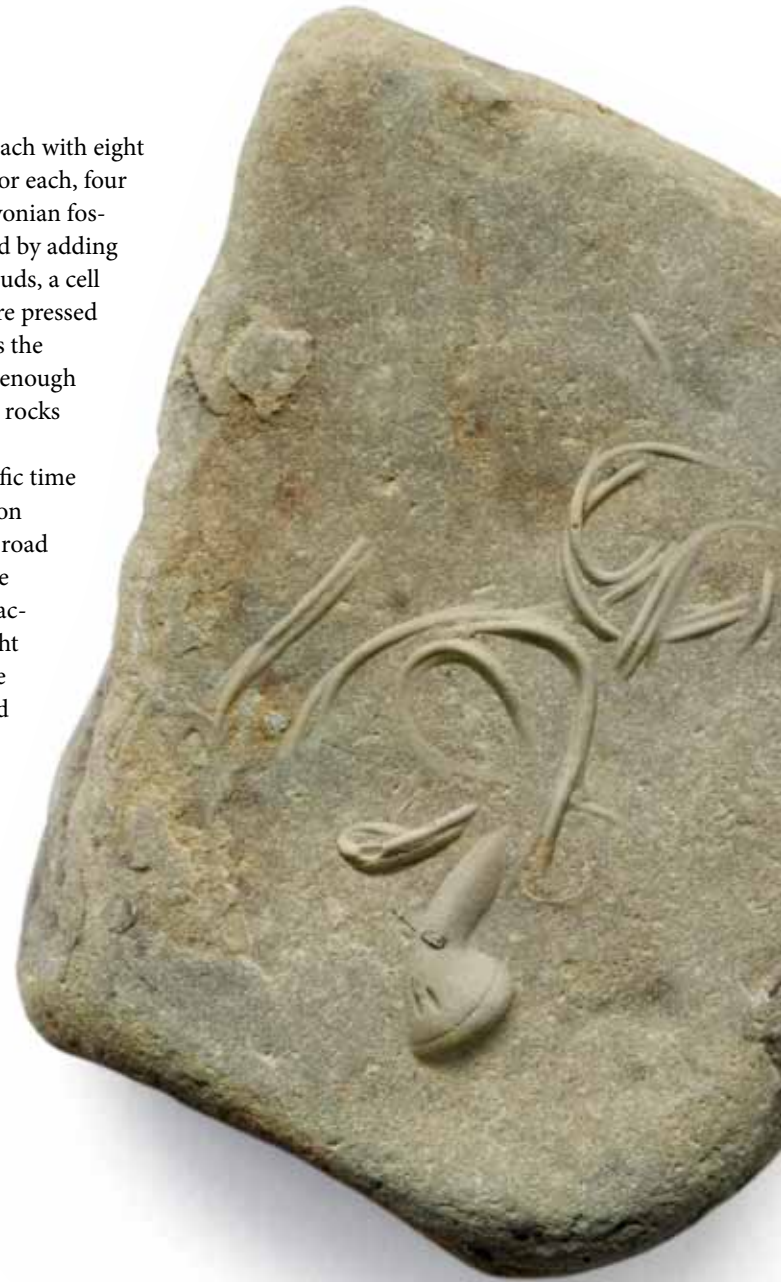
The ordering of these images is chronological. Because the seasonal change from one image to the next is so large and because the geological change is so small, it is easy to view that ordering as arbitrary. Last year's spring could follow this year's winter without noticeable logical disruption. While the idea of cyclical time may be comforting to some, I am uncomfortable giving support to it here. In a time of global climate crisis, the notion that time is cyclical can offer the solace that we will get another opportunity when time completes its "great circle," giving us the chance to avoid our responsibilities this time around. In hindsight, that seems like an irresponsible myth to allude to instead of one that keeps with the observable facts of linear time apparent in *Canacadea Creek 2008–2009*. Perhaps the way to view this series for now is that it is a work in progress, and that sooner or later large branches will come down, and eventually the entire tree. This longer view will also be the more honest.[1]

1 At two of my other bog sites, large pieces or whole trees came down during my one-year observation period. One trunk snapped twenty feet in the air, and its broken end landed over the nail I used to mark the spot for the Half Moss series. It does not appear in the three shot composite, but crosses just to the right, in what would be the fourth section of that composite. The other, a large oak that I put my back against for the first few versions of the long oak branch that overhangs the bog, fell into the bog, again just to the right of my three-shot set of exposures. Change happens whether your camera is pointed at it or not.

Seeing is Believing / Believing is Seeing

Seeing is Believing / Believing is Seeing is a pair of 3 x 6 foot prints, each with eight images of four fossil-covered rocks loosely arranged across them. For each, four rocks were photographed from one side, which is covered with Devonian fossils, and then the opposite side. The second side is then manipulated by adding the images of invented, modern "fossils"—a ring of keys, iPod ear buds, a cell phone and some change, remains from a turkey dinner—which were pressed into clay, cast in plaster, and then photographed in the same light as the matching rock. When seen in one large print the effect is seamless enough to convince some viewers at a distance that they are looking at real rocks that have been mounted somehow to loosely hanging paper.

Behind this was an effort to create a comparison between scientific time and creationist time using the language of local fossils. It was election season in 2008 and I was imagining a situation two years down the road when Sarah Palin, admitted Biblical literalist, takes the oath of office after John McCain's demise from melanoma. (It was a time of very active and pessimistic imagination.) For all the humor that she brought to the campaign, I imagined a President with George Bush's attitude toward science but with no inhibitions about that attitude. I grasped for ways to illustrate the discrepancy between science and the literal interpretation of traditional religious myth, latching on to the irreconcilable difference between the two ages of the earth, which differ by a *factor* of 150,000, a figure so large that it defies compromise. In length it would be a mile of string compared to a centimeter. In area it is the size of one pixel of an image that is five and a half inches square on the screen. In time, compared to the 6000 year creationist age of the earth, it is .04 years, which works out to about two weeks. Translated to the original recording medium of rock and fossils, we can now rediscover your lost keys, Thanksgiving dinner, a cable to a computer device that you no longer own.



Observational Sediment: Algae, Grass, Granite, Water

Occasionally I come across a fossil-filled rock that has cracked across the bedded strata to reveal the layer upon layer of organisms that make up that piece of rock. Most of the time they are dense and solid, but sometimes they are loosely packed and contain spaces between them like the space in a dried sponge. For me, these images have that feel—a loose, primordial packing of layers too dense to count, whose aggegate is solid though made of many fragile parts, a sense that is supported by their construction. The individual parts are drawn from an archive that is itself many layers deep, assembled in layers that cross seasons and years.

Coming from a still photography background I am struck by how little importance time usually plays in thinking about photography. Although they don't move, photographs are as much about the sliver of time they capture as they are about light reflected onto sensitive medium. We are used to seeing the results of a single short sliver, Henri Cartier-Bresson's *decisive moment*, but there also other possibilities. An exposure may be long, it may be intermittent, or it may occur in more than one location. When these possibilities were attempted on film, the cumulative exposure acted to flatten the resulting image so that the result had neither contrast nor detail. Digital processing has change this. As the images are combined, contrast can be enhanced, and the image can be sharpened as well, allowing images from multiple exposures that are rich and extremely detailed.

Canis Lupus Mobius (Mobius Dog)

Most people remember what happens when you take scissors to a Mobius loop and split it in half—it turns into a longer, narrower band that has the same half-turn built into it. But when you split it into thirds, an odd thing happens. You end up with two Mobius loops, a short one and a long, that are linked to each other. That twisting, joining, and connecting seems a good metaphor for what is happening here.

Mobius Dog is an expansion on the form of the loop, using it in three frames to play with several different levels of meaning for the word "loop" over the course of its 2′49″ duration.

The first level of looping happens on the cinematography level. Carrying a hand-held camera at full gallop, I approach the running retriever from behind, pass the dog, cross in front of him, drift back on the opposite side as the dog outruns me. After gaining a significant lead, the dog slows down. I recover both breath and ground, close the gap, then approach the dog from the original side as the dog again gains speed. At a point when I am again passing the dog, the dog acknowledges me with a glance and there is a moment where a frame near the beginning of this circuit matches closely to one at the end.

At the second level of looping, these frames are cut together, matched "tail-to-nose" to form the nineteen-second loop that is used as the basis for the entire piece. It is repeated sixteen

times in less than three minutes. By varying the speed at which the single video loop is played, and by playing it concurrently in three frames, *Mobius Dog* displays the flexibility with which this medium deals with the ordinarily inflexible dimension of time.

Although some contemporary workers have used the loop for mind-numbing purposes—Rodney Graham, (Tumlir, 159) Stan Douglas (Renaud, 121)—it is possible to look back to other periods when it was taken at face value as another way to extend perception and an understanding of subjects in motion—to see interesting motion again and again. It is only since the development of high-speed recording that we know whether a horse's feet leave the ground at a gallop. Among his many discoveries, Eadweard Muybridge did not show us what it was like to run with a dog on a beautiful late summer evening.[1]

For me the loop is a way to savor these nineteen seconds, to share them in their quickness and grace. For a few years I am hoping to keep up with this dog, then to be ahead of him as he ages. After he's gone, another dog, and all bets are off.

1 In 1887 Muybridge published *Animal Locomotion,* a catalog of stop-action sequences that included humans and other animals performing various activities and tasks., (Newhall, 86)

Binocular Vision

An odd encounter with a hawk, who watched me first with one eye and then another, reading a story about a patient of neurologist Oliver Sacks who lost and then regained binocular vision, (Sacks, 85) and the writing down of all thirty of *Einstein's Dreams* (Lightman, 1994) triggered this question: What would it be like if your eyes did not process vision simultaneously?

This is a portrait of my neighbor Stephen Fielding, taken with two video cameras mounted side by side. The footage is played back in two channels, projected together on a corner wall so that the two halves are synchronized. Despite the fact that the cameras were positioned carefully, the complexity of binocular vision soon shows its telltale signs. Parallax changes that perfect alignment as camera distance changes, causing the match to include an area of overlap. Problems with the synchronization of left and right channels caused even more issues and becomes apparent even when off by a few frames. We take for granted the fact that human eyes blink at a regular rate and that they blink simultaneously. Seeing these eyes blink independently is only the first of several things that become unsettling.

Unsynchronized motion allows one half of the face to disappear into the corner before the other side comes out (revealing only one eye) or one side to be out before the other goes in (revealing three or even four eyes.) But the most unsettling part may be to be in such close proximity with such a large view of such a close face, which looks you directly in the eye for such a long time. Combined with projection into the corner, the face wraps around to engage your peripheral vision, forcing you to choose to watch one eye or another.

Whirling

Whirling comes from an early experiment with the equipment used in *Binocular Vision*—two video cameras mounted together and pointed so they would join in a two channel projection. The two cameras were mounted on the end of a twelve-foot pole, this "binocular pole cam" was raised in the air and whirled. The matched clips were then put together, a looping point was found, and for each of four loops in the middle of the video the speed of one side is different from the speed in the other. Only at two points, once at the beginning and once at the end, are the two clips synchronized, and then it is only momentarily as their different speeds cross.

With time running unsynchronized, the two channel corner format creates a space where the image "hides" before being pushed or pulled out by the other channel. A tree moves into the frame from the right, disappears into the corner, then reappears a moment later.

My Eclipse

This is a time-shortened version of the total eclipse of the moon that happened on February 20, 2008. The single frames captured every six seconds for the four hour duration of the event. As with every time I have tried to capture an eclipse, things go wrong, but there is nothing to do except to do your best and stay with it until the end. I have had dew accumulate on lenses, condensation stick sheet film to holders, and carefully placed tripods kicked while stumbling around in the dark.

This time it is 12°F outside, I am stringing video camera to laptop, keeping both charged with wiring that comes from the window of my car. At this magnification, the camera has to be repositioned every ten or so minutes. The tripod is not happy about pointing straight up in the air, the grease in the head is stiff. Three and a half hours into the eclipse the computer starts throwing errors with each exposure, requiring me to click OK every six seconds. There is no opportunity to figure out why this is happening and nobody is there with me to help. Clearly something is being discovered here, but just as clearly it has little to do with astronomy.

If you have never seen an eclipse of the moon before, *My Eclipse* will not disappoint you. It follows the progress start to finish, but it is more about the process of looking and recording and doing the best you can with equipment that has a mind of its own. As attempts to override auto exposure and focus are managed through thick winter gloves, each bump and fumble is magnified by the 12x power of the zoom lens.

Bog Year

Bog Year is the structured animation of still observations made over the course of a year that were recorded as stitched panoramas made up of three twelve megapixel sections each. All of the motion in the video happens by moving within these matched sets of composite images. They were made at four locations inside Mendon Ponds Park, which preserves an impressive array of glacial geology. Seen here is the area between Devil's Bathtub, a kettle formed when a large block of isolated glacial ice melted amid large deposits of sand and gravel, and Kennedy Bog, a floating peat bog at the other end of a long esker that runs above them and forms a steep wall. (Lopez, 126, 198) The area between is low and wet most of the year, for there is no outlet. During times of rain or when the ground freezes the water backs up and gradually drains through the porous sandy soil. In dry times there are places where you can walk from one side to the other, and in the winter it is usually flooded. Also included is one enormous oak just off the trail on one approach to the area.

In *Fog Line*, Larry Gottheim uses eleven minutes of real-time footage to focus attention on the lifting of a blanket of fog on a distant field. At first it seems that nothing is happening, and yet over time you realize that you are watching a change unfold. You cannot actually see the change, but you sense it by drawing on a short term memory of what the scene looked like when it started. Not until three-quarters of the way through the film do you see motion that is identifiable—one horse, and then another walk across the field. *Fog Line* demonstrates the difficulty we have in perceiving slow change, and it does so by recording that change on a medium that captures all of it. We become as much aware of the medium, its changing film grain, its framing window on the scene, as we are of the landscape. Although change is portrayed, it is shown in such small steps that we are barely aware of it. (MacDonald, 9)

Bog Year shows change over a full year, and it does so in the same eleven minutes as *Fog Line*. Using the medium of still photography instead of motion to capture that period simply cuts away all but nine distinct moments in the year. By blending these moments back together, comparing one moment to the next, motion is created within the frame. Some of that motion comes from the change in color and texture as veg-

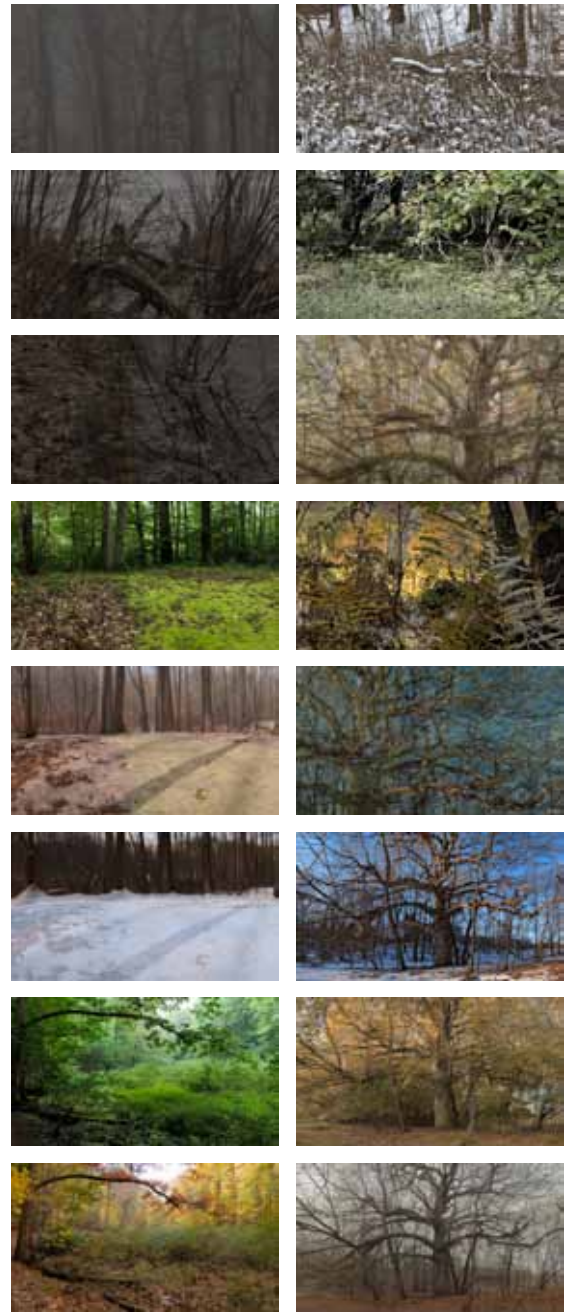
etation emerges, becomes lush, and dies back. Some comes from changes in light and weather, as you would expect. But some motion comes from the process of observation, the difficulty in locating the same view point from one visit to the next. It also comes from inaccuracies in the process of joining several exposures together to make a seamless scene, and from layering difficulties that these inaccuracies cause when blending one time to the next while panning through the image. Solid earth bulges and creeps as though breathing, tree trunks sway back and forth, branches dance and wave.

Fog Line presents observed time in a one-to-one relationship with recorded time, so in that way it is a structureless or at least a simply structured film. Hollis Frampton's *Zorn's Lemma* plays out the consequences of a principle of set theory using time to structure the display of images and the set theory to control their substitution. (Jenkins, 192) Frampton has also written of the many ways that he broke his own structure in putting the film together, because of errors, accidents, and sometimes practical matters.

Bog Year uses structure to reveal what the landscape locations have to say about the passage of time and the familiarity that is gained from returning repeatedly to these places. It uses scaled time as the underlying basis for that structure as it combines several different transformations of that scale into different visual and audio elements. The paring away of all but a few moments of *Bog Year* is loosely structured like this:

12 frames = 1 day
11 seconds = 1 lunar month
2.5 minutes = 1 solar year

The short fragments are each a *day* long, as is the beat in the low underlying rhythm. Each "breathing" cycle lasts for a *lunar month*. Each visit to a location lasts for a *solar*



year and is made up of fragments, (which progress from completely random to completely ordered throughout the video) an introduction, four breathing cycles, and an exit. So, if

location = {fragments [entering (4 cycle) leaving] fragments};

the structure of the entire video is:

exploration (4 location) familiarity

with *exploration* being an introduction that reveals first parts of the all scenes at random, then parts of one scene with random time, then parts of one scene in ordered time. *familiarity* is a closing that is again random, but unlike it seemed at the beginning, four solar years and ten minutes earlier, it is imagery that is recognizable. Throughout the entire piece the sound volume varies with its position in the solar year.

That was the basic plan. Like Frampton, deviations in that plan were made from time to time, for unlike *Zorn's Lemma*, the main concerns of *Bog Year* are narrative and not structural. At times the breathing cycles were lengthened to smooth out that motion. The length of the entry and leaving sections varied depending on how they were treated, which causes the length of the solar year to vary.

I have photographed this area for many years, but have never worked with it in such a methodical way. Observation reveals one level of meaning from a subject. Structure, I've discovered, reveals another.

Calla Lilies, Bog, 1978
Dye transfer print
from 8x10 color negative

Time's Shadow

My thesis show was held in the Fosdick-Nelson Gallery at Alfred's School of Art and Design, opening on April 18, 2009, and running for five days. I shared the gallery with my classmate Rebekkah Palov, whose work in video and large print installation provided a point of contrast with respect to both style and subject. Her sixteen monitor installation *Clouds*, a twelve foot tower of animated electronic space sat directly across the main gallery from the thirty-two foot length of *Canacadea Creek 2008-2009*.

Canacadea Creek 2008-2009
90" x 24" and 44" x 12"

Seeing is Believing / Believing is Seeing
36" x 72"

Devonian Erosion, Angelica Creek
24" x 90"

Annual Erosion, Canacadea Creek
24" x 90"

Observational Sediment: Water, Granite, Grass, Algae
36" x 28"

Binocular Vision

Bog Year

White Oak, 2008–2009
36" x 22"

Seeing is Believing / Believing is Seeing
36" x 72"

The State of the Art: Some Notes on Process, Material, and Gear

Cameras

A Nikon 2Dx has been my camera of choice for several years. There are smaller, lighter, less expensive versions of it now, but for me the 12 megapixel size strikes a good balance between usable detail and, well, being overwhelmed with data. That will change, no doubt, as hard drive prices continue to drop. But until I get a real job, I will have to depend on the... at least dozen or so hard drives that make up my redundant backup system.

Aurthur Felig (Weegee) was once asked to reveal the secret of his success. He said, "f8 and be there," meaning that he would be there with a camera. His was a Speed Graphic, complete with a pocket full of flash bulbs. Right now, mine is a Canon G10. I carry it with me most of the time—running, in the car, stuffed in my computer bag or dangled from my neck or shoulder. It has more pixels than the Nikon, but they are not the same quality of pixels—especially when shot above ISO 100, for the noise increases severely. That said, it's a great camera for a point and shoot, and even though you can use it on auto, it has good manual controls once you get used to them. Some of the images in *Observational Sediment* were shot with this camera, as was the video in *Downhill*.

For video, I have used a pair of Panasonic PV-GS500 standard definition cameras. (A pair, because a loop of charger cable caught the arm of my desk chair and as I turned in the chair I dragged the camera to the concrete floor. Two months after sending it to Panasonic for repairs, I bought a second one for half of the repair cost. Someone there must have felt sorry for me, because within a week of buying the second camera, the first camera showed up unexpectedly in the mail, with working video but no sound.) Although I miss the control of a real camera to adjust exposure and focus, these worked well for much of what I asked them to do. Notably, they crashed through a lot of brush, worked smoothly while I was running, whirling, and bouncing, and with the exception of the previously noted fall to the concrete floor, survived a fair amount of ineptitude by the operator. They also worked fine at temperatures as low as 12°F. Their main weakness is that they are always thinking and adjusting themselves when what you really want them to do is just stay set on what they are set at. *My Eclipse* is a four hour battle against the relentless auto-focus and auto-exposure features of this camera. Although there is supposed to be a way

to turn these off, I could not find them in the six seconds I had between exposures once they accidently got turned on.

Software

This is a historical document, so it's important to cover the main points, but from the perspective of 2009 it seems unimportant to say that Photoshop is the still image processing software of choice. Even at version 11, Adobe has never had any real competitors. What is new is the huge shift in processing horsepower Adobe's *Lightroom* has taken from *Photoshop*, as well as the non-destructive editing approach that it employs. Although I have used *Lightroom* since it was in beta testing, I am still discovering new ways that this approach can be useful. Treating camera originals as a "digital original" that can also incorporate most of the corrections to that image provides the opportunity to export unlimited variations for different uses. Combining this with different options for file naming provided a way to accumulate the different sets of "fragments" for *Bog Year*. It is also how the large animation sequences were processed for *Why I Am Late*, *Line Drawing*, and *Electric Peppers*.

Titles, animation sequences, and the short looping sequences made from stills in *Bog Year* were built in *After Effects*. Because *After Effects* has such rudimentary sound capability, these parts were always moved to *Final Cut 5* for assembly and the addition of sound. *Final Cut 5* is also where all other video work was done.

Frame Thief, a free video-camera-to-still-frame capture program, was the tool of choice for animation, either triggered manually or on its built in timer. I have since discovered that Nikon's *Camera Control* program will do the same, and had I known this I probably would have used it for *My Eclipse*, enabling me to capture with a much better camera, which would have had its advantages and disadvantages.

I would like to report that I have mastered *Soundtrack Pro* for working with sound, but that's not the case. I had some success with it early on, but for some reason it does not make sense for much of what I have done. Instead I have used *Audacity,* freeware that deals with sound independently of the accompanying video. It lacks good previewing of effects and some other amenities, it occasionally crashes, but on the whole it is simple and straightforward enough for a beginner like me to understand.

Two obscure but very useful organizational utilities that I brought with me continued to prove invaluable. *iView Media Pro*, (*Expressions Media* now that it has been bought by Microsoft) is a media cataloging database that allows you to organize pic-

tures, video, and sound clips as well as embed metadata in them. It handles custom fields, the promise of XMP, which cannot be done with *Lightroom*. Before *Lightroom* I used it for pictures. Now I use it for organizing the many recorded sound files I have collected. You can keyword them, add captions, and put them into virtual (and nested) "sets" to make it easy to find, say, all sound clips of cicadas. Because it is scriptable, there are still a few things that I rely on it for with pictures.

Synk is the program that allowed me to lose all of my current working data three times during the course of my second year and still have something left to look at. It is a file synchronizing and backup program that can be both customized and scheduled to run automatically. Although it is still an organizational nightmare to lose your working drives, having several levels of backup available makes it possible to recover.

Finally, when disaster does strike, there is *Disk Warrior*. The first two times I lost all data I had tried to use *Drive Genius* and had very little success. It fixed what could be seen by the system, but it would not even try to read an unmountable disk. *Disk Warrior* digs into the unmountable disk, creates a replacement catalog (which you can use to make a copy to another disk) and then replaces the damaged catalog. After I bought a copy to try to recover from my third disaster, I was able to also recover data from disks that could not even be re-formatted.

Computers

Of the two MacPro dual quad-core 2.66 ghz towers I had for the two years of the program, one worked flawlessly the entire time. Both were running with 4g of RAM and were far and away the most wonderful machines I have ever used. The 23" Apple Cinema Display was the first flat panel screen I had used and I was overwhelmed with it. There is simply nothing not to like, except that I cannot take it with me.

The second machine began giving me trouble after one semester, and by the end of the second semester became entirely unstable. I wish I could say that the problem was taken care of quickly, or even that I had help in solving the problem. I lost seven weeks troubleshooting, rebuilding and reinstalling, sitting in front of a machine that simply would not run, before I could prove that I needed a new computer.

There are two additions that make this two (three including my PowerBook) computer setup work smoothly. The first is a 5-port gigabit switch that allows all three computers to have access to each other at near-hard-drive speed. This may not be an issue if the school's ethernet network is upgraded, but at this time, they are running at 100T speed, very slow for pushing around large image and video files.

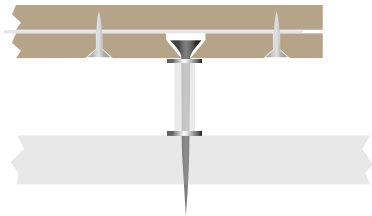
The second addition is an array of backup drives—not a fixed number, but something, anything, to protect against the inevitable loss of data that comes from drive or computer failure. I added four internal drives and four externals and do not regret it. I also bought a portable drive, mainly for saving print jobs for use with my PowerBook on the school's printers. Combined with *Synk*, all three computers operate as one tidy unit and can be backed up to common drives automatically.

Printing

Digital printing at Alfred remains a mystery to me, and one of my biggest disappointments. At the heart of it is Raster Image Processing software that intercepts print jobs and prints them to its lowest common denominator—a simulated cmyk offset press, printed with a generic profile made for a different paper on another printer. It is a system that prevents previewing results, which has been available for the last six versions of *Photoshop*, and sidesteps all of the advancements and advantages that color management has brought in the past dozen years, relying instead on a frustrating and wasteful trial-and-error method. Even worse is the fact that after four years of using this system, students still don't know how to print in the color managed environment they will find elsewhere. I can only compare this situation to printmaking students who have not learned to ink or wipe their own plates.

A year of trying to change this situation convinced me that it was not to happen, and that for whatever reason, it was a system that is there to stay. My solution has been to bypass the whole system, plug the printer into my laptop, and create my own working environment. In October 2008 I bought a Color Munki, then newly released, to calibrate monitors and projectors and profile printing paper. In half an hour I can build a profile for any paper I want to use, whether it is paper that the school stocks or paper that I buy elsewhere. I can use that profile to preview or soft-proof my results in *Photoshop*. Best of all, I can take what I learn to any other color managed environment and use it to "ink my own plates."

My printing paper of choice was Innova's S*mooth Cotton High White*, with Canson *Rag Photographique* a close second. Both are 100% cotton rag, have a smooth surface, and contain no optical brightening agents (OBAs have been shown to break down and yellow the paper surface) which provides long term stability for both the inks and the paper surface. The Canson paper is stiffer and requires more effort to take the curl out of the roll-fed prints. All exhibition prints were made on the Epson 11880 using UltraChrome pigmented inks.



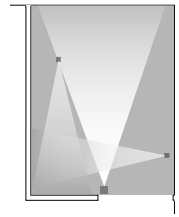
Framing

Hanging 90" long prints presented its own problems. The solution I came up with was inspired by a commercially-made product I saw at Booksmart Studio in Rochester, New York, a metal channel with a plastic insert that gripped the paper from the top and bottom. My low-tech version does the same thing by clamping the paper between two matching strips of ash, fastened together from behind with ½" #8 wood screws. A V-shape slot routed half way across the rear strip receives the head of a standard 3" drywall screw for mounting to the wall. This drywall screw has a 1" piece of plastic tubing slipped over it and between two ¼" washers. When the screw is tightened, the tubing acts as a spring to keep the slot of the wood strip between the screw head and the upper washer.

For each size print, a template was made to locate the slots in the rear wood strip. When it came time to hang the show, this same template was used to locate the holes in the wall. With plumb-bob, laser level, and the appropriate templates the entire show was laid out and the screws set, ready to have the prints attached by slipping the frames over the screw heads.

Projection

The idea for displaying three channels of video work for my thesis show seemed simple enough, but as my show got closer and closer the solution got fuzzier and fuzzier. I wanted to project video alternately between a two channel and a single channel space, but as I looked into the matter, details got into my way. The two channels were standard definition video, the single channel was built in HD, ruling out the Jones 3-channel sync system. Having a way to sync the two-channel piece from either one or two computers relied on either luck or resetting the system after each day, (or both) a proposition that is complicated by the location of the computer near the ceiling of the gallery. I have Barbara Lattanzi to thank for her work in programming and in suggesting *The 8s*, a jitter patch that she and Devin Henry built and refined. With the addition of a second graphics card, three projectors each handled a separate synced feed.



Works Cited

Apple Computer, *Oxford American Dictionary.* Vers. 1.0.2. Computer software, Cupertino, CA, 2005. (Apple Macintosh System)

Bayles, David and Orland, Ted. *Art and Fear*. Santa Cruz, CA: The Image Continuum, 1993.

Dalrymple, G. Brent. *The Age of the Earth*. Stanford, CA: Stanford University Press, 1991.

Dean, Cornelia. "Thoreau Is Rediscovered as a Climatologist." New York, NY, 2008. The New York Times. 1/29/09 2009. <http://www.nytimes.com/2008/10/28/science/earth/28wald.html?_r=1&ref=science>.

Francis, Richard. *Jasper Johns.* Modern Masters Series. New York: Abbeville Press, 1984.

Gould, Stephen Jay. *Eight Little Piggies: Reflections in Natural History.* New York: W.W. Norton, 1993.

---. *Rock of Ages: Science and Religion in the Fullness of Life.* New York: Library of Contemporary Thought, 1999.

---. *The Hedgehog, the Fox, and the Magister's Pox*. New York: Harmony Books, 2003.

Jenkins, Bruce. *On the Camera Arts and Consecutive Matters: The Writings of Hollis Frampton*. Cambridge, MA: MIT Press, 2009.

Le Poidevin, Robin. "The Experience and Perception of Time." 2008. *The Stanford Encyclopedia of Philosophy (Fall 2008 Edition)*. Ed. Edward N. Zalta. 10/5/08 2008. <http://plato.stanford.edu/archives/fall2008/entries/time-experience/>.

Lightman, Alan. "Keynote Address, Scholar's Day Conference." Monroe Community College, 2009.

---. *Einstein's Dreams*. New York: Vintage, 1993.

Lopez, Barry, Editor. *Home Ground: Language for an American Landscape.* San Antonio, TX: Trinity University Press, 2006.

MacDonald, Scott. *The Garden in the Machine*. Berkeley, CA: University of California Press, 2001.

Malin, David. "Introduction" in *Images from Science: An Exhibition of Scientific Photography.* Rochester, NY: Carey Graphic Arts Press, 2002.

McPhee, John. *Basin and Range*. New York, NY: Farrar Straus & Giroux, 1981.

Newhall, Beaumont. *The History of Photography*. New York: Museum of Modern Art, 1964.

Noe, Alva. "Novel Experience". *Gertz Lecture Series, Matters of Perception: Articulating Hybridity* Alfred University, Alfred, NY, April 7, 2008.

Paulos, John Allen. "Scientific Notation." *Beyond Numeracy.* New York, NY: Alfred A. Knopf, Inc., 1991. 218-20.

Reynaud, Bérénice. "Stan Douglass's Win, Place, or Show." *Robert Lehman Lectures on Contemporary Art V.3.* Ed. Lynn Cook and Karen Kelly. Vol. 3. vols. New York: Dia Art Foundation, 2004.

Sacks, Oliver. "Stereo Sue." *The Best American Science Wrtiting 2007*. Ed. Gina Kolata. New York: Harper Collins, 2007. 82-105.

Schama, Simon. *Landscape and Memory*. New York: Vintage Books, 1995.

Shlain, Leonard. *The Alphabet Versus the Goddess: The Conflict between Word and Image*. Arkana: The Penguin Group, 1998.

Tumler, Jan. "Rodney Graham's Black Box Treatment." *Robert Lehman Lectures on Contemporary Art V.3.* Ed. Lynn Cook and Karen Kelly. Vol. 3. vols. New York: Dia Art Foundation, 2004.

Turkle, Sherry. *Life on the Screen.* New York: Simon & Schuster, 1995.

Zielinski, Siegfried. *Deep Time of the Media: Toward an Archeology of Hearing and Seeing by Technical Means.* Cambridge, MA: MIT Press, 2006.

References

Gould, Stephen Jay. *Time's Arrow, Time's Cycle*. Cambridge, MA: Harvard University Press, 1987.

---. *Rock of Ages: Science and Religion in the Fullness of Life.* New York: Library of Contemporary Thought, 1999.

Medawar, Peter. "Induction and Intuition in Scientific Thought". *Pluto's Republic*. Oxford University Press paperback edition. Oxford, UK: Oxford University Press, 1984.

Prothero, Donald R. *Evolution: What the Fossils Say and Why It Matters*. New York: Columbia University Press, 2007.

Scarry, Elaine. *On Beauty and Being Just.* Princeton University Press, 1999.

Sitney, P. Adams. *Eyes Upside Down: Visionary Filmmakers and the Heritage of Emerson*. New York: Oxford University Press, 2008.

Tufte, Edward R. *Beautiful Evidence.* Cheshire CT: Graphics Press, 2006.

---. *The Visual Display of Quantitative Information.* 2nd ed. Cheshire, CT: Graphics Press, 2001.

---. *Visual Explanations: Images and Quantities, Evidence and Narrative*. Cheshire CT: Graphics Press, 1997.

---. *Envisioning Information: Narratives of Space and Time*. Cheshire, CT: Graphics Press, 1990.

Volker, Harlan. *What Is Art? Conversation with Joseph Beuys*. Was ist Kunst?, Werkstattgesprach mit Beuys. Trans. Matthew Barton and Shelley Sacks: Clairview Books, 1986.

Devonian Period
3,450,000 Years