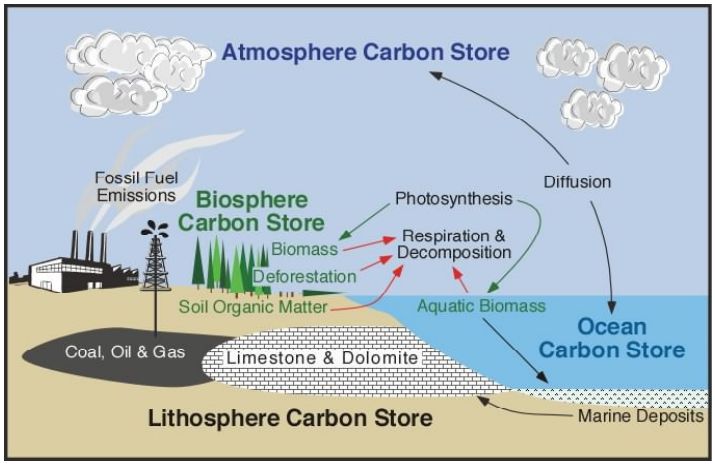
LEAFS

In the fall of 2007, I became obsessed with the exquisite color, texture, and presence of falling leafs. Piled in gutters, racing across yards, hanging by a thread, and sailing airborne in playful whirls, the leafs were undeniably in my face. I collected pockets full and ran back to the studio to examine my treasures. Why, I wondered, am I possessed to gather this frighteningly growing assembly of leafs? Nothing. Nothing came to my mind and so nothing happened with them. The darkness of winter crept into the studio and, as I watched, the leafs begin to shrink and wither. I decided to arrest their decay so that their beauty could remain longer than this season. I trolled through the discard pile at Kerry's woodshop (www.westwoods.com) and claimed 20 boards of varying size, taking my bounty back to the studio where I tirelessly glued tens of leafs to each board. Kerry had recently been exploring water borne sealers and I sealed each leaf under a preserving film. Thusly the boards sat over the cold dark winter, leafs captured in arrested beauty. With spring, however, I began to pace around them, glancing from the corners of my eyes. What about these boards, I wondered? What is the secret that the leafs hold? Before I got that thought out – however, I knew, I knew! Photosynthesis! I thought, the perfect closed-loop-energy-producing system! THAT, I raised my fists in the air, is the secret of leafs!

There is a simple symbiosis between leafs (green plants) and people: leafs utilize carbon dioxide to produce their life sustaining sugars, producing oxygen as a byproduct; humans breathe in oxygen and respire carbon dioxide.

The science of this begins with understanding that carbon is the major chemical constituent of most organic matter, from fossil fuels to the complex molecules (DNA and RNA) that control genetic reproduction in organisms. Carbon is stored on our planet in the following major sinks (see figure below): (a) as organic molecules in living and dead organisms found in the biosphere; (b) as the gas carbon dioxide in the atmosphere; (c) as organic matter in soils; (d) in the lithosphere as fossil fuels and sedimentary rock deposits such as limestone, dolomite and chalk; and (e) in the oceans as dissolved atmospheric carbon dioxide and as calcium carbonate shells in marine organisms.[1]



[1] Source: PhysicalGeography.net

Ecosystems gain most of their carbon dioxide from the atmosphere. A number of autotrophic organisms have specialized mechanisms that allow for absorption of this gas into their cells. With the addition of water and energy from solar radiation, these organisms use photosynthesis to chemically convert the carbon dioxide to carbon-based sugar molecules[2]. In so doing, photosynthesis provides the basic energy source for virtually all organisms. An extremely important byproduct of photosynthesis is oxygen, on which most organisms depend. Photosynthesis has far-reaching implications. Like plants, humans and other animals depend on glucose as an energy source, but they are unable to produce it on their own and must rely ultimately on the glucose produced by plants. Moreover, the oxygen humans and other animals breathe is the oxygen released during photosynthesis[3].

The formula looks like this:
6H2O + 6CO2 ----------> C6H12O6+ 6O2
Six molecules of water plus six molecules of carbon dioxide produce one molecule of sugar plus six molecules of oxygen[4].

Historically, however, earth was not even capable of hosting human life. After loss of the hydrogen, helium and other hydrogen-containing gases from early Earth due to the Sun's radiation, primitive Earth was devoid of an atmosphere. The first atmosphere was formed by out gassing of gases trapped in the interior of the early Earth, which still goes on today in volcanoes. Life started to have a major impact on the environment once photosynthetic organisms evolved. These organisms, blue-green algae fed off atmospheric carbon dioxide and converted much of it into marine sediments consisting of the shells of sea creatures. While photosynthetic life reduced the carbon dioxide content of the atmosphere, it also started to produce oxygen. For a long time, the oxygen produced did not build up in the atmosphere, since it was taken up by rocks, as recorded in Banded Iron Formations (BIFs) and continental red beds. To this day, the majority of oxygen produced over time is locked up in the ancient "banded rock" and "red bed" formations. It was not until probably only 1 billion years ago that the reservoirs of oxidizable rock became saturated and the free oxygen stayed in the air. Once oxygen had been produced, ultraviolet light split the molecules, producing the ozone UV shield as a by-product. Only at this point did life move out of the oceans and respiration evolved[5].

However, let’s not stop there, how did earth get here to begin with? The Big Bang is the cosmological model of the universe that is best supported by all lines of scientific evidence and observation. Georges Lemaître proposed what became known as the Big Bang theory of the origin of the Universe[6].

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[2] http://www.eoearth.org/article/Carbon_cycle

[3] http://encarta.msn.com/encyclopedia_761572911/Photosynthesis.html

[4] http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookPS.html

[5] http://www.globalchange.umich.edu/globalchange1/current/lectures/samson/evolution_atm/

[6] http://en.wikipedia.org/wiki/Big_Bang

The Big Bang theory is an effort to explain what happened at the very beginning of our universe. Discoveries in astronomy and physics have shown beyond a reasonable doubt that our universe did in fact have a beginning. Prior to that moment there was nothing; during and after that moment there was something: our universe. The big bang theory is an effort to explain what happened during and after that moment. According to the standard theory, our universe sprang into existence as "singularity" around 13.7 billion years ago. What is a "singularity" and where does it come from? Well, to be honest, we don't know for sure. Singularities are zones which defy our current understanding of physics. They are thought to exist at the core of "black holes." Black holes are areas of intense gravitational pressure. The pressure is thought to be so intense that finite matter is actually squished into infinite density (a mathematical concept which truly boggles the mind). These zones of infinite density are called "singularities." Our universe is thought to have begun as an infinitesimally small, infinitely hot, infinitely dense, something - a singularity. Where did it come from? We don't know. Why did it appear? We don't know. After its initial appearance, it apparently inflated (the "Big Bang"), expanded and cooled, going from very, very small and very, very hot, to the size and temperature of our current universe. It continues to expand and cool to this day and we are inside of it: incredible creatures living on a unique planet, circling a beautiful star clustered together with several hundred billion other stars in a galaxy soaring through the cosmos, all of which is inside of an expanding universe that began as an infinitesimal singularity which appeared out of nowhere for reasons unknown[7].

My collection of leafs had quite a story to tell! It didn't tumble out at once, but eventually I had the pieces of the story: the leafs, the big bang (a black splat), and the formula for photosynthesis. I assembled the pieces, using natural clay paint and graphite to render the boards and, lastly, I added two things, human eyes as witness to the story, and scratches and scribbles that coaxed a subconscious language. I used natural bees wax to seal the assemblage and outlined the story on the back. These are boards that encourage a closer look – the wax provides a caress-able surface, the images provoke exploration, and the leafs – ahh, the source of it all, the leafs are enticing you to step into our story – the whole story.

Available for exhibition and/or purchase:
LEAFS 1: 18 boards of various sizes, leafs collected fall 2007
LEAFS 2: 19 boards of various sizes (13 completed, 6 underway), leafs collected fall 2008.

[7] http://www.allaboutscience.org/big-bang-theory.htm

#14 LEAFS1 11.5”x18”

#5 LEAFS2 15.75”x19.5”

#7 LEAFS2 18”x24”