\ ARCHAEOLOGY OF GENETOLOGY

\ CONTEMPORARY CUNEIFORM SCRIPT

\ CCS-1 \

The 196th Law (“an eye for an eye …”) of Hammurabi, King of Babylonia, using graphics, in three different modes of cuneiform script, illustrating the evolution of signs over time. The first is the original Old Babylonian version (around 1750 BC), the second is in Neo-Assyrian signs (around 1000 BC), and the third is in the classic Sumerian signs used about 400 years before Hammurabi’s reign. Below that follow a transliteration into Akkadian and a translation into English.

\ CCS-2 \
Toine Klaassen
Untitled, 2005

This work consists of rusty nails attached to the ceiling forming the names of several global corporations like Shell, Pentax, Texaco, BMW …

\ MODERN ARCHAEOLOGY

\ MA-1 \
Maarten Vanden Eynde
Genetologic Research n° 18, 2004 A.D., Tajimi, Japan, 2004 (35cm x 35cm x 20cm)

In 2004 I went to Tajimi, Japan to master the traditional ceramic arts. I learned to make a tea ceremony cup, the most valuable ceramic art object, and destroyed it. I labeled it *Genetologic Research n° 18, 2004 A.C., Tajimi, Japan* and presented it in the context of a typical museum dedicated to conservation. It was very hard to explain my motives to the Japanese visitors, who considered the broken cup as useless. A stone’s throw away from the room where my work was shown, in the same building, people where selling little pieces of very old cups on an antique market for extravagant prices. Right now, in 2006, the work is history and as much part of archaeology as any other found object.

\ MODERN ARCHAEOLOGY II

\ MA II-1 \
Maarten Vanden Eynde
Genetologic Research n° 22; 60937 Ikea-era, 2005 A.D., Rome, Italy, 2005
\ MA II-2 \
Genetologic Research n° 23; 50075026 Ikea-era, 2005 A.D., Rome, Italy, 2005

\ HOMO CYKLOPICUS

\ HC \
Admiral and Minister Pedro of the selfproclaimed freestate Ladonia has made an amazing discovery during his excavations. He has found a cranium which, no doubt, belongs to the hitherto unknown Homo Cyklopicus. The scientists are developing two theories. King Ladon can have been Cyklops. It is also possible that cyclops lived in Ladonia long before and that Ulysseus during his travels visited Ladonia.

Ladonia is a micronation, proclaimed in 1996 as the result of a years-long court battle between artist Lars Vilks and local authorities over two sculptures, ‘Nimis’ (Latin - ‘too much’) and ‘Arx’ (Latin - ‘fortress’). These two colossal sculptures were erected without permission on the stony shores of a remote part of Kullaberg, a nature reserve in the southernmost part of Sweden. The battle about Arx and Nimis rolled through the court system of Sweden for 20 years.

Ladonia is not recognized by any other accredited state, and there is no legal basis in international law for calling it a state.

In 1997 Ladonia acquired a colony in Norway (Telemark), acclaimed on May 17th (National Day in Norway). An embassy was built in Falkenberg where the first official state visit took place.

\ BRIAN JUNGEN

\ BJ \
Brian Jungen
Study for the Evening Redness in the West, 2006

Detail of a larger installation with two mounted saddles and stands, made from oversized relax chairs, eight handmade human ‘skulls’ Jungen created using old baseballs he and his dog had found in an overgrown park in Vancouver and a home theatre/stereo system. Mini speakers were put into the skulls playing sounds of movies that represent the flag-waving American consciousnness, including Unforgiven, Saving Private Ryan, and Platoon.

\ IRA BARTELL

\ IB-1 \
Ira Bartell
The History of Egypt
\ IB-2 \
Flowerpot, 2005

In a town of Roman antiquity like Cologne, a pottery shard is not simply a piece of ceramic. A shard speaks – to archaeologists most completely – but to us all. To a professional, a shard tells of its origins: the period, place, likely use, possibly the former contents. To the rest of us, a shard means that what once was held together as a functioning vessel is now no more than pieces; to paraphrase the Buddha, “Whatever is put together, comes apart.” Perhaps the shard tells of violence. Certainly it speaks of destruction, and most ineluctably, the passage of time – a point Bartell underscores by dating this object.

Acknowledging all this – having broken the pot himself – Bartell takes several triumphant steps past depression or nihilism. He has re-assembled the pot – not back into a seamlessly, cleverly, glued camouflage job – but loosely, so that the pieces remain pieces, and the destruction remains present and visible. This airy reconstruction of shards into the shape – the former shape – of a flowerpot, becomes an act of bravery and pluck. Bartell says, “yes, things break, my things too. But you can do with the pieces. Pick them up, put them together. Make something.”

(David Schieider, 2005)

\ MODERN ARCHAEOLOGY

\ MA-2 \
Maarten Vanden Eynde
Preservation of IKEA tea cup, 2005

Preservation of Ikea tea-cup is an intervention that took place in Rome, Italy. When, around the turn of the millennium, 2000 A.D., the IKEA catalogue became the most widely distributed publication in the world (beating the Bible for the first time ever), I decided to give history a hand and preserve an IKEA teacup. I climbed over the fence of Il Foro Romano, the old city center of Rome, and buried a teacup, observed by a crowd of shocked tourists. No one stopped me, so as far as I know the cup is still there, to be discovered by future archaeologists. It is an open air museum, where archeologists will be digging for all eternity.

\ FAMOUS FOREVER

\ FF-1 \
Damien Hirst
For the love of God, 2007

A 19th century human skull cast in platinum and encrusted with 8601 diamonds (weighing in at over 1100 carats). Price: $100 million.

The human skull, bought in a shop in Islington, is thought to be that of a European who lived between 1720 and 1810. The work’s title was supposedly inspired by Hirst’s mother, who once asked, “For the love of God, what are you going to do next?”

\ FF-2 \
Zatorski + Zatorski
Away from the Flock, 2008

In Away from the Flock (2008) we peer into a Victorian bell jar and a still-born goat skull smiles back with a wry cheeky grin, its mouth bejeweled with a 22ct gold capped tooth.

\ NEOLITHIC COCA-COLA

\ NC-1 \
Ai Wei wei
Neolithic Culture Pot with Coca-Cola Logo, 1992
\ NC-2 \
Han Dynasty Urn with Coca-Cola Logo, 1994

Chinese artist and architect Ai Wei Wei uses the skills of craftsmen to transform antique Qing dynasty (1644-1911) furniture into mysterious objects that no longer have a clearly defined function. Ai is a conceptual artist in the Dada tradition, there is no doubt that showcasing the technical virtuosity of his hired minions is low on his agenda. Yet their superb skill is inextricable from his work; it is their expertise that allows his ideas to shine through. According to Ai “By changing the meaning of the object, shaking its foundation, we are also changing our own condition. We can question what we are.” Shoddy workmanship would have distracted from the strange authenticity of Ai Wei Wei’s creations; we need to believe in their purposelessness in order to be persuaded to examine our own.

(Tracey Clement)

\ DIGITAL DIGGINGS

\ DD \
Niklaus Rüegg
Hand-axes, 2002 (cardboard, varnish, glue)

\ TO FIX THE IMAGE IN MEMORY

\ FIM \
Vija Celmins
To Fix the Image in Memory, 1977-1982

To Fix the Image in Memory places eleven small stones and their duplicates, made of painted cast bronze, onto a surface, challenging the viewer to decipher the real from the manmade and to question the relevance of the distinctions between real object and copy, nature and art. Culled from the area around the Rio Grande near Taos, New Mexico, where Celmins went to recover from the breakup of a romance in 1977, the stones have a magical, talismanic quality. They are all different shapes, colors and textures, ranging from the craggy to the phallic to the fecal, with interesting markings and lines on each.

By having each original rock installed with its duplicate, Celmins invites the viewer to examine them closely: “Part of the experience of exhibiting them together with the real stones,” she has said, “was to create a challenge for your eyes. I wanted your eyes to open wider.”

\ FAMOUS FOREVER

\ FF-3 \
Piero Golia
Maybe not even a Nation of Millions can hold us Back, 2003

Complete skeleton with implanted diamond on the exact location where the (still living) artist has one as well.

\ MODERN ARCHAEOLOGY III

\ MA III-1 \
Maarten Vanden Eynde
Plato’s Closet, 2008 A.D., 2008

When, around the turn of the millennium, 2000 A.D., the IKEA catalogue became the most widely distributed publication in the world (beating the Bible for the first time ever), it was clear that in the new geological layers that were being added around the globe, the fossils would consist mainly of IKEA products. In the future this period in time would become known as the IKEA-era. It would take several centuries for their empire to decay and disappear under the next layer of history. This external mold, a negative fossil if you like, is one of the oldest remains of an IKEA closet, containing traces of a lamp and cup which probably stood on the closet. The fact that is a mold of course enables eternal reproduction.

\ PRESERVATION OF THE BERLIN WALL

\ PBW-1 \
Maarten Vanden Eynde
Berlin Wall, 2006
\ PBW-2 \
Preservation of the Berlin Wall, 2007

The Berlin Wall, known in the Soviet Union and in the German Democratic Republic as the ‘Anti-Fascist Protective Rampart’, was a barrier separating West Berlin and East Germany, including East Berlin, for 28 years. Construction on the Berlin Wall began on August 13, 1961, and it was dismantled in the weeks following November 9, 1989. The Wall was over 155 km (96 miles) long. Between two parallel fences, some 100 metres (110 yd) apart, a no man’s land that became widely known as the ‘death strip’ was established. It was covered with raked gravel, making it easy to spot footprints left by escapees; it offered no cover; it was booby-trapped with tripwires; and, most importantly, it offered a clear field of fire to the guards.

For the exhibition Turn to Stone in the Museo Mineralogico Campano I send a postcard to the museum, with a small plastic box containing a piece of the Berlin Wall. I donated the work to the director with the specific demand to preserve the Berlin Wall by including the piece in the permanent collection. He agreed and from now on the postcard is on display surrounded by other mineral stones.

The small stone contains the story of the whole wall and preserves an important part of human history. It represents World War II, the Cold War, communisms and all the personal stories connected with the Berlin Wall. It’s a memory of the past for the future.

\ TO FIX THE IMAGE IN MEMORY

\ FIM \
Vija Celmins
To Fix the Image in Memory, 1977-1982

\ CETOLOGY

\ C \
Brian Jungen
Cetology, 2002

Brian Jungen (b. British Columbia, Canada, 1970) is part of a generation of Vancouver-based artists currently bursting onto the international stage. Born to a Swiss-Canadian father and First Nations mother and raised in the Dane-zaa nation, his drawings, sculptures and installations explore elements of his own hybrid cultural identity. Yet, his approach transcends questions of ethnicity to explore the complex exchanges of goods and ideas in our globalized world.

Jungen’s reputation was secured by his magnificent whale ‘skeletons’, large suspended sculptures made from cheap plastic deckchairs. His rendering of rare and endangered whale species in nonbiodegradable mass-produced objects also refers to current debates about whaling practices in Canada. Representing the postmodern, postcolonial world with a wry sense of humor, Jungen collapses stereotypes and embraces change, flux and instability. Offering new ways of thinking about multiculturalism at a time when the famous model of Dutch ‘tolerance’ is under close scrutiny, his practice approaches cultural difference as an unstable, reciprocal notion, using it as a starting point for creativity and critical reflection.

\ HOMO STUPIDUS STUPIDUS

\ HSS \
Maarten Vanden Eynde
Homo Stupidus Stupidus, 2008 A.D., 2008

Homo Stupidus Stupidus is a human skeleton taken apart and put back together again in a different way, disregarding our knowledge of human anatomy. A new species emerges, functioning as missing link and mocking the maker and the entire human race simultaneously. It was part of a bigger exhibition in which my Genetologic Research infiltrated the museum collection of the University of Ghent’s Department of Archaeology and Ethnography.

Homo Stupidus Stupidus was first exhibited in the Dominican Library, which contains a huge collection of old books behind glass, inaccessible knowledge, used for preservation purposes only.

\ MODERN ARCHAEOLOGY III

\ MA III-2 \
Pompeii, Italy

Plaster casts of people buried by ash and lava from the eruption of Mt Vesuvius that obliterated Pompeii in 79 A.D. (The garden of the fugitives). The corresponding mold formations were discovered as early as 1860 by one of the first archaeologists of Pompeii, Giuseppe Fiorelli. He is credited with developing the process by which the molds – one might call them negatives in clay – are turned into the positive plaster forms. The technique was further refined by the archaeologist Amadeo Maiuri, who was in charge of Pompeii excavations for much of the last century.

\ THE DOGS FROM POMPEII

\ DP-1 \
Allan McCollum
The Dog From Pompeii, 1991
(cast glass-fiber-reinforced Hydrocal)

Mount Vesuvius was blazing in several places … A black and dreadful cloud bursting out in gusts of igneous serpentine vapor now and again yawned open to reveal long, fantastic flames, resembling flashes of lightning, but much larger … Cinders fell … then pumice-stones too, with stones blackened, scorched, and cracked by fire …

The scene described by Pliny the Younger occurred on an August afternoon in 79 A.D. Of the more than 20,000 inhabitants in the city of Pompeii, several hundred died that day in their homes and in the streets. The rest fled toward the sea.

The cavity of *The Dog From Pompeii* was discovered November 20, 1874, in the house of Marcus Vesonius Primus, in the ‘Fauce’, the corridor at the entrance of the house. The house was located in Region VI, Insula 14, Nr. 20.

During the eruption, the unfortunate dog, wearing his bronze-studded collar, was left chained up at his assigned place to watch the house, and he suffocated beneath the ash and cinders.

Allan McCollum’s casts were taken directly from a mold made especially for the artist from the original second-generation cast presently on display at the Museo Vesuviano, in present-day Pompeii.

\ DP-2 \
Allan McCollum
The Natural Copies from the Coal Mines of Central Utah, 1993

Allan McCollum’s series *The Natural Copies from the Coal Mines of Central Utah* is a companion to the two series he’d done before – the *Lost Objects* (casts of dinosaur bones) and *The Dog From Pompeii* – all created from gypsum casts of fossils and done in cooperation with natural history museums around the world. The Natural Copies are re-castings of ‘natural casts’ of dinosaur tracks found in the roofs of coal mines in central Utah, which are produced through a process of natural fossilization.

By reproducing the natural casts as artworks, McCollum intersects another narrative into the story. Originally discovered in the roofs of underground mines, the footprints’ inverted position offers the eerie experience of a dinosaur walking on the ground above one’s head, already suggesting the realm of the fantastic: monsters and exotic creatures from a primeval and forgotten past, treasures produced over the millennia and unearthed from the subterranean depths through the competitive and determined search for ‘the rock that burns’. McCollum’s evocation of this narrative in the fine art context immediately transforms it into a metaphor for romantic views of the archaic and unconscious sources of human creativity, and at the same time suggests a symbolic shadow narrative that might underlie all social relations in communal labor.

Integral to his exhibitions is the accompanying display of multi-colored photocopies of didactic literature the artist calls the Reprints. This other display of ‘copies’ reiterates the metaphorical references to community organization, production, and dissemination in the real time of the exhibition space itself; it not only suggests an alternative to the convention of the expensive fine art catalogue, it simultaneously presents an exuberant, allegorical drama of repetition and production which imagines an uncanny continuity between the geological (natural) copying of tracks and traces from a prehistoric past and the mechanical and electronic endless copying of today.

\ NEW WEAPONS

\ NW \
Shi Jinsong
Secret Book of Cool Weapons, 2007

\ INDUSTRIAL EVOLUTION

\ IE \
Maarten Vanden Eynde
City of a thousand trades, 2007

Birmingham played a leading role in the Industrial Revolution, changing the world beyond recognition and paving the way for the largest population explosion in human history. In 1791, Arthur Young, the writer and commentator on British economic life described Birmingham as “the first manufacturing town in the world”. The Lunar Society, based in Birmingham, was the brain and fuel for the machine that powered the evolution of human civilization. The members of the Lunar Society were Matthew Boulton, Erasmus Darwin, Samuel Galton Junior, James Keir, Joseph Priestley, Josiah Wedgwood, James Watt, John Whitehurst and William Withering. More peripheral characters and correspondents included Sir Richard Arkwright, John Baskerville, Thomas Beddoes, Thomas Day, Richard Lovell Edgeworth, Benjamin Franklin, Thomas Jefferson, Anna Seward, William Small, John Smeaton, Thomas Wedgwood, John Wilkinson, Joseph Wright, James Wyatt, Samuel Wyatt, and Member of Parliament John Levett.

In 2007 most of the manufacturing companies moved out off Birmingham to other parts of the world where labor is cheaper. Together with the companies the knowledge to manufacture things is disappearing. In two generations there will be hardly anyone left who has the ability to make something. The Eastside area is being redeveloped and the predominant manufacturing business will be replaced by a service and culture oriented industry. Some huge factories have already been transformed to yuppie flats. I visited every factory at Eastside to excavate the remnants of the manufacturing industry.

Above the Jennens road I only saw university buildings and brain parks for the IT sector. In the middle there is Millenium Point and huge shopping areas surrounding the Bullring, one of the biggest shopping centers in the world. Everything is imported. Only in the southeast, in Digbeth (the historical center and birthplace of Birmingham), did I find manufacturing factories. Half of the buildings were empty already, abandoned, to let. The others are scheduled to disappear within a few years, some even within months. It felt like I was just in time to collect a few samples before everything was gone. Like a contemporary archaeologist I wandered through the area to look for what was still left. I asked the factory owners if they wanted to contribute to the collection of manufactured goods being made in Birmingham anno 2007. I wanted to preserve them for future archaeologists to discover. It was now or never.

“I remember Birmingham being the epitome of modernity … Birmingham was the future – in a sense it has been the future, but that bit of the future is worn out now and we need a new one”

[Will Alsop, architect]

\ PRESERVATION OF THE FUTURE

\ PF-1 \
Mark Dion
Mobile Wilderness Unit, 2001
(290 x 170 x 380 cm)
\ PF-2 \
Damien Hirst
Away from the Flock, 1994

Preserving information and ensuring the transmission of knowledge from one generation to another is an ancient cultural activity. As a field within library and archival science, preservation is only a few decades old. It began primarily as item-level repair and conservation, deriving its original professional traditions and physical techniques in large part from the museum world. To the importance in that world of the repair and conservation of individual pieces deemed to be of special value as artifacts, preservation in libraries has added the significance of the archival value of the object as bearer of historical evidence. Paradoxically, dedicated as it is to mitigating the deleterious effects of aging, preservation has rapidly become, along with computer applications, one of the most forward-looking fields in the library and archival profession. One step further is the predetermined preservation of all possible things representing the present. What do we preserve for the future?

(Based on a text by Abby Smith)

\ PF-3 \
Savage
Back to the flock, 2003

Jumper, unpicked, rolled into a ball and left in a field somewhere.

\ ‘THE REVOLUTION IS JUST AROUND THE CORNER’

\ RJAC \
Marjolijn Dijkman
The Revolution is Just Around The Corner, 2006

During my stay in Tbilisi I carried out some research into the transition of the street kiosk, and into the way people designed and constructed displays to sell their goods in the streets. The inventive and autonomous construction of these displays is a part of the economic history of Georgia. There is an evolution in the design of the displays, going from one piece of paper, a stick, a small table, a self invented construction, to a standardized Coca-Cola kiosk. If the economy and the regulations for selling goods continue to develop at the current speed, all the improvised and handmade displays will have disappeared from the city within the next couple of years. I decided to collect and preserve some examples of displays. Aside from the sculptural quality of the objects, the displays might contribute to a future to understanding of the development of Georgia’s rebuilding, and what it all started from. As in most democracies, it literary began with a piece of paper and a stick …

After I visualized the evolution of the display in a series of drawings and photographs I decided to make a collection of the authentic displays. I asked people with interesting and special displays if they would be willing to exchange their display for my exact, though standardized copy of it. The exchange itself is an important moment in the process. The two exchanged displays and their satisfied owners reveal the complicated present relationship between the West and Georgia, an Eastern country in transition. The owners from Tbilisi were amazed by the new standardized copy, and I, from the Netherlands, was totally fascinated by the character and authenticity of the old displays. There is a strong longing for the West in Georgia and the West is curious about and fascinated by the Eastern countries. This exchange of ideologies, and the aims of the rebuilding of Georgia were important topics of discussion. The exchanged displays and a series of photographs of the actual exchange constituted ‘The revolution is just around the corner’.

\ MODERN ARCHAEOLOGY

\ MA-3 \
Mark Dion
New England Digs, 2002

Mark Dion is an explorer, naturalist, archaeologist, botanist, historian, and artist all rolled into one. His recent art actions and museum installations have focused on archaeological digs at unusual sites, deemed ‘historically insignificant’ by local historians. A recent dig on the bank of the Thames River in London revealed interesting, if not significant, objects such as medicine bottles, animal bones, pottery shards, and several messages in bottles. As with other dig recoveries, Dion categorized the Thames material and presented it in curiosity cabinets (a term describing the display cases used for cultural artifacts and oddities in the seventeenth century) at the Tate Museum in London. Unlike an archaeologist who scientifically classifies objects to reveal their historical significance, Dion creates his own categories that may tell us more about contemporary culture than that of the past-color, for example, may put a sixteenth century, yellow porcelain fragment next to a Juicy Fruit gum wrapper.

\ INDUSTRIAL EVOLUTION

\ IE \
Maarten Vanden Eynde
City of a thousand trades, 2007

\ CADILLAC RANCH

\ CR \
Ant Farm
(Chip Lord, Hudson Marquez, Doug Michels)

Build in 1974, Cadillac Ranch was made up of ten Cadillacs, ranging from a 1949 Club Coupe to a 1963 Sedan, buried fin-up in a wheat field in Texas. The piece was contructed in four days using a motorized back-hoe and low-tech surveying tools. On the fifth day the work was unveiled. In the tradition of readymades, the work uses mass-produced parts which have symbolic overtones. The Cadillac was a status symbol in 1960s America, indicating that the owner was financially succesful and had therefor ‘made it’. By using the Cadillacs as mere component parts of a work, *Ant Farm* subverted their symbolic function. The piece functions as a kind of cemetery, a comment on social values as well as their deathly polluting effect on the environment.

\ STONEHENGE THE SEQUEL

\ STS \
Jim Reinders
Carhenge, 1987

Carhenge, which replicates Stonehenge, consists of the circle of cars, 3 standing trilithons within the circle, the heel stone, slaughter stone, and 2 station stones, and the Aubrey circle …

The artist of this unique car sculpture, Jim Reinders, experimented with unusual and interesting artistic creations throughout his life. While living in England, he had the opportunity to study the design and purpose of Stonehenge. His desire to copy Stonehenge in physical size and placement came to fruition in the summer of 1987 with the help of many family members.

Thirty-eight automobiles were placed to assume the same proportions as Stonehenge with the circle measuring approximately 96 feet in diameter. Some autos are held upright in pits five feet deep, trunk end down, while those cars which are placed to form the arches have been welded in place. All are covered with gray spray paint. The honor of depicting the heel stone goes to a 1962 Caddy.

\ TRASHOLOGY

\ T \
Pascal Rostain & Bruno Mouron
Hollywood’s trash and treasure, 2004

In 1988, French photographer Pascal Rostain had an idea. Or, to be strictly accurate, he nicked someone else’s. He read an article by a French sociologist who had set his students a project to examine the contents of 10 people’s rubbish bags. In garbage, the sociologist declared, could be found people’s true personality.

Rostain wondered if it might take a little showbusiness twist. The next time he went on a job – to photograph the French singer Serge Gainsbourg – he took Gainsbourg’s bin-bags home with him. What he found astonished him. “It was like the key to Gainsbourg” he says. “Everything was completely distinctive: the bottles of Ricard, the packets of Gitanes. I felt as if I had a part of him in front of me.”

Soon Rostain and his partner, Bruno Mouron, were sifting through other famous people’s bin-bags. Brigitte Bardot came next, then French National Front leader Jean-Marie Le Pen. It may have been messy and smelly, but the results, the pair reckoned, were well worth the effort.

The magazine Paris Match suggested they try their luck in Los Angeles. In 1990, Rostain and Mouron flew to California with a map of the stars’ homes and a garbage collection schedule for Beverly Hills. “The first thing we would do was locate a suitable home,” says Rostain. “For example, Jack Nicholson’s or Bruce Willis’. Next, we would find out when the garbage was being collected and grab it before the truck came round.”

Taking someone’s rubbish is not illegal in America, but then came the awkward part. Rostain and Mouron wanted to do the photography in their Paris studio where they felt able to do their best work. They travelled back to France with three trunks of rubbish. When French customs officers demanded the trunks be opened, they recoiled in disgust, then went into a perplexed huddle and finally waved them through as harmless lunatics. Once home, they washed the contents of their trunks before spreading them out in neat lines to be photographed. They decided not to shoot anything that was either directly personal or medical – despite finding American Secret Service papers in Ronald Reagan’s rubbish listing his bodyguards and details of the weapons they carried. This puts them in quite a different league to more scurrilous scroungers such as Britain’s Benjamin Pell (aka ‘Benji the Binman’) who has made a speciality of raiding the rubbish bins of the famous, then selling the contents on to the tabloids, or even the original ‘garbologist’ A. J. Weberman, who obsessively pillaged Bob Dylan’s bin for three years in the late 1960s.

It comes as no surprise to learn that several of Rostain and Mouron’s subjects – they won’t say who – recently bought the prints of their own rubbish at an exhibition in New York for $US6000 ($A8300) a piece, thus completing what even by Hollywood standards is a very peculiar cycle of self-regard.

“My brother is an archaeologist,” says Rostain, “and he’s always telling me that if he could find the garbage of a Mayan family, then he would win a Nobel prize.

Oddly enough, I think what we are doing is significant. In 200 years’ time our pictures will provide a very useful guide to how certain people lived in the 21st century. So, you see, what we’re doing is fun – but it’s not only fun.”

(Written by John Preston - Telegraph Magazine)

\ OBJECT FETISHIZATION

\ OF-1 \
Haim Steinbach
Caution, 2007
\ OF-2 \
Pink accent^2, 1987

Since 1979 Steinbach has produced works that feature a variety of familiar, common objects, creating a system for their display and thereby introducing a sense of order into the chaos of consumer culture. Selecting his sculptural elements while out shopping, Steinbach addresses the newness and pleasure associated with purchasing objects as well as the tremendous range of things that people buy, collect, and preserve. Additionally, by incorporating items that are readily available and easily replaceable, Steinbach challenges the traditional methods of art-making and undermines the fetishization of the art object.

\ CADILLAC RANCH

\ CR \
Ant Farm
(Chip Lord, Hudson Marquez, Doug Michels)

\ THE CAR-AGE

\ CA-1 \
Patrick Nagatani
Bentley, Stonehenge, Salisbury Plain, Wiltshire, England, 1987
\ CA-2 \
Model A Woody, National Astronomy Observatory (VLA), NM, USA, 1997
\ CA-3 \
Volkswagon ‘Beetles’, Xi’an, Necropolis of Mt. Li’, China, 1988

Nagatani informs us that in 1985, a Japanese archeologist named Ryoichi received a mysterious set of maps that led him to excavate numerous historic and contemporary sites around the world noted for their cultural significance. For fifteen years Ryoichi and his team secretly excavated Stonehenge, Chaco Canyon, Ayers Rock, Kitt Peak National Observatory, the very Large Array radio-telescope, and other sites. At each location they unearthed a different make of car. Buried in the volcanic ash at Herculaneum they found a Ferrari. In the foundations of the Observatory at Chichen Itza was a Jaguar, while a Bentley emerged from Salisbury Plain near Stonehenge. Ryoichi had discovered a worldwide ‘automobile culture’ that appeared to parallel our own, although it was anachronistic both historically and geographically. After unearthing the artifacts, Ryoichi’s team covered up all evidence of their digs, but not before Nagatani had photographed each site, providing the only existing record of Ryoichi’s discoveries.

\ THE NEW WORLD ORDER

\ NWO-1 \
Tony Cragg
Britain Seen From the North, 1981
\ NWO-2 \
Stack, 1975

Many of Cragg’s early works are made from found materials and discarded construction materials and disposed household materials. This gave him a large range of mainly man-made materials and automatically provided him with the thematic concerns that became characteristic of his work up to the present. During the 1970s he made sculptures using simple making techniques like stacking, splitting and crushing. In 1978 he collected discarded plastic fragments and arranged them into colour categories. The first work of this kind was called *New Stones - Newtons Tones.* Shortly after this he made works on the floor and wall reliefs which created images. One of these works, *Britain Seen From the North* (1981), features the shape of the island of Great Britain on the wall, oriented so that north is to the left. To the left of the island is the figure of a man, apparently Cragg himself, looking at the country from the position of an outsider.

\ COPY A COPY

\ CC-1 \
Andy Warhol
Brillo Boxes, 1969
\ CC-2 \
Campbell’s Soup Cans, 1962

The Moderna Museet, Stockholm’s modern art museum, has determined that six Andy Warhol Brillo boxes in its collection are fakes. They were turned out by carpenters three years after Warhol’s death, at the request of the late Pontus Hulten, the Museum’s famous director in the 1960s, who needed them to promote a show in Russia in 1990. The Museum now claims that Hulten later sold some of the boxes with the false claim that they had been made in 1968 and donated several to the Museum.

The irony in the row is that Warhol himself questioned the idea of ‘original’ art – choosing everyday items as subjects and producing thousands of prints of the same work. Andy Warhol often left assistants to ‘mass produce’ many of his most famous pictures, among them images of the Campbell soup tin.

The Andy Warhol Authentication Board has decreed that only artworks the artist was directly involved in producing can be considered a Warhol original, according to reports in the Independent on Sunday and Sunday Telegraph in the UK.

Andy Warhol paintings are among the most prized 20th Century artworks. A screen-print of Campbell’s soup tin fetched £10m at an auction, while a Marilyn Monroe picture from 1967 reached £11m at auction in 1998. Was it really real?

“Isn’t life a series of images that change as they repeat themselves?”

[Andy Warhol]

\ PRESERVATION OF THE FUTURE

\ PF-3 \
Biosphere II in Arizona
(funded by billionaire Ed Bass)

Biosphere II is a 3.15-acre (12,700 m^2) structure originally built to be an artificial closed ecological system in Oracle, Arizona (USA). Constructed between 1987 and 1991, it was used to explore the complex web of interactions within life systems. It also explored the possible use of closed biospheres in space colonization, and allowed the study and manipulation of a biosphere without harming Earth’s. The name comes from the idea that it is modeled on the first biosphere, which is the life system on Earth. The first closed mission lasted from September 26, 1991 to September 26, 1993. The crew were: medical doctor and researcher Roy Walford, Jane Poynter, Taber MacCallum, Mark Nelson, Sally Silverstone, Abigail Alling (a late replacement for Silke Schneider), Mark Van Thillo and Linda Leigh. At a size comparable to two and a half football fields, it was the largest closed system ever created. The sealed nature of the structure allowed scientists to monitor the ever-changing chemistry of the air, water and soil contained within. The health of the human crew was continuously monitored by a medical team. After several month extra oxygen was needed from the outside world. Several animal species died and food was scarce. No mission was ever successful in the sense that *Biosphere II* proved to be a functional alternative to *Biosphere I.*

\ PF-4 \
Rachel Whiteread
House, 1993 (concrete - destroyed)

Nineteenth-century sculptors referred to the process of bronze casting as life, death, and resurrection as the original live object was destroyed in the casting process and resurrected in bronze. In a similar but distinctly different manner Rachel Whiteread casts the space inside, around, and adjacent to objects that have been part of people’s lives. This process and her choice of materials transform the residue of everyday life into ghostlike, uncanny spirit images of everyday objects.

Rather than using the traditional casting process of making molds of objects and then casting them in a different material, Whiteread uses the objects themselves as molds. For example her 2002 sculpture *Sequel IV,* is a casting of the enclosing space surrounding the backs of a library shelf done in plaster. This is a reversal of a bookshelf as the titles are hidden and the books inaccessible. Instead of inviting browsing, these books are inaccessible shadows, frozen in time, reflecting hidden knowledge. It is as if we came upon an ancient ruin of a library.

House was cast from the last row house left in an area in East London that was being demolished for urban renewal. The brick and wood structure of the house was used as a mold for the casting of *House.* After the structure was stripped away, what was left was a ghostlike monument to the private insides of a dwelling turned inside out.

(Text by Damon Hyldreth)

\ APOLOGETIC ARCHAEOLOGY

\ AA \
Guillaume Bijl
Archaeological Site (A Sorry Installation), 2007

Right in the middle of a grassy area on the Sentruper Höhe by Lake Aa with nothing but trees and meadows around, is a milestone of cultural tourism. If the spectator steps a bit closer, he can view the archaeological excavation site from a balustrade guarding the edge of the pit. Standing there, he will see an unearthed, shingle-roofed spire topped by a weathercock. Guillaume Bijl discovered it – or rather, he invented it, as the spectator will quickly have guessed. It is an absurd, surrealist sculpture. With their steeples, the churches of Münster are still an integral part of the urban landscape. Bijl came up with the idea that “somebody could discover another church – one that had fallen victim to the passage of time, buried during the war.” And, thanks to the Belgian artist, Münster has now gained new perspective on the culture of façades.

With his characteristic charm, Guillaume Bijl has added an apologetic gesture to his work, assigning it to the category of ‘sorry objects’ that reveal themselves to be reproductions. However, Bijl is not apologizing for drawing a caricature of our expectations, but rather for betraying his normal emphasis on realism. His modesty will probably not help him much, though, for his steeple will become a tourist attraction.

\ STONE AGE

\ SA \
Maarten Vanden Eynde
Genetologic Research n° 3, 2003

Stones are the core of our planet. You can find them almost anywhere in what we call our ‘natural environment’ (mountains, deserts, oceans). The industrial revolution created two new kind of stones: bricks and concrete. Slowly they are taking over the natural environment.

Genetologic Research n° 3 was made in France during the international symposium Art & Nature which was dealing with the river l’Hers that runs through the village of St-Colombe. I recreated several giant pebbles out of massive blocks of bricked wall and displayed them in the current of the river. As more and more big city beaches are being submerged by human made stones, I introduced these contemporary pebbles in the ancient French village as a memory for the future. On two other occasions they were displayed indoors as separate sculptures.

\ 3 *** HOTEL

\ 3*H \
Michael Sailstorfer
3 Ster mit Ausblick, 2002

“The title *3 Ster mit Ausblick* (3 Steres with a view, 2002) … juxtaposes technical vocabulary with a romantic sentiment one might find in Casper David Friedrich. Sailstorfer describes the etymological signifigance of the word Ster: Ster is a Bavarian slang and means 1m x 1m x 1m of wood. 3 Ster are 3 x 1m x 1m x 1m of wood. The amount of wood they used to build the cabin. ‘Mit Ausblick’ translates as ‘with a view.’ But it is not any kind of view, but implies a paradoxical outlook into delightful, often remote scenery. We will see how paradoxical this title proves to be.”

“With playful irony, the artists change the meaning of the wood-burning stove. It no longer acts as the material and spiritual center of the house, but instead, becomes the internal aggressor that attacks the very foundations of its own domesticity. Sailstorfer and Heinert’s transformation denies the stove the role as a literal and metaphorical place of nourishment. On the contrary, its own self-nourishment leads to self-annihilation. Instead of offering a nice view, the 3 Ster – this certain amount of wood – no longer constitutes the cabin, but is now turned into its most basic usage: as food for the stove.”

(Massimiliano Gioni, Max Hollein, Johan F Hartle, Simone Subal. 2006. Michael Sailstorfer: Für Immer War Gestern. Verlag Für Moderne Kunst., p. 5)

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AT THE ORIGIN OF HISTORY, EVERY DAY

A few words about Maarten Vanden Eynde’s Science of First Things

All men use stories and images to converse with the world, which is largely invisible and unknowable. These stories and images do not necessarily have to correspond to this unknowable reality. As long as they produce some effect, they will be used. This is what art and science have in common: the development of new forms to converse with reality in order to be able to survive more easily and more comfortably. In both cases, the basic problem is finding strategies to make the jump from our body of existing knowledge to new insights. As Thomas Kuhn wrote, these jumps probably occur during our sleep.

When I first met Maarten Vanden Eynde, I was struck by the beauty of his sculptures, but also by this strange collection of images pinned to the studio wall and arranged according to old and newly invented sciences. Some patterns in the images on the wall matched patterns within the sculptures (e.g. the wooden sticks imitating antlers and the repaired cracks in the French lake). I sensed a joyful faith in the miracles of form, as wondrous links with the outside world. I call this faith joyful, because it was obvious that the artist recognized and savored the hypothetical nature of his construction. I know a lot of artists who juggle with theories to arrive at new images, but very often they take themselves so seriously that one feels pity. I must admit I prefer this artist’s playful approach to the wonders of our interaction with the world.

However, it was not until I attended a reading by this artist, kindly offered by him to my Antwerp students, that I understood the background and maybe one of the deeper meanings of his Genetology or Science of First Things. Apparently, the artist went through a rough period of hopelessness, during which he couldn’t help but perceive everything he did as being part of a dying world that is nearing its end. I remember suffering from the same spleen or despondency when I was younger, until I invented a buoyant young man who wasn’t burdened by the past or afraid of the future and who dared to write as if he were the first poet on earth. Vanden Eynde’s approach is different, much more energetic, much more complex and perhaps more efficient too. With a verve that reminds us of Walt Whitman and Alvaro de Campos’s wish to be everything and everywhere at the same time, this young man tries to encompass the complete field of human knowledge from the wrong side. It’s a moment of genius, reminding us of Nietzsche’s revelation concerning the Eternal Recurrence of the Same: if our lives are without meaning, perhaps every moment becomes meaningful if we imagine it to be destined to happen over and over again, forever …

Vanden Eynde’s reasoning is the following: what if everything I did was not part of a dying past, but the beginning of a bright future? What if the object I am making at the moment is the only object which in 2,000 years’ time will be left over from our civilization? In that case, every object can be seen as sacred. And funny. Because from that moment on everything Vanden Eynde creates might also be seen as a potential witness of the stupidity, tastelessness or mere absurdity of our culture. And all his sculptures comment on our own way of dealing with the past and extracting stories from it, based upon some accidental findings. For example, Maarten Vanden Eynde breaks an Ikea cup and tries to mend it, or travels to Rome to bury an artifact on an archaeological site. Thus he discovers authentic footprints of a Chihuahua in Los Angeles, dating from the year 2008, and tries to preserve them for humanity. Basically, he turns upside down our historical way of looking at things by pretending to predict what will be left of our society in the future, and he does so without ever forgetting the absurdity of his undertaking. These days the idea that history is always a construction of the beholder, is generally accepted. Truly objective history doesn’t exist. We don’t know what happened in the past, we don’t know what’s happening in the present and we surely don’t know what will happen in the future. But as long as we stick to Socrates’ adagio never to forget that we know nothing, we can continue to embrace the world with an open mind and perhaps even learn something.

Vanden Eynde’s Genetologic Research is divided into different chapters, which correspond to different traditional sciences (and some new ones). The chapter illustrated on this poster is dedicated to archaeology. Obviously, archaeology is closely linked to Vanden Eynde’s Science of first things. Primarily based upon the interpretation of isolated findings, this science tries to reconstruct cultures from the past. Funny business. If they find the oldest human bone in Africa, they think man originates from that continent. If they find an older bone in China, man has to have originated in China. And so on. In the past, when an archaeologist found one golden ape, he or she declared that the culture in question worshipped apes. Why else would they have gone through the painstaking process of creating such a sophisticated object? This method was so silly, of course, that by the end of the 20th century they started coining concepts to explain the presence of ‘random’ objects: firstly the creativity and freedom of the craftsman and secondly the concept of ‘emulation’: objects might also have come into being as the result of a kind of copying, e.g. for reasons of status (instead of absolute representational reasons). Clearly, this emulation business is another way of rationalizing the fact that the whole undertaking is absurd if one doesn’t recognize its hypothetical nature.

One of the most important books about archaeology at the moment is Steven Mithen’s *The Prehistory of the Mind* (1996). With his so-called cognitive approach Mithen tries to explain the sudden appearance of art and agriculture, which he attributes to a change in man’s brain, i.e. to a genetic change within the species of homo sapiens sapiens. According to Mithen, prior to this change man possessed several fields of knowledge that had come into existence as an answer to different problems: he distinguishes between a field of knowledge for the design and use of tools, one for the recognition of the natural environment (orientation, tracking), one for language and one for socializing. Apart from these four fields, man also possessed a kind of general intelligence, which he shared with animals. Art and agriculture would have become possible once the knowledge of the four separate fields started flowing into the other fields, where it started to be used ‘incorrectly’, i.e. in the form of metaphors, thus paving the way for creative new solutions. We know that art and science really evolve this way: by applying patterns originating from one field (e.g. mathematics) to another (e.g. cellular biology), but does this imply the need for a genetic revolution to account for the birth of art and agriculture? According to Mithen such a genetic revolution was needed to allow mothers to acquire the necessary social and linguistic skills to have others feed them whilst they took care of their babies. He also thinks that these social and linguistic skills would have started to mingle at that moment. I don’t think Mithen ever observed a mother with a young baby (and underestimates the strength and mobility of nurturing women) and never really wondered how animals organize mutual feeding. Is there really a fundamental difference? Anyway, this is not the place to discuss this book at great length. The basic absurdity is that Mithen’s attempt isn’t presented as a hypothesis, but as a reconstruction that must contain some truth. What a hopeless business!

One look at the writings of Oliver Sacks would make you wonder why Mithen doesn’t talk about music. If we really have to accept the existence of an innate linguistic and social grammar, as he believes, why not perceive it as a kind of musical intelligence or just a biological, chemical, electrical and rhythmical way of storing and combining knowledge? At some point Sacks proposes we consider proprioception (the internal ‘image’ we have of our bodies) as the continuous singing of a kind of internal melody, which is constantly sustained by nerve impulses originating from all over our body. However, he never presents his ideas as a truth, always as a hypothesis. This open way of thinking allows him to observe facts that seem to escape other people, e.g. when he slowly discovers the true linguistic and at least four-dimensional, visual, spatial and temporal structure of sign language, as opposed to the more linear structure of common language. In short, if we compare archaeology to two other sciences of first things, evolutionary biology and astronomy, we cannot help but notice that quite often it suffers from teleological prejudices and a pathetic desire for absolute ‘scientific’ proof common to much of biological thought, and that it lacks the playful, modest, tolerant and consciously hypothetical approach to astronomy.

Unfortunately, the same closed, fearful, teleological way of thinking is common to most of what is written about art, which is almost always looking for ‘meaning’ instead of appreciating art as an endless production of images and forms allowing us to discover, handle or simply enjoy new parts of reality. Very often, the meaning they hope to discover seems to be a superficial, rather meager one, devoid of body, sense, sensuality, rhythm, matter, color and incongruous diversity or unpredictability. Time and time again, theoreticians concentrate on the elements works of art have in common so as to classify them, instead of concentrating on what makes them specific. According to Lévi-Strauss (in a lecture for Canadian radio), if we want to look for meaning in myths, we have to look for what they have in common, e.g. the presence of twins. I would like to turn this around. If we consider ‘twins’ to be an essential formal element to construct a story, we might also consider them to be void of specific meaning, and try to do the opposite: consider the differences between several myths as more meaningful than what they have in common. Or both at the same time, of course. Was Heraclitos the Obscure one of the first to use metaphors (“Fire is the Father of all Things”) because of the recent introduction of money into his culture (as Marxists would claim), or could the introduction of money be viewed as the result of a new capacity to think metaphorically? Probably both evolutions came about simultaneously.

In 2003, Maarten Vanden Eynde created giant pebbles out of large fragments of brick walls and placed them in a river, thus referring to the man-made stones turned into pebbles currently found on beaches everywhere (Stone Age, *Genetologic Research n° 3,* 2003). I think it’s a marvelous piece of sculpture, because of the unexpected size and the playful tension between the orthogonal cement lines and the rounded shape, but also because of the reference to contemporary beaches and the ongoing construction activities throughout the world. In 2004 Vanden Eynde learned how to make a traditional Japanese ceramic tea-cup; he made one, broke it and exhibited the shards. In 2007 he had a postcard of the Berlin Wall exhibited with a piece of the wall. In 2007 he invited slowly disappearing manufacturers in Birmingham (Great Britain) to donate two specimens of a product they made. In 2008 he reconstructed the skeleton of *Homo Stupidus Stupidus* and he showed a negative clay mould of a lamp and a cup as an archaeological find from the IKEA era. The title of this piece, *Plato’s Closet,* reminds us of the famous parable of the cave and of Plato’s conviction that non-philosophers were blind to the Real World, which now, 2000 years later, still has the habit of hiding and playing tricks on us. Nothing wrong with stumbling, I think, as long as we do it graciously.

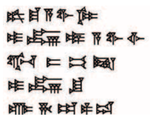
The fake antlers, the cracks in the repaired lake and in the Ikea cup and hundreds of other cracks, folds, rhythms and patterns, sing a song of endlessly changing forms, some of which remain invisible to us, some of which were created to help us stumble forward into the darkness.

I am curious to see how this beautiful and heart-felt work will evolve.

Hans Theys, Montagne de Miel, February 2nd 2009
www.hanstheys.be
Editor: Willem Vanden Eynde

Original Old-Babylonian

Neo-Assyrian



Classic Sumerian

Transliteration

šumma awīlum
šīn mār awīlim
uḫtappid
šīn šu
uḫappadû

English

If a man
the eye of a son of man
destroys
eye his
they will destroy.

\ CCS-1 \

\ CCS-2 \

\ CCS-3 \

\ MA-I-1 \

\ MA-II-1 \

\ MA-II-2 \

\ HC \

\ III \

\ IB-1 \

\ IB-2 \

\ MA-2 \

\ TE-1 \

\ FF-2 \

\ NC-1 \

\ NC-2 \

\ DD \

\ FIM \

\ FF-3 \

\ MA III-1 \

\ PBW-1 \

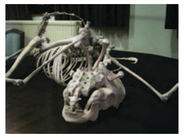
\ PBW-2 \

\ PBW-3 \

\ FIM \

\ C \

\ HSS \



\ MA III-2 \

\ DP-1 \

\ DP-2 \

\ NW \

\ IR \

\ PF-1 \

\ PF-2 \

\ PF-3 \

\ RIAC \

\ MA-3 \

\ IR \

\ CR \

\ IT \

\ ITI \

\ OF-1 \

\ OF-2 \

Ronald Reagan

Sharon Stone

Madonna

\ T \

\ CR \

\ CA-1 \

\ CA-2 \

\ CA-3 \

\ NWO-1 \

\ NWO-2 \

\ CC-1 \

\ CC-2 \

\ PF-3 \

\ PF-4 \

\ CA-4 \

\ AA \

\ SA \

\ PH \

www.genetology.net

\ LANDSCAPING

"Nature transformed through industry is a predominant theme in my work. I set course to intersect with a contemporary view of the great ages of man; from stone, to minerals, oil, transportation, silicon, and so on. To make these ideas visible I search for subjects that are rich in detail and scale yet open in their meaning. Recycling yards, mine tailings, quarries and refineries are all places that are outside of our normal experience, yet we partake of their output on a daily basis.

These images are meant as metaphors to the dilemma of our modern existence; they search for a dialogue between attraction and repulsion, seduction and fear. We are drawn by desire – a chance at good living, yet we are consciously or unconsciously aware that the world is suffering for our success. Our dependence on nature to provide the materials for our consumption and our concern for the health of our planet sets us into an uneasy contradiction. For me, these images function as reflecting pools of our times."

[Edward Burtynsky]

\ L-1 \
Edward Burtynsky
Urban Renewal #5, City Overview From Top of Military Hospital, Shanghai, 2004
\ L-2 \
Oil Fields No. 13, Taft, California, 2002
\ L-3 \
Oxford Tire Pile No. 5, Westley, CA, 1999
\ L-4 \
Tanggu Port, Tianjin, 2005
\ L-5 \
Kennecott Copper Mine No. 22, Bingham Valley, Utah, 1983

\ CURVED SPACE

\ CS \
Folded rock in Namib desert (Southern Africa)

When Einstein wrote his general theory of relativity in 1915, he found a new way to describe gravity. It was not a force, as Sir Isaac Newton had supposed, but a consequence of the distortion of space and time, conceived together in his theory as 'space-time'. Any object distorts the fabric of space-time and the bigger it is, the greater the effect.

Just as a bowling ball placed on a trampoline stretches the fabric and causes it to sag, so planets and stars warp space-time – a phenomenon known as the 'geodetic effect'. A marble moving along the trampoline will be drawn inexorably towards the ball.

Thus the planets orbiting the Sun are not being pulled by the Sun; they are following the curved space-time deformation caused by the Sun. The reason the planets never fall into the Sun is because of the speed at which they are travelling. According to the theory, matter and energy distort space-time, curving it around themselves.

(Anushka Asthana and David Smith, The Observer)

\ NOUMENON CONUNDRUM

Charles Avery
The Islanders: An Introduction, 2004 - …

For the past four years, Scottish artist Avery has created texts, drawings, installations and sculptures which describe the topology and cosmology of an imaginary island, whose every feature embodies a philosophical proposition, problem or solution.

\ NC-1 \
Untitled (World View), 2008

Avery's mapping of the Island, to be completed over a projected ten-year period, can be interpreted as a meditation on making art and the impossibility of finding "truth". The artist is characterised as a bounty-hunter, retrieving artifacts and documenting scenes from the subjective realm. Some of the works on show will focus in absurd detail, on particulars such as the sale of pickled eggs in the marketplace. Others present mysterious landscapes, such as the "Eternal Forest", a place no one can ever reach but where a prized beast called the Noumenon is rumoured to live. A specimen of the Island's wildlife will also be on show, having been realised in the form of a large taxidermy sculpture. These vivid and intricate works invite the viewer to recreate the Island in their own minds, and to use it as an arena for exploring philosophical conundrums and paradoxes.

\ THE INVISIBLE LINE

\ IL-1 \
Gordon Matta-Clark
Splitting, 1974

Gordon Matta-Clark (1943 – 1978) was an American artist best known for his site-specific artworks made in the 1970s. He is famous for his "building cuts", a series of works in abandoned buildings in which he removed sections of floors, ceilings, and walls. Over a period of about three months in 1974, he made two parallel vertical cuts straight through the middle of a nondescript two-story suburban house in Englewood, New Jersey, removing the material left between the cuts as well as some of the foundation blocks on which the house stood so that one half slightly tilted away from the other, creating a wedge-shaped aperture between them.

\ BIOMIMETIC CHAIR

\ BC-1 \
Ai Weiwei
Monumental Junkyard, 2006
(each 210 x 80 cm)
\ BC-2 \
Marble Chair, 2008
(125 x 52 x 50 cm)

"The marble chair is made from a solid piece of a stone into a chair, into something which ironically overthrew the idea of the wooden classic chair. The work as one piece is strongly against its own form, its own way of structure. In the kind of making it really dismisses its own meaning. I enjoy that part."

[Ai Weiwei]

\ BC-3 \
Joris Laarman
Bone Chair

Joris Laarman's *Bone Chair* takes its inspiration from the efficient way that bones grow (adding material where strength is needed and taking away material where it's unnecessary). Made using a digital tool developed by GM that copies these methods of construction, Laarman says the ironic result of his biomimetic technique is "an almost historic elegancy" that is "far more efficient compared to modern geometric shapes."

If evolution could create a chair …

Trees have the ability to add material where strength is needed. But bones also have the ability to take away material where it is not needed. With this knowledge the International Development Centre Adam Opel GmbH, a part of General Motors Engineering Europe created a dynamic digital tool to copy these ways of constructing used for optimizing car parts. In a way it quite precisely copies the way evolution constructs. I didn't use it to create the next worlds perfect chair but as a high tech sculpting tool to create elegant shape with a kind of legitimacy. The chair is the first in a series and the process can be applied to any scale up to architectural sizes in any material strength …

(credits to: Prof. Dr. Mattheck, Forschungszentrum Karlsruhe and Gravotech B.V.)

\ ORE GENESIS

\ OG-1 \
Maarten Vanden Eynde
Genetologic Research Nr. 25: Ore Genesis, 2006
(60 x 80 x 160 cm)

An ore is a volume of rock containing components or minerals in a mode of occurrence which renders it valuable for mining.

Rare samples of ore in the form of exceptionally beautiful crystals, exotic layering (when sectioned or polished) or metallic presentations such as large nuggets or chrystaline formations of metals such as gold or copper may command a value far beyond their value as mere ore or raw metal for subsequent reduction to utilitarian purposes.The grade or contained concentration of an ore mineral, or metal, as well as its form of occurrence, will directly affect the costs associated with mining the ore. The cost of extraction must thus be weighted against the contained metal value of the rock and a 'cut-off grade' used to define what is ore and what is waste.

Ore minerals are generally oxides, sulfides, silicates, or 'native' metals (such as copper) that are not commonly concentrated in the Earth's crust or 'noble' metals (not usually forming compounds) such as gold. The ores must be processed to extract the metals of interest from the waste rock and from the ore minerals.

Ore bodies are formed by a variety of geological processes. The process of ore formation is called ore genesis.

\ OG-2 \
The various theories of ore genesis explain how the various types of mineral deposits form within the Earth's crust. Ore genesis theories generally involve three components: source, transport or conduit, and trap. This also applies to the petroleum industry, which was first to use this methodology.

Source is required because metal must come from somewhere, and be liberated by some process.

Transport is required first to move the metal bearing fluids or solid minerals into the right position, and refers to the act of physically moving the metal, as well as chemical or physical phenomenon which encourage movement.

Trapping is required to concentrate the metal via some physical, chemical or geological mechanism into a concentration which forms mineable ore.

The biggest deposits are formed when the source is large, the transport mechanism is efficient, and the trap is active and ready at the right time.

\ SYSTEMATIC LANDSCAPES

\ SL-1 \
Maya Lin
Caspian Sea, 2006

\ CONCRETE CASTING

\ CC \
Rachel Whiteread
House, 1993
(concrete, destroyed)

House, perhaps Whitereads best known work, was a concrete cast of the inside of an entire Victorian terraced house. It was completed in autumn 1993 and exhibited at the location of the original house – 193 Grove Road in East London (all the houses in the street had earlier been knocked down by the council). It drew mixed responses, winning her both the 1993 Turner Prize for best young British artist and the concurrent 1994 K Foundation Art Award for worst British artist.

\ NEUTRAL BUNKERS

\ NB \
Leo Fabrizio
Swiss Bunkers, 1999-2004

Switzerland is riddled with hidden and disguised military installations. What appears to be a rock face in a lay-by beside the road are actually steel and concrete doors painted like rock. *Swiss Bunkers* is a five years study, questioning landscape and identity. Is the territory surrounding us influencing our identity? What happens then when this territory, reputed to be wild and pure, is in fact completely manipulated by humans?

"After the cold war ended many of the bunkers became obsolete. The tendency is to forget them or even to renounce them, my approach on the contrary, aims to expose them from a new angle. This approach has led me to discover a great number of bunkers, some in remote areas, sometimes hardly accessible, covering the whole of the Swiss territory. The relations between the basic geometrical shapes of these bunkers and the often sumptuous landscape surrounding them became an essential part of the study. I looked for the most spectacular bunkers, notable for their camouflage devices, genuine theatre scenery made with the utmost care. A quality indeed fully Swiss."

[Leo Fabrizio]

\ INDUSTRIAL GARDENING

\ IG \
Panamarenko
Hofkes, 1967

Three thick sheets of cardboard of about 1m^2 carry a variety of inorganic trash and debris. From a kind of prophetic, visionary viewpoint, Panamarenko nostalgically tries to restore and reconstruct the long lost city-gardens, that put some country life into the city and provided additional food for the working classes. Since 2008 the majority of the world population is living in cities. The necessity to have physical contact with the earth and live from the land is gone. People are used to this new, self-created landscape and recognize the urban environment as their natural habitat.

\ OCEAN EARTH

\ OE \
Peter Fend – Ocean Earth
LOCAL FUEL PRODUCTION, Afganistan/Iran, 2009

The aim of the Ocean Earth Construction and Development Corporation is research on alternative energy sources. They use satellite imaging to monitor and analyze global ecological and geopolitical hot-spots, largely for media clients. Considering the world a living earthwork, ecological aspects are linked to and interconnected with artistic aspects. Ocean Earth was conceived as an instrument for implementing the goals of the environmental art movement, directly building upon the ideas of artists such as Joseph Beuys, Robert Smithson and Gordon Matta-Clark. Through inter-disciplinary collaborations and by connecting ecological imperatives with experimental new technologies, Fend asks 'How far can art go?' in drawing attention to a belief that artistic research can generate productive dialogue about global ecological problems and that it can be used to develop effective solutions.

"Geopolitically, fighting in Afghanistan is about fossil-fuel flows from Central Asia to the world. But geophysically, one sees the context to be inward-draining sea basins. These basins can be "studied" as modeled in a skatepark … They can also become sources of local energy, from renewable sources: direct solar (of course), run-of-the-river waterwheels, up high, and massive harvests of waterplants (e.g., Elodea) to yield … local, renewable, zero-emissions methane gas. Why fight over fossils?

Afghanistan, with Iran, mostly drains inward. Therein, one can catch fast-flow water energy with waterwheels, and can produce zero-emissions fuel by fermenting the huge amounts of waterplants that absorb the inflowing nutrients. Soldiers can set up 'local energy production.'"

[Peter Fend]

\ SYSTEMATIC LANDSCAPES

\ SL-2 \
Maya Lin
Atlas Landscape, 2006

\ CONTEMPORARY CAVEDRAWINGS

\ CCA \
Maarten Vanden Eynde
Contemporary Cavedrawings, Los Angeles, 2007

The first manifestations of human existence and self-expression, hand-marks, negative prints of hands, left behind in caves or on mountain slopes by putting one's hand against the wall and spitting white chalk over it. The graffiti and tags in a modern urban environment are a continuation, sometimes even a downright copy, of man's ancient use of basic signatures to delineate his territory, to express his personality, and to preserve his existence forever.

\ GEOLOGICAL GRAFFITI

\ GG \
This is an extreme closeup scan (2400 dpi) of a paint chip retrieved from the ruins of Belmont Art Park (picture taken by Amy McKenzie earlier this year). The fragment is about 1 cm thick, and appears to consist of about 150-200 layers of paint.

\ SYSTEMATIC LANDSCAPES

\ SL-3 \
Pierre Huyghe
Timekeeper, 1999

A hole, 20 cm in diameter, revealing layers of wall paint for successive exhibitions at the Viennese Secession. Like a geological cross-section, *Timekeeper* uncovers the successive layers left behind by previous actions (paint jobs) on the walls of the Wiener Secession. Just like the rings of a tree tell that tree's history. *Timekeeper* captures the story of its own location. It allows the work of different artists to coexist. Kind of a retrospective group exhibition.

"It's very difficult to say what's poetic in my work because it's not something 'mathematical'. It's not a recipe. There's no reason to have a recipe and say that I'm going to be poetic. I never do that. It's rarely within the form itself. It's more in the process. If there is something poetic, it's poetic in the procedure … in the way things are made."

[Pierre Huyghe]

\ INLAND ISLANDS

\ II-1 \
Christo and Jeanne-Claude
Surrounded Islands, Biscayne Bay, Greater Miami, Florida, 1980-83

On May 7, 1983 the installation of *Surrounded Islands* was completed. In Biscayne Bay, between the city of Miami, North Miami, the Village of Miami Shores and Miami Beach, 11 of the islands situated in the area of Bakers Haulover Cut, Broad Causeway, 79th Street Causeway, Julia Tuttle Causeway, and Venetian Causeway were surrounded with a 61 meters (200 feet) wide sheet of pink woven polypropylene. 585,000 square meters (6.5 million square feet) of fabric was sewn into 79 patterns to follow the contours of the 11 islands.

For 2 weeks *Surrounded Islands*, spread out over 11.3 kilometers (7 miles), was seen, approached and enjoyed by the public, from the causeways, the land, the water and the air. The luminous pink color of the shiny fabric was in harmony with the tropical vegetation of the uninhabited verdant island, the light of the Miami sky and the colors of the shallow waters of Biscayne Bay.

\ II-2 \
The World is a man-made archipelago of 300 islands constructed in the rough shape of a map of the landmasses of the Earth, located 4 kilometres off the coast of Dubai, United Arab Emirates.

\ RODINIA

\ R-1 \
Current model

"In 1912, German meteorologist Alfred Wegener first put forward the theory of continental drift to describe the movement of major landmasses across the surface of the planet.

Initially, the theory was widely criticised but then later absorbed into the current, accepted model of continental dynamics known as plate tectonics.

Continents move at slower than a snail's pace, like pieces of a puzzle, squeezing together and pulling apart to form oceans and landmasses of various sizes.

Movements deep within the Earth are thought to drive the whole process, although the exact mechanism is still being investigated."

[Dr David Whitehouse]

In geology, Rodinia (from the Russian родина, or "motherland") refers to one of the oldest known supercontinents, which contained most or all of Earth's then-current landmass. Paleomagnetic evidence provides clues to the paleolatitude of individual formations, but not to their longitude, which geologists have pieced together by comparing similar strata, often now widely dispersed.

Geologic evidence suggests that Rodinia formed and broke apart in the Neoproterozoic, probably existing as a single continent from 1 billion years ago until it began to rift into eight smaller continents about 800 million years ago. It is thought to have been largely responsible for the cold climate of the Neoproterozoic era.

Rodinia began forming about 1.3 billion years ago from three or four pre-existing continents, an event known as the Grenville orogeny. The absence of fossils of hard-shelled organisms and reliable paleomagnetic data make the movements of continents earlier in the Precambrian, prior to this event, uncertain. (See Columbia for one possible reconstruction of an earlier supercontinent.)

The arrangement of Rodinia has been hypothesized using paleomagnetic data from the Seychelles islands and India and the Grenville mountain belts, which were formed by the Grenville orogeny and span multiple modern continents, as references.

Although the details are disputed by paleogeographers, the continental cratons that formed Rodinia appear to have clustered around Laurentia (proto-North America), which constituted Rodinia's core.

It appears that the East Coast of Laurentia lay adjacent to the West Coast of South America, while a conjoined Australia and Antarctica seem to have lain against the proto-North American West Coast. A third craton, what would become north-central Africa, was caught in between these two colliding masses.

Other cratons such as the Kalahari (southern Africa), the Congo (west-central Africa), and the Sao Francisco (southeastern South American), appear to have been separate from the rest of Rodinia.

Paleogeography

Rodinia's landmass was probably centered south of the equator. Because Earth was at that time experiencing the Cryogenian period of glaciation, and temperatures were at least as cool as today, substantial areas of Rodinia may have been covered by glaciers or the southern polar ice cap. The interior of the continent, being so distant from the temperature-moderating effects of the ocean, was probably seasonally extremely cold. (See continental climate.) It was surrounded by the superocean geologists are calling Mirovia (from mir, the Russian word for "globe").

Cold temperatures may have been exaggerated during the early stages of continental rifting. Geothermal heating peaks in crust about to be rifted; and since warmer rocks are less dense, the crustal rocks rise up relative to their surroundings. This rising creates areas of higher altitude, where the air is cooler and ice is less likely to melt with changes in season, and it may explain the evidence of abundant glaciation in the Ediacaran period.

The eventual rifting of the continents created new oceans, and seafloor spreading, which produces warmer less-dense rock, probably increased sea level by displacing ocean water. The result was a greater number of shallower oceans.

The evaporation from these oceans may have increased rainfall, which, in turn, increased the weathering of exposed rock. By inputting $\delta^{18}O$ data into computer models, it has been shown that in conjunction with quick-weathering volcanic rock, this increased rainfall may have reduced greenhouse gas levels to below the threshold required to trigger the period of extreme glaciation known as Snowball Earth.

All of this tectonic activity also introduced into the marine environment biologically important nutrients, which may have played an important role in the development of the earliest animals.

\ R-2 \
Separation

In contrast to Rodinia's formation, the movements of continental masses during and since its breakup are fairly well understood. Evidence of extensive lava flows and volcanic eruptions around the Precambrian-Cambrian boundary, especially in North America, suggest that Rodinia began to rift apart no later than 750 million years ago. Other continents, including Baltica and Amazonia, rifted off Laurentia 600 to 550 million years ago, opening the Iapetus Ocean between them. The separation also led to the birth of Panthalassic Ocean (or Paleo-Pacific)

The eight continents that made up Rodinia later re-assembled into another global supercontinent called Pannotia and, after that, once more as Pangaea.

\ MARVELOUS MARBLE

\ MM-1 \
Four Framed Hardstone Panels
English (in imitation of an Italian typology)
Getty Center, Los Angeles

Based on a type of inlay dating back to the 15oos, specimen plaques such as these were popular from the 1700s as celebrations of nature's beauty and of the human ability to classify such marvels scientifically.

\ MM-2 \
Jan Fabre
De benen van de rede ontveld, 2000
(The legs of reason skinned)

Jan Fabre, born in Antwerp in 1958, is an internationally acclaimed Belgian multidisciplinary artist. Over the years he has built up a sizeable body of work in a wide variety of disciplines: theatre, ballpoint drawing, dance, opera, installation and performance art, sculpture, film …

In 2000 he covered the bluestone columns of the Aula Academica, the most prestigious building and even the logo of the University of Ghent, Belgium, with layers of Ganda ham, a local brand of smoked ham. The columns, the "legs of reason", had been skinned, exposing their flesh, which to the delight of some had the texture of a richly veined red marble, even more so when over the days the ham started to rot and grow a greenish mould. It caused quite a commotion. The good citizens of Ghent were outraged at such a waste of food with millions of (people starving all over the world). The curators claimed to have bought, at a dumping price, a batch of overdue ham, which was to be destroyed anyway, but the Ganda ham smoking company (one sponsor no doubt delighted with the huge return in publicity) protested that it would never, under any circumstances, sell overdue ham. When the smell became unbearable, the work was removed.

\ MM-3 \
Wim Delvoye
Marble Floors, 1999

Known for his exceptional transformations of images and objects using processes typically associated with the applied arts (i.e. wood-carving, stained glass, tattoo), Delvoye in his *Marble Floors* has photographed "charcuterie" – precision cut salami, chorizo, mortadella and ham, arranged in geometric patterns based on Italian Baroque and Islamic motifs. The visceral and sometimes unsettling effect this body of work can have on a viewer is balanced by the perfect order and rhythmic harmony of these familiar Baroque and Islamic patterns.

\ THE INVISIBLE LINE

\ IL-2 \
Maarten Vanden Eynde
Restauration du Lac de Montbel, 2003

Restoration of a dried up lake near the village of Montbel, France. The clay bottom dries out more and more each year due to global warming. It was restored with white plaster. The work was destroyed when water filled up the lake again in spring.

\ IL-3 \
Doris Salcedo
Shibboleth, 2007

As the very first representative of a non-European tradition to be commissioned by the Tate Modern Unilever Series, Doris Salcedo has chosen an understated technique: that of inscribing into the ground of the Turbine Hall. The scar that begins like a thin, almost invisible line, at the main entrance gradually becomes a chasm in the earth at the far end of the former power station. This earthquake-like insertion evokes the brokenness and separateness of the post-colonial cultures of a non-white, non-European legacy. The installation is a metonymy for the term absence – an absence that negates the space of post-colonial peoples. The construction of a 'negative space', or emptied out space, corresponds to the trajectory of the history of post-colonialism. It is in *Shibboleth* (2007), where space is occupied silently and discreetly, not via a sense of domination or empowerment, that this trajectory can be traced.

An 'imaginative landscape' is at work in the heart of what Salcedo states is a monument to a European and modernist tradition of Western art; the Tate Modern. *Shibboleth* disrupts the Western view of landscape that creates a sense of things being in place and emphasises 'a visual scape in which the observer stands back and distances himself or herself from the thing observed.' In reversing the role of the viewer as not only witness but accomplice in an act of silence, *Shibboleth* proposes a different take on the role of Western art practice and traditions of art: here the earth opens up under the viewers' feet, evoking an earthquake, an eruption of space, time and place. The view is negated by its downward spiralling motion, bringing to mind a story in Borges' *Labyrinths*; negativity has become one with the ground, forcing a glance into an abyss that is disquieting in its silence.

(abstract from a text by Stella Baraklianou, 2008)

\ MO(NU)MENTUM

\ M \
Maarten Vanden Eynde
Mon(NU)mentum, 2008 AD
(450 x 60 cm)

The installation *Mo(NU)mentum* is a huge cylindrical sample core drilled from the earth in some future in order to understand how the then present world came about. Piled on top of a massive stone block (showing several geological layers) are successive layers of human history, containing samples of wood, copper, metal, bricks, concrete, asphalt, tar and plastic. The layers are getting thinner the closer they get to the top, which is the current, plastic layer. In the past, the materials have always provided a solid enough foundation for the next layer, but the plastic layer is so thin and vulnerable that it is impossible to continue from. The evolution has come to an end.

Mo(NU)mentum is a monument for the future, showing the impossibility of further evolution. It is a permanent memorial of the Generali Groups Executive Forum on Time: Business Opportunity and Strategic Timing. The best champagne was served in plastic champagne glasses. The empty glasses were collected and melted on top of the installation, thereby physically constituting the last layer.

\ SAMPLING MOTHER EARTH

\ SME-1 \
Nobuo Sekine
Phase – Mother Earth, 1968
(270 x 220 cm)

In October 1968 Nobuo Sekine dug a hole in the ground, shaped the extracted dirt into a large cylinder and called the work *Phase – Mother Earth*. It was probably an experiment, influenced by discussions of the new Land Art and Minimalist works taking place in the United States.

When it was first constructed, the prevailing view in Japan was that it was kind of quirky visual play of positive and negative spaces. But artist Lee Ufan disagreed, claiming that this was actually the end of visual manipulation; it was in fact a real time, real life absence and presence presented in temporal juxtaposition – a before and an after.

This, Sekine's piece and Lee's comment, is typically pointed to as the founding moment of Japan's influential, homegrown Mono-ha art movement.

Born into the post-war years and the supposed ruins of consumer culture, a small group of artists were attempting to create a new, utopian reality. They proceeded as if art might be re-enchanted by shifting attention away from the objectification of images and to the creation of a world of encounters, with everyday objects, that might end up looking like mythic gestures.

Mono-ha, literally "the school of things," was initially an informal term – sometimes used derisively – that brought together loosely affiliated artists around Tokyo including Sekine, Lee, Susumu Koshimizu, Katsuro Yoshida, and 12 or so others.

(by Matt Larking - Special to The Japan Times)

\ SME-2 \
"Faced with this solid block of raw earth, the power of this object of reality rendered everybody speechless, and we stood there, rooted to the spot … I just wondered at the power of the convex and concave earth, the sheer physicality of it. I could feel the passing of time's quiet emptiness … That was the birth of 'Mono-ha."

[Nobuo Sekine]

\ TIME AS A VERTICAL DIMENSION

\ TVD-1 \
Walter De Maria
The Broken Kilometer, 1979
(500 brass rods, permanently installed at 393 West Broadway, New York City. Each rod 200 x 5 cm)

"With *The Broken Kilometer*, De Maria had put in place the fourth and last stage of his multi-part sculptural system. While the solid brass work in Kassel plunged a kilometre into the ground and *The Lightning Field* in New Mexico marked out an area of one kilometre by one mile with poles that all reached the same, absolute height, in 1977 he created *The New York Earth Room* – apparently permanently – by covering the entire floor of a room in Friedrich's other SoHo gallery with an even layer of earth. The work can still be seen on the second floor at 141 Wooster Street. Two years later, when *The Broken Kilometer* – filling the whole floor space of a gallery – was installed as a permanent exhibition, it was clear that the viewer who encountered the piece in astonishment could only respond in one way: silent contemplation."

[Thomas Kellein]

\ TVD-2 \
Vertical Earth Kilometer, 1977

"A km-long rod of metal was buried vertically in the ground. The boring of the shaft, which goes through six geological layers, took seventy-nine days. The continuous metal rod is made of 167 m-long rods, screwed tightly together. The sandstone square which surrounds the top of the shaft is at the intersection of two paths which traverse the Friedrichsplatz in Kassel, Germany, site of theinternational contemporary art serveys, Documenta. The work is only visible in section: the kilometer of metalplunged into the earth can be seen as a representation of time in a vertical dimension."

[Jeffrey Kastner and Brian Wallis, Phaidon]

\ PALEONTOLOGIC TIME TRAVEL

\ PTT-1 \
The collections document the Rancho La Brea biota and include some 3.5 million specimens representing over 600 species of animals and plants. The site-specific collections also include geological samples, archaeological artifacts and historical objects. The Tar Pits function as wormholes where the past gets mingled with the future. Every day objects from the past rise up from the pits, while new ones disappear inside them, to be discovered by the next generations of archaeologists. They will wash and clean every artifact and piece the puzzle together again in order to understand the future past.

\ PEAK OIL

\ PO-1 \
Maarten Vanden Eynde
Oil Peak, 2006

Oil Peak was produced during the third Enough Room for Space (ERforS) project in Tbilisi, Georgia, where the most severe protests since the Rose revolution were taking place. In 2003 the new Georgian president Mikheil Saakashvili called back his fellow country men, who had fled Georgia in the past decades, to help with the rebuilding of the once prosperous and wealthy nation and its transformation into a modern western democracy. ERforS decided to respond to this call as well and to investigate how this was done and what the side-effects of such an enormous political and sociological shift would be. Ten 'oil eruptions' were erected throughout the city. The one in front of the parliament it caused an unexpected commotion: the protesting crowd appropriated the work as a 'black rose', symbolizing the failure of the Rose revolution.

\ PO-2 \
Oil Peak, 2008

Peak oil is the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline. The concept is based on the observed production rates of individual oil wells, and the combined production rate of a field of related oil wells. According to Mathew Simmons, author of *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy*, "… peaking is one of these fuzzy events that you only know clearly when you see it through a rear view mirror, and by then an alternate resolution is generally too late." There is no consensus on whether Peak oil occurred already, or is still to come.

\ PALEONTOLOGIC TIME TRAVEL

\ PTT-2 \
La Brea Tar Pits, Los Angeles

Rancho La Brea is one of the world's most famous fossil localities, recognized for having the largest and most diverse assemblage of extinct Ice Age plants and animals. Radiometric dating of preserved wood and bones has given an age of 38,000 years for the oldest known material from the La Brea seeps, and they are still ensnaring organisms today.

The Page Museum is located next to the Rancho La Brea Tar Pits in the heart of Los Angeles. Through the windows of the museum's laboratory, visitors can watch bones being cleaned and skeletons being reassembled. Outside the Museum, in Hancock Park, life-size replicas of several extinct mammals are featured.

\ PTT-3 \
Sculs of the saber-toothed cat,
Page Museum Los Angeles, 2008
\ PTT-4 \
La Brea Tar Pits lab,
Page Museum Los Angeles, 2008

\ THE LONG BEACH EARTHQUAKE OF 1933

\ LBE \
During the 1933 Long Beach, California earthquake, this coastal road was destroyed. Wind and water have transformed it into a present-day archaeological site. A new geological layer, consisting of concrete and asphalt, is added on top of the others.

\ ASPHALT AFTERMATH

\ AA-1 \
Robert Smitson
Asphalt Rundown, 1969

"Smithson's interest in the second law of thermodynamics completely dominated his life and work. Much of his art is associated with the concept of entropy: the law that states that molecular disorder can only increase, and as such the universe will eventually run down (a law that has since been discredited). In this piece, liquid asphalt slides from the dump truck and runs down an eroded hill in a quarry near Rome, Italy forming an abstract expressionist canvas. However, the work cannot only be considered aesthetically – we're forced to consider the ecology (What is the damage being done? Who will clean this up? How will the earth recover?). By performing an act with the weapon of urban sprawl – asphalt – we are forced to look at the effects of industrialization on the landscape under a hard light."

[D. Scott Hessels]

\ AA-2 \
Robert Smithson died in a plane crash in 1973 while surveying the site for a work in a dried up lake near Amarillo, Texas. *The Amarillo Ramp*, executed by his widow and Richard Serra, among others, was a partial circle of earth and rock, 140 feet in diameter and smoothly ascending from ground level to a height of more than 20 feet. The work is slowly eroding. In 2008 the high point was "no more than 10" feet tall, and the ramp looked like "a worn down, weed covered, neglected berm of dirt (…). A phantom. In itself that's ok. Smithson was all about entropy."

(based on a text by Titus O'Brien)

\ THE WALK OF FAME

\ WF-1 \
Richard Long
Circle in the Andes, 1972
\ WF-2 \
Dusty Boots Line Sahara, 1988

"Nature has always been a subject of art, from the first cave paintings to twentieth-century landscape photography. I wanted to use the landscape as an artist in new ways. First I started making work outside using natural materials like grass and water, and this led to the idea of making a sculpture by walking. This was a straight line in a grass field, which was also my own path, going 'nowhere'. I like the idea of making something from nothing. In the mid-sixties I began to think that the language and ambition of art was too formal and orthodox. I felt it had barely engaged with the natural landscapes which cover our planet, or used the experiences those places could offer. Starting from my home territory and gradually spreading further afield, my work has tried to explore this potential. I see it as abstract art laid down in the real spaces of the world. It is not romantic; I use the world as I find it."

[Richard Long]

\ WF-3 \
Michael Heizer
Double Negative, 1969-70

Double Negative is Michael Heizer's first prominent earthwork. *Double Negative* consists of two trenches cut into the eastern edge of the Mormon Mesa, northwest of Overton, Nevada in 1969-70 … The trenches line up across a large gap formed by the natural shape of the mesa edge. Including this open area across the gap, the trenches are 1,500 feet (457 meters) long, 50 feet (15.2 meters) deep, and 30 feet (9.1 meters) wide. 240,000 tons (218,000 tonnes) of rock, mostly rhyolite and sandstone, was displaced in the construction of the trenches.

\ WHEN FAITH MOVES MOUNTAINS

\ FMM-1 \
Francis Alys (in collaboration with Rafael Ortega and Cuauhtémoc Medina)
When faith moves mountains, 2002

On April 11th 2002, 500 volunteers formed a line and, only using shovels, moved a sand dune near Lima, Peru. The actual displacement was infinitesimal, but not its metaphorical resonance.

\ THE POSSIBILITY OF A MOUNTAIN

\ PM-1 \
Persijn Broersen & Margit Lukács
Manifest Destiny, 2009
(serie of silkscreens, 120 x 80 cm)

In the silk-screens one sees an imaginary sky that is silkscreened over photographs of a barren desert where some of the Mars mobiles have been tested. In these works Broersen & Lukacs investigate the notions of close-up and distance, of horizon and frontier, in relationship to the American tradition of the sublime landscape.

\ PM-2 \
James Turell
Roden Crater, 1979 - 2011

Roden Crater is an extinct volcano crater northeast of Flagstaff, Arizona. Artist James Turrell purchased the 400,000 year old, 3 km wide crater in 1979 and has been transforming it into a massive naked-eye observatory, designed specifically for the viewing of celestial phenomena. He stated that he plans to open the crater for public viewing in 2011.

\ THE RIVER IS ALWAYS GREENER ON THE OTHER SIDE

\ RAG-1 \
Olafur Eliasson
Green River, Stockholm, Sweden, 2000
\ RAG-2 \
Green River, Moss, Norway, 1998

"One Friday at half past one there I was on the bridge with Emile and a bag full of red powder and people starting to stare at us. I hesitated for a moment then emptied the bag out over the parapet and the wind whipped up this enormous red cloud. I could literally feel people in cars slowing down, the cars went all quiet. And there was this cloud, floating over the river like a layer of gas. When it came in contact with the water, all of a sudden the river turned green, it was like a shock wave. There was a crowded bus ten metres a way and everybody was staring at the water. I told Emile we should maybe move on, as if everything was perfectly normal, then I carefully put the bag in a trashcan, as if colouring the centre of Stockholm was the kind of thing I did every day. I went down to IASPIS and when I came out again my heart started jumping up and down like mad: the whole length of the river was completely green and all these people had stopped to look at it. Next day it was all over the front page of the papers: 'The river turned green'. The colorant was absolutely harmless and there was no pollution whatsoever."

(Abstract of a conversation between Hans Ulrich Obrist and Olafur Eliasson, 2002)

\ CITY JEWELS

\ CJ \
Jeroen Jongeleen
Influenza / City Jewels, 1998-2007

\ NOUMENON CONUNDRUM

\ NC-2 \
Charles Avery
Untitled (Stone-Mouse Display), 2008

\ STONE AGE

\ SA-1 \
Stones are the essence of our planet. You can find them almost anywhere in what we call our 'natural environment' (mountains, deserts, oceans). The industrial revolution bred two new kinds of stone: bricks and concrete. Slowly they are taking over the natural environment.

In 2003 I went to Sainte-Colombe sur l'Hers, France and made brickwork pebbles. They were displayed in the river L'Hers. In a follow-up exposition the same year in TENT., Rotterdam, they were presented as lying in a dried up riverbed winding through the exhibition building. The smaller stones are broken ceramic tiles.

\ SA-2 \
Maarten Vanden Eynde
Genetologic Research Nr. 3, 2003

Genetologic Research Nr. 3 was made in France during the international symposium Art & Nature, dealing with the river l'Hers that runs through the village of Sainte-Colombe-sur-l'Hers. Several brickwork cubes, polished into pebbles were displayed in the river current. As more and more of the world's beaches near big cities are covered by human-made stones, these contemporary pebbles were introduced in the ancient French village as a memorial for the future.

\ WHEN FAITH MOVES MOUNTAINS

\ FMM-2 \
Maasvlakte 2, Rotterdam, NL (2008 - 2033)
(photo: Michiel van Raaij)
\ FMM-3 \
Virgin Island, 2009
(photo: Marjolijn Dijkman)

Maasvlakte 2 is a project to extend the port of Rotterdam in The Netherlands with newly created land. PUMA (Project Uitbreiding Maasvlakte), a consortium consisting of Koninklijke Boskalis Westminster NV and Van Oord NV, notorious for *The Palm Islands* and *The World* in Dubai, will deliver the first developed lots in 2013.

The sheer statistics of *Maasvlakte 2* give an idea of the scale of the project. The planned total area of the site is about 2,000 hectares, half of which will be for industrial zones, including 630 hectares for container storage and throughput (with a total container handling capacity of 17 million teu annually), 190 hectares for chemical industry, and 180 hectares for distribution. The traffic infrastructure will consist of 13 km of roads, 14 km of railways and 13 km of quayage. The raising of the new land will have required a total of 365 million m^3 of sand when the project is completed in 2033, 240 million m^3 for the first phase of construction to be finished in 2013. There will be 10.8 km of sea defences. The access channel for ships will be 10 nautical miles long and up to 20m deep, with a 600m wide port entrance and a 700m wide turning basin. The sky is the limit …

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\ GEOLOGY OF GENETOLOGY

TIME'S TRIAL

On the Geological Imaginary in Contemporary Art

Sometime in the early nineties, the lights went out in modern and contemporary art museums around the world – some would say, paraphrasing Sir Edward Grey, the 1st Viscount Grey of Fallodon, not to be switched back on in our lifetime. This darkening of the countless white cubes of museums and galleries alike was meant to accommodate the entry of film into the hallowed space of art; although there had of course been film and video art before (think of Andy Warhol's *Empire* or *Sleep* and Martha Rosler's *Semiotics of the Kitchen* respectively), it was really artists like Eija-Liisa Ahtila, Matthew Barney, Stan Douglas, Douglas Gordon, Bill Viola and Gillian Wearing who ushered in the canonization of Hollywood-inflected film art (mostly conceived as spatial installations), and oversaw its subsequent transformation into what was probably the dominant, defining art form of the first half of the decade. Fifteen years on, it is worth remembering that quite a few of these artworks were in essence based on the simple tactic of slowing down, of deceleration; certainly some of the period's most emblematic pieces (Douglas Gordon's *24 Hour Psycho* immediately comes to mind, but so do Viola's films) revolved around the aesthetics of slow motion and the freeze (here we could cite Jeff Wall's cinematic photographs as a programmatic example). There are many reasons why so many artists active at the very forefront of art's habitual appropriation of cutting-edge technology (digital in this case) chose to slow down rather than – perhaps the more logical instinct, given that it had become technologically possible – speed up, but the advent of globalization as an everyday economic reality obviously played a major part in this, for the new world order of the electronic global village came with a new scopic regime in which the ceaseless acceleration, accumulation and proliferation of (digital) imagery gave new depth of meaning to the old situationist catchphrase of the "society of the spectacle". Deceleration (and occasional paralysis) in moving-image-based art came to signal a critical stance not unlike that of the Luddites in early nineteenth-century, Industrial Revolution-era England, and pushing the pause button on the video camera (or in an early version of Final Cut Pro) could easily be constructed as symptomatic of a broader social or cultural demand for what the Dutch so poetically (hence untranslatably) call "onthaasting": the conscious decision to lead a slower life of well-being.

In more recent times, art's anxiety-ridden, traumatic relationship with the onslaught of time – always going forward, never going back; always going faster, never slowing down – has taken on a very different form, that of a "historiographic turn in art": an obsession with the (recent) past and retrospective glance, excessive modulations of melancholy and nostalgia (the preferred tone of much 'serious' art produced in the last eight years or so), a compulsive desire for all that is anachronistic, archival and obsolete – all conspiring to produce that which Friedrich Nietzsche damningly called "the malady of history." I have written elsewhere (and extensively so) about this chronomaniacal complex, focusing on one modality of the historiographic turn in contemporary art in particular – that of the *archeological*: artists collecting, digging, dusting off; revealing, uncovering, unveiling; excavating and lovingly inventorying the dumbstruck traces, shards and fragments of a distant, uncharted history.[1] An important factor in motivating this widespread artistic interest in archeology, as one particular form of historiography, concerns the paradigmatic character of the archeological enterprise as an *episteme*, i.e. as a truth procedure and site of the production of knowledge: archeology is (by its very definition, namely that of the scientific study of history's material *sources*) bound to a materialist view of culture, history and society, and it is always also a science of origins – "archè" being the ancient Greek word for "beginning" or "first principle". Dig and ye shall find – and seeing as the earth, and the many mute materials that it hesitatingly hands over to the industrious digger, cannot lie, the process of excavation ultimately functions as a promise of revelation, of the unveiling of a hidden truth. And ahistorical truth, of course, is the stable rock of comfort and assurance we're after in these hectic, disorienting times of the ceaseless acceleration and proliferation of data (connective, visual and otherwise), the silent, stone-faced permanence of the ruin or the excavation site offering refuge from the teeming culture of speed that permeates our daily lives to such dizzying, and ultimately petrifying effect.

The rock, the ruin and all that is solid and made of stone: here we seamlessly slip into the adjacent realm of geology, where time is measured on a scale that makes even the archeological seem jittery with continuous shifts and changes – where the building, completion and subsequent erosion of the pyramids is not very different, as a 'historical' process, from subatomic motion: geology, as the scientific study of the earth's crust and physical properties, has revealed that our miniscule heavenly body is not that much younger, relatively speaking, than the universe as a whole (4,5 billion years as opposed to the cosmos' estimated 13,5 billion years). Geology as the realm of stasis then, of what seems, to the untrained human eye, absolute motionlessness – the imperious eternal Same: no wonder that geology has been an (admittedly strange) source of philosophical comfort in its own right, and has made occasional allegorical inroads into the world of art, especially since the so-called "chronophobic" Sixties, when artists first started to tap into the rich reservoir of the geological (as well as astronomical, biological, botanical, ecological) imagination.[2]

Any consideration of the meeting of art and geology must of course pass by (or rather, depart from) Robert Smithson's pioneering work in the Land or Earth Art movement, as well as his prolific activity as a critic and renegade art theorist. A lengthy quote from his widely-read essay "A Sedimentation of the Mind: Earth Projects" (1968) reminds us of Smithson's keen awareness of art's folding into an experience or philosophy of time that is aligned with the geological rather than the merely historical (or archeological): "The earth's surface and the figments of the mind have a way of disintegrating into discrete regions of art. Various agents, both fictional and real, somehow trade places with each other – one cannot avoid muddy thinking when it comes to earth projects, or what I will call "abstract geology." One's mind and the earth are in a constant state of erosion, mental rivers wear away abstract banks, brain waves undermine cliffs of thought, ideas decompose into stones of unknowing, and conceptual crystallizations break apart into deposits of gritty reason. Vast moving faculties occur in this geological miasma, and they move in the most physical way. This movement seems motionless, yet it crushes the landscape of logic under glacial reveries. This slow flowage makes one conscious of the turbidity of thinking. Slump, debris slides, avalanches all take place within the cracking limits of the brain. The entire body is pulled into the cerebral sediment, where particles and fragments make themselves known as solid consciousness. A bleached and fractured world surrounds the artist. To organize this mess of corrosion into patterns, grids, and subdivisions is an aesthetic process that has hardly been touched."[3] Smithson is best known today, of course, for his giant, megalomaniacal 'interventions' in the American natural landscape, most notably his *Spiral Jetty* (which, despite its monumental size, appears to be notoriously hard to find). Amid today's incessantly expanding body of Smithson literature, the exegesis of *Spiral Jetty* in particular bears many markings of hagiographic hero worship (Matta-Clark is another favorite), yet there has been relatively little discussion of the relationship between geology and art's epochal claim of "timelessness" (an important factor in all sainthood and sacrality): wasn't *Spiral Jetty* geological – and no longer archeological, as was the case in the work of, say, Michael Heizer – in both scale and temporal conception because this best expressed the artist's desire to move beyond time, to stand outside time's merciless constraints – to ensure the kind of permanence and timelessness more commonly associated with the earth than with man's cultivation of it? In the aforementioned essay, Smithson advises the artist to become the proprietor of art's perceived timelessness, of the artwork as that which is a product of "no time at all": "the deeper an artist sinks into the time stream the more it becomes *oblivion*; because of this, he must remain close to the temporal surfaces. Many would like to forget time altogether, because it conceals the "death principle." Floating in this temporal river are the remnants of art history, yet the "present" cannot support the cultures of Europe, or even the archaic or primitive civilizations; it must instead explore the pre- and post-historic mind; it must go into the places where remote futures meet remote pasts"[4] – into the spaces of *geological* time, such as lifeless deserts (in his exemplary case) untouched by man's corrupting presence. For deserts, as the domains of death (or at least of a deep-seated hostility towards life), are zones "out of time" *par excellence*, their forbidding, morbid silence the wind-swept 'proof' of the alignment of geology with the a- or anti-historical – this timelessness the dream, precisely, of many a land art project.

As one may have gathered from these few sentences, I am no great lover of the desert, of which it is said somewhere, in Tuareg wisdom, that silence is its prayer – indeed, could the great nay-saying Monotheistic religions ever have emerged anywhere else? It is no coincidence that one of the worst touristic experiences of my life [details omitted] happened on the very edge of the Sahara, south of the Moroccan city of Zagora. That said, however, one of the finest artistic experiences of my life, in a strictly touristic sense, *also* involved a trip to desert – this one under the knowing guidance, it should be added, of the Los Angeles-based 'artist' collective Center for Land Use Interpretation, who organize bus trips into the Mojave desert, including such memorable highlights as a visit to the mining town of Boron (home to the largest borax mine in the world) and the ultra-atmospheric Mojave airplane boneyard along the California State Route 14. Perhaps this was such a memorable experience precisely because the Center for Land Use Interpretation, as a bunch of time bandits, pull off that which so many others like (and unlike) them do not (mainly because of the programmatic immodesty and ultimate humorlessness of the latter's many attempts), and this clearly has something to do with the risky business of trying to marry art *and* science (geology in this case), art *and* information, art *and* pedagogy – and entertainingly, parodically so to boot. But the success of their venture (and relatively high profile in a contemporary art world that is justifiably averse to positivist, lab coat-clad posing) is ultimately also linked to the object of their loving, slightly mocking *faux*-geological scrutiny: the city of Los Angeles and its built-up surrounds, a city whose short history was chronicled by Mike Davis in a book that promised to "excavate the future of L.A." Can a future be excavated *at all*? Can the geological clock be wound (fast) forward, and art dream about tomorrow for a change? Exactly because of Los Angeles' perceived lack of (natural) history – another prominent chronicler of L.A. culture and lore, Norman Klein, dubbed it the capital of forgetting[5] – and both its relative youth as well as its cultural obsession with youth, its historiography must be conducted in a spirit of slight irreverence, and there is perhaps no better way to do so than by reconstructing this history as a *geological field trip* along a string of imaginary excavation sites (such as a mining town): the geological fixation of many art practices, after all, always serves to signal art's unease – in this case endemic to Angeleno culture – with the ruthlessness of the passage of time. And much more to the point of the present (that is to say, Maarten Vanden Eynde's) curatorial undertaking, CLUI's geo-archeological field trips do not concern natural wonders (the conventional destinations of such specialized tourism), but rather those naturalized 'wonders' left behind, in the haste typical of the Gold Rush' provisional living, by man: theirs is not a geology of the natural, but one of the *cultural* world, proving that the daily practice of history (i.e. archeology) is a "quintessential tool for denaturalizing the social" indeed.[6] A geology, not so much of the earth, then, but of the patterns of scars laboriously carved into its surface, rendered legible as a document of man's restless passing across even the world's remotest expanses.

A geo-logy of the cultural *world* rather than the *earth* upon which it rests: a paradox this may seem perhaps, but isn't 'paradox' the very logic of all art?

Dieter Roelstraete

1 See, among others, my "The Way of The Shovel: On the Archeological Imaginary in Contemporary Art," published in e-flux journal #4, March 2009 (to which the subtitle of the present essay refers); "After the Historiographic Turn: Current Findings," published in e-flux journal #5, May 2009; "Whose 'End of History'?", published in Yilmaz Dziewior (ed.), Jahresring 56: Wessen Geschichte? Whose History?, Berlin: Kulturstiftung des Bundes & Köln: Verlag der Buchhandlung Walther König, 2009 (forthcoming); and "Listen to the Stones: Mariana Castillo Deball Among the Ruins", published in Mousse Magazine #21, September 2009.

2 The reference here is to Pamela M. Lee's book-length study Chronophobia: On Time in the Art of the 1960s. In it, Lee links 1960s art's anxious examination of the issue of time (history, progress, speed) to the "emergence of the Information Age in postwar culture. The accompanying rapid technological transformations, including the advent of computers and automation processes, produced for many an acute sense of historical unknowing; the seemingly accelerated pace of life began to outstrip any attempts to make sense of the present. Lee sees the attitude of 1960s art to time as a historical prelude to our current fixation on time and speed within digital culture." [From the MIT Press website, ed.]

3 Quoted in: Robert Smithson, Collected Writings, Berkeley, University of California Press, 1996, p. 100.

4 Ibid., p. 112.

5 Norman Klein, The History of Forgetting: Los Angeles and the Erasure of Memory, London & New York: Verso, 2008.

6 "History represents the quintessential tool for denaturalizing the social; as a result, it goes hand in hand with critique," in: Luc Boltanski & Eve Chiapello, The New Spirit of Capitalism, London & New York: Verso, 2003, p. 8.

\ VL-1 \

\ VL-2 \

\ VL-3 \

\ VL-4 \

\ VL-5 \

\ CS \

\ NC-1 \

\ IL-1 \

\ BC-1 \

\ BC-2 \

\ BC-3 \

\ OG-1 \

\ OG-2 \

\ SL-1 \

\ CC \

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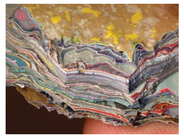
\ IG \

\ OE \

\ SE-2 \

\ SE-1 \

\ CCA \



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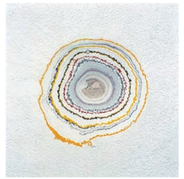
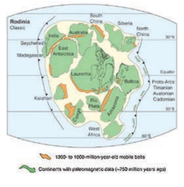


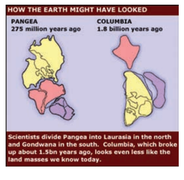
\ SL-3 \

\ II-1 \

\ II-2 \



\ IE-1 \



\ IF-2 \

\ MM-1 \

\ MM-2 \

\ MM-5 \

\ IL-2 \

\ IL-3 \

\ M \

\ MME-1 \

\ MME-2 \

\ TVD-1 \

\ TVD-2 \

\ PTT-1 \

\ PO-1 \

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\ PTT-4 \

\ LBE \

\ AA-1 \

\ AA-2 \

\ WF-1 \

\ WF-2 \

\ WF-3 \

\ FMM-1 \

\ CC \

\ PM-1 \

\ PM-2 \

\ PM-3 \

\ RAG-1 \

\ RAG-2 \

\ LCI \

\ NC-2 \

\ SA-1 \

\ SA-2 \

\ FMM-2 \

\ FMM-3 \

www.genetologcy.net

\ HOMO STUPIDUS STUPIDUS; THE MISSING MEME

\ HSS-1 \

Ida – Researchers from the University of Oslo have suggested the specimen, which was found 95 per cent complete, may be the root of anthropoid evolution, when primates were first developing the features that would evolve into our own.

Discovered in Germany, Ida is so well preserved that even the outline of its fur can be seen. An incredible 95 percent complete fossil of a 47-million-year-old human ancestor has been discovered and, after two years of secret study, an international team of scientists has revealed it to the world. The fossil's remarkable state of preservation allows an unprecedented glimpse into early human evolution. Discovered in Messel Pit, Germany, it represents the moment before anthropoid primates – the group that would later evolve into humans, apes and monkeys – began to split from lemurs and other prosimian primates. This groundbreaking discovery fills in a critical gap in human and primate evolution.

[www.history.com]

\ HSS-2 \

Maarten Vanden Eynde
Homo Stupidus Stupidus, 2008 A.D.

\ CHINESE CRYPTOZOOLOGY

\ CC-1 \

Shen Shaomin
Unknown Creature - Three Headed Monster, 2002

\ CC-2 \

Unknown Creature - Mosquito, 2002

Shen Shaomin adopts the role of being anthropologist, scientist, and author of his own fabricated mythologies. Constructed from real animal bones, his sculptures collectively create a bestiary of fictional creatures that are wondrous, frightening, and strange. Reminiscent of Borges's Book of Imaginary Beings, Shen's absurd assemblages exude an ancient wisdom, authenticating the magic of fable and folklore, while alluding to contemporary issues of genetic modification, consequence of environmental threat, and concepts of the alien and exotic.

In pieces such as Three Headed Monster and Mosquito, the skeletal remains of "extinct" creatures are presented with the validity of museum display. Their colossal scale reinforces their imagined prehistoric origin as Jurassic curiosities and spiritual totems. Assembled from genuine ossified animal parts, his creatures are simultaneously familiar and perplexing, indicating a warped and uncomfortable process of evolution. Often carving into his surfaces, Shen adorns his creations with scrimshaw, further entwining humanistic reference into his disturbing zoological evidence.

\ CC-3 \

Jin Jiangbo
Tyrannosaurus Rex of China, 2005 - 2007
(interactive media installation, 500 x 230 x 100 cm)

When entering the room the Tyrannosaurus Rex starts moving and making sounds. Unlike the realistic Jurassic Park variety, Jin's dino appears to have been assembled in the junkyard, using scrap metal and industrial bits and bobs. As a result, this T-Rex is less fearsome and more sympathetic than one might expect. Which, of course, is a reflection of the artist himself. Jin came of age as China was opening up to the world and that newfound curiosity, that need to communicate with the world, is the essence of his work.

\ ANIMALIS UNIVERSALIS

\ AU-1 \

Joan Fontcuberta & Pere Formiguera
Felix Penatus, 1987

Joan Fontcuberta´s and Pere Formiguera´s work Fauna is the Natural History of imagination. It consists of an Archive of impossible but possibly existing animals – hybrids and metacreatures.

The collector of the Archive is Dr. Ameisenhaufen, the Alter Ego of the artists. These pictures are a part of a series of Fauna consisting of dozens of different animals. All the animals have been originally "reconstructed" in their natural size.

\ AU-2 \

Solenoglypha Polipodida, 1987

Phylum: Chordata
Subphylum: Vertebrata
Class: Reptilia-Ratidae

Sighting: Found in a deciduous forest in the federal state of Tamil Nadu in southern India, thanks to informant G-16, who was attacked while looking for truffles. Observation and capture lasted for a period of 30 days, during which it proved impossible to locate any other specimen. Survived in captivity until it was killed by artificial means to allow study of its internal structure.

Date of Capture: 30 April 1941.

Main Traits: Osseous internal skeleton. Pulmonary respiration. Typical vertebrate nervous system. It has not been possible to observe its reproductive system, but everything would indicate that it is oviparous with division of the sexes. The captured specimen is an adult male measuring 133cm in length.

Morphology: Corresponds to a mixture of reptile and non-flying bird. Although it has no wings now, it is quite possible that more primitive forms did have them. The morphological characteristics correspond completely to those of report 21 on the postRellic fauna of Mobolk, provided by Dr. Ray's liaison. It would thus correspond to suborder 8 of the current New Zoology.

Habits: Extremely aggressive and venomous, it hunts for food and also for the pleasure of killing. It is quite rapid and moves forward in a curious and very rapid run, thanks to the strong musculature of its 12 paws and the supplementary impulse which it obtains by undulating all of its body in a strange aerial reptation. When facing its prey it becomes completely immobile and emits a very sharp whistle which paralyzes its enemy. It maintains this immobility for as long as the predator needs to secrete the gastric juices required to digest its prey, which can vary between two minutes and three hours, as determined by the size of the victim. At the end of the whistling phase, Solenoglypha launches itself rapidly at its immobile prey and bites the nape of its neck, causing instantaneous death. Immediately afterwards, if it wishes to eat its victim, the beast vomits part of the gastric juices all over the animal and waits for this highly acidic matter to begin to take effect, while it circles around the dead animal uttering the characteristic murmur of "Globe-toe", with a 3-pause-1 cadence. Unlike known reptiles, Solenoglypha never rests after eating. Quite the contrary, it sets off on a wild chase which is only interrupted for the purpose of defecation.

\ AU-3 \

Cercopithecus Icarocornu, 1987

\ CETOLOGY

\ C \

Brian Jungen
Cetology, 2002

Whale skeleton made of white plastic lawn furniture.

\ ICHTHYOSAURUS

\ IC \

Mark Dion
Ichthyosaurus, 2003

(pronounced IK-thee-oh-SAWR-us) Ichthyosaurus was an ichthyosaur, a marine reptile; it was not a dinosaur. This sleek animal could perhaps swim at speeds up to 25 mph (40 kph). Ichthyosaurus lived from the early Jurassic period until the early Cretaceous period, roughly 206 to 140 million years ago.

Anatomy: Ichthyosaurus was about 6.5 feet (2 m) long and may have weighed about 200 pounds (90 kg). It had a tall dorsal fin, a half-moon-shaped tail, paddle-like flippers, and smooth skin. The nostrils were near the eyes on the top of the head. It had massive ear bones and large eyes, probably indicating that it had acute hearing and keen eyesight. These marine reptiles gave birth to live young.

Diet: Ichthyosaurus' diet was mostly fish, but may have also included cephalopods (like straight-shelled belemnites).

Fossils: Hundreds of Ichthyosaurus fossils have been found in England, Germany, Greenland, and Alberta, Canada. Even fossilized dung (called coprolites) and fossilized skin impressions have been found. Ichthyosaurus, which means "fish lizard", was named by Charles Koenig in 1818.

\ CHIHUAHUA FOOTPRINTS DISCOVERED!

\ CFD \

Maarten Vanden Eynde
2008 AD, concrete sidewalk, Hollywood, USA

Smallest breed of dog, 15 cm / 10 in high, developed in the USA from Mexican origins. It may weigh only 1 kg / 2.2 lb. The domed head and wide-set ears are characteristic, and the skull is large compared to the body. It can be almost any colour, and occurs in both smooth (or even hairless) and long-coated varieties.

\ KINETIC SKELETONS

\ KS \

Theo Jansen
Animaris Percipiere, 2004

Theo Jansen is an artist and kinetic sculptor living and working in Holland. He builds large works resembling skeletons of animals able to walk using the wind on the Dutch beaches. His animated works are a fusion of art and engineering. In a BMW television commercial, Jansen says "The walls between art and engineering exist only in our minds."

Jansen sets out to create artificial life through the use of genetic algorithms in computer programs simulating evolution in complex systems. Some measure of "fitness" is introduced into the algorithm; in Theo's case the assignment is to survive on the beach in an area of wet sand enclosed by two lines between the sea and the high-water mark. The most succesful designs are interbred and evaluated again. Over time complex designs emerge that sprout wings, which they flap in the breeze, pressurizing what look like plastic 2-liter soda bottles. Others sprout legs and scuttle across the sand like crabs.

\ THE TURNING POINT OF LIFE

\ TPL \

Damien Hirst
Mother and Child, Devided, 1993

The impulses driving Damien Hirst's work stem from dilemmas inherent in human life: "I am aware of mental contradictions in everything, like: I am going to die and I want to live for ever. I can't escape the fact and I can't let go of the desire." The materials he uses often shock, but he says he "uses shock almost as a formal element, not so much to thrust work in the public eye, but rather to make aspects of life and death visible."

\ BACK TO THE FLOCK

\ BF-1 \

Damien Hirst
Away from the Flock, 1994

\ BF-2 \

Savage
Back to the flock, 2003

Jumper, unpicked, rolled into a ball and left in a field somewhere.

\ NOUMENON CONUNDRUM

\ NC-1 \

Charles Avery
Untitled (Noumenon)

For the past four years, Scottish artist Avery has created texts, drawings, installations and sculptures which describe the topology and cosmology of an imaginary island, whose every feature embodies a philosophical proposition, problem or solution.

\ NC-2 \

Untitled (Aleph-Nul)

\ CHAOTIC WARFARE

\ CW-1 \

Pascal Bernier
Hunting Accident - Deer, 1996

\ CW-2 \

Hunting Accident - Tiger, 2000

\ WHAT'S UP DOC?

\ WUD \

Hyungkoo Lee
Lepus Animatus, 2005 - 2006

\ ANIMAL ANOMALIES

\ AA-1 \

Thomas Grünfeld
Misfit (St.Bernard / Sheep), 1994

\ AA-2 \

Misfit (Pig / Bird), 2001

\ AA-3 \

Misfit (Flamingo), 1998 - *Misfit (Girafe),* 1991

Thomas Grünfeld's anomalous creations are some of the strangest and most surreal of contemporary taxidermy. The creatures from his appropriately titled Misfit series are composed of bits and pieces of animals, all flawlessly sewn together to create entirely new species. The Misfits are reminiscent of early natural histories in which strange and unfamiliar animals were described according to the bits and pieces of well known creatures. For example, the camelopard, now known as the giraffe, was described having the height and neck of a camel, the head of a stag although somewhat smaller, the teeth and feet of an ox, and a leopard's spots. The armadillo was a pig with a turtle's shell, and the sloth, part bear, part ape. The platypus displayed complete anatomical confusion, seeming to "possess a three fold nature, that of a fish, a bird, and a quadruped" as Thomas Bewick wrote in 1824. On inspecting the skin of a platypus for the first time in 1802, George Shaw, director of the British Museum, observed that it appeared to have "the beak of a Duck engrafted on the head of a quadruped." Such a hybrid animal seemed too strange to be true, and Shaw claimed that "it is impossible not to entertain some doubts as to the genuine nature of the animal, and to surmise that there might have been some arts of deception in its structure." In fact the specimen Shaw examined still bears the marks from his efforts to prise the beak off. As Shaw highlights, it is only a small step from describing animals as if they were composite to actually making a new species.

\ MICE AND MEN

\ MM-1 \

Bryan Crockett
Ecce Homo, 2000
(marble and epoxy, 30 x 40 x 70 in)

Transgenics is the practice of transplanting genes from one species to another, thus creating genetic hybrids that can develop characteristics of both species. Consider what is happening with genetics. For instance, the oncomouse is the first patented transgenic lab mouse, engineered to have a human immune system for the purpose of oncology research. In this way, the practice of genetics can be understood as an analogy to the worlds of allegory and mythology. Like the Satyr or Minotaur, the oncomouse is the literalization of a cliché man/mouse.

\ MM-2 \

Back in 1997, a rather bizarre photograph suddenly became very famous. It showed a totally hairless mouse, with what appeared to be a human ear growing out of its back. That photograph prompted a wave of protest against genetic engineering, which continues today.

\ BLACK CAT / WHITE CAT

\ BCW \

South Korean scientists have cloned cats that look reddish under ultraviolet light by modifying a protein gene to change their skin color.

The team at Gyeongsang National University produced three Turkish Angora cats possessing altered fluorescence protein (RFP) genes.

The Ministry of Science and Technology said, "It marked the first time in the world that cats with RFP genes have been cloned. The ability to produce cloned cats with the manipulated genes is significant as it could be used for developing treatments for genetic diseases and for reproducing model (cloned) animals suffering from the same diseases as humans."

\ FOLLOW THE GREEN RABBIT

\ FGR \

Eduardo Kac
GFP Bunny, 2000

"Alba", the green fluorescent bunny, is an albino rabbit. This means that, since she has no skin pigment, under ordinary environmental conditions she is completely white with pink eyes. Alba is not green all the time. She only glows when illuminated with the correct light. When (and only when) illuminated with blue light (maximum excitation at 488 nm), she glows with a bright green light (maximum emission at 509 nm). She was created with EGFP, an enhanced version (i.e., a synthetic mutation) of the original wild-type green fluorescent gene found in the jellyfish Aequorea Victoria. EGFP gives about two orders of magnitude greater fluorescence in mammalian cells (including human cells) than the original jellyfish gene.

"I will never forget the moment when I first held her in my arms, in Jouy-en-Josas, France, on April 29, 2000. My apprehensive anticipation was replaced by joy and excitement. Alba – the name given her by my wife, my daughter, and I – was lovable and affectionate and an absolute delight to play with. As I cradled her, she playfully tucked her head between my body and my left arm, finding at last a comfortable position to rest and enjoy my gentle strokes. She immediately awoke in me a strong and urgent sense of responsibility for her well-being."

[Eduardo Kac]

\ THE BEGINNING OR THE END

\ BOE \

Hubert Duprat
Aquatic caddis fly larva with case, gold, pearls, precious stones 2/3 cm, 1980 - 1996

In his works Duprat often borrows shapes and materials from the plant and animal kingdoms, and combines them with a pseudo-scientific frame.

In earlier works, as a kind of nature's own ready-mades, he has for example let water-living larvae of dragonflies (genus Trichoptera) produce sculptures for him. The artist has disassembled the tubular shell of the larva and placed the "nude" creature in an aquarium where there are grains of gold, pearls and chips of precious stones. From this material the larva has then built itself a new shell. The process shows in what way the insect is capable of adjusting to new circumstances and materials, and the strength of its instinctive behaviour, but also poses questions about man's view of art, about what is manufactured and what is "naturally" created.

\ MAMMOTH CLONE: SCIENCE, OR SIMPLY FICTION?

\ MC-1 \

Baby Mammoth discovered in Siberia in 2007

\ MC-2 \

"The idea of cloning a mammoth is just a fantasy", says biologist Ross MacPhee, an expert on the giant fauna of the last ice age and chairman of the American Museum of Natural History's mammalogy department. Alex Greenwood, a molecular biologist who studies ice age extinctions (and a colleague of MacPhee's in New York), agrees: "I am really stunned," he says, "that there are scientists still pushing this idea." MacPhee, who has worked extensively with the Jarkov mammoth in Siberia, and Greenwood say that making an exact copy of a species that died off 10,000 years ago is possible only in science fiction movies.

The main reason is simple: To have any chance at a successful cloning, scientists must start with pristine, complete DNA. But even in cold environments, cells quickly break down after an organism dies; entropy occurs, and bacteria and certain enzymes latch onto or destroy cellular material. All the DNA found from long-extinct animals (even those remains found in the Siberian permafrost) has been incomplete and fragmented.

"If freezing is done under special conditions, such as in a modern laboratory, cells with their genetic material can be preserved indefinitely," explains Russian scientist Alexei Tikhonov. "But conditions out in the permafrost are far from perfect." Tikhonov has worked with the best-preserved mammoth ever found, a baby mammoth carcass pulled from a construction site in 1977. Nicknamed "Dima", the small calf still had its skin and looked like it could have died just days earlier. But it probably fell into a mud pit and died quickly 44,000 years ago. Dima now rests in Tikhonov's institute in St. Petersburg. Studies have shown that proteins in Dima's cells were seriously modified after death, and that other substances common in living tissues (such as phosphorous molecules) disappeared entirely.

Cloning is only possible when the nucleus taken from a living cell is placed into an egg from which the original nucleus has been removed, as has been done in the case of the sheep Dolly. This substitute nucleus, with its DNA, proteins and other crucial material completely intact, was what controlled the development of Dolly. Injecting fragments of DNA into a cell without a nuclear transfer would not result in a clone. Greenwood explains it this way: "If I throw all the parts needed to make a car down the stairs of a building, I will not have a Porsche 911 in the stairwell when they land."

Ryuzo Yanagimachi, a scientist in Hawaii who has successfully cloned mice and other small mammals, says he would like to clone a mammoth. But he agrees that this could happen only if intact DNA is ever recovered from a long-dead mammoth. In recent years, a Japanese team has mounted several expeditions into Russia's far north with the expressed aim of trying to bring a mammoth back to life. The team's main intent is to recover frozen sperm from a mammoth and then use it to impregnate a female elephant, the mammoth's closest living relative. But Greenwood and MacPhee say this is equally problematic, even on the off-chance that intact sperm DNA from a mammoth could ever be found. "Mammoths and elephants have been separated by about 4 to 6 million years of evolution", says Greenwood. "This would be like crossbreeding a human and a chimp and expecting to have a successful generation of a hybrid."

Is it possible that in the march of time and scientific advance, technologies may be developed that will allow extinct creatures to be cloned? Or, someday, may a perfectly intact chain of mammoth DNA be found? According to MacPhee, such questions remain too tough to answer. "There isn't even a direction we can point to," he says, "which would indicate whether cloning extinct animals will ever be possible."

[Bill Gasperini © 2005 Discovery Communications Inc.]

\ X-RAY SPIDER

\ XS \

A 53-million-year-old spider has been revealed in exquisite detail by scientists from the UK and Belgium. The spider Cenotextricella simoni is about 1mm in length (see scale-bar). The scientists say that it would have inhabited a wooded area and lived in a warm climate. Internal details can be seen in the view at bottom-right.

The ancient creepy-crawly had been trapped in amber and preserved in a lowland area around Paris, France. The scientists reconstructed the creature's original appearance using an X-ray-based medical imaging technique. The pictures, published in the journal Zootaxa, "digitally dissect" the tiny spider to expose amazing details such as the preservation of internal organs.

This is the first time that the medical imaging technique, known as Very High Resolution X-Ray Computed Tomography, has been used to investigate a fossil in amber – and Dr Penney said it had the potential to "revolutionise" the way fossils were studied.

\ MODERN TAXONOMY

\ MT-1 \

Jeroen Kuster
Symbos Dorcas, 2005

Already from a young age Jeroen Kuster (1971) developed a craze for the animal world. He is especially curious as to how an animal is build and what structures can be seen. Kuster collected skulls since he was 12 and analysed about five hundred animals already. A remarkable hobby which resulted in valuable knowledge of the inner spirit of each separate animal. He plays God and creates new species as he sees fit, combining his fantasy with his anatomical knowledge. He frequently uses everyday inorganic objects like plastic spoons as building materials for his own fictitious animal kingdom, the names of whose species are taken from the Systema Naturae of Carolus Linnaeus (1707 - 1778), the founder of modern taxonomy.

(http://jeroenkuster.nl)

\ MT-2 \

Nematocera Hystrix, 2005

\ MT-3 \

Taurulus Surmuletus, 2004

\ MT-4 \

Symbos Ovibos Lervia, 2005

\ IMAGINEERING

\ I \

The color of rabbits is determined by 5 letters: A, B, C, D, E.

Wild rabbits carry color genetic make up of AABBCCDDEE which appear as chestnut agouti. Over thousands of years, mutations occured. In addition to all capital letters genes, some genes of lower letters and lower letters with subscripts show up. There are some rules to remember:

- The capital letter genes, in principle, are the dominant genes. The lower letter genes are recessive to the capital letter genes.
- A rabbit's appearance is determined by the dominant gene, it may carry copies of recessive gene that we do not see.
- A sire and a dam with the appearances of all recessive genes can not produce offsprings with dominant gene.
- The bunny will obtain one gene from the sire and one gene from the dam.

[Betty Chu]

\ SPIDERS ON SPEED

In the 1960s, Dr. Peter Witt gave spiders various kinds of drugs and alcohol to observe the effects on their webs. The results were pretty interesting. In 1995, NASA scientists seeking to measure toxicity relationships examined the webs of spiders dosed with various chemicals. Their experiments have shown that common house spiders spin their webs in different ways according to the psychotropic drug they have been given. Nasa scientists believe the research demonstrates that web-spinning spiders can be used to test drugs because the more toxic the chemical, the more deformed was the web.

\ SOS-1 \

Those on Benzedrine – "speed" – spin their webs "with great gusto, but apparently without much planning leaving large holes", according to New Scientist magazine.

\ SOS-2 \

Spiders on marijuana made a reasonable stab at spinning webs but appeared to lose concentration about half-way through.

\ SOS-3 \

On chloral hydrat, an ingredient of sleeping pills, spiders "drop off before they even get started".

\ BACTERIAL (R)EVOLUTION

\ BR \

Ira Bartell
Delft Anthrax, 2005
(ceramic tile, Delft blue transfer, 15 x 15 cm)

"This began as an e-mail at the time of the anthrax scare in the United States. I decided not to send it to various U.S. government agencies as an antidote to mass hysteria. It is a 300x magnification of an anthrax bacteria arabesque."

[Ira Bartell]

\ THE FUTURE FARM

\ FF-1 \

Alexis Rockman
The Farm, 2000
(oil and acrylic on wood panel, 96 x 120 in)
Courtesy of JGS, Inc.

"My artworks are information-rich depictions of how our culture perceives and interacts with plants and animals, and the role culture plays in influencing the direction of natural history.

The Farm contextualizes the biotech industry's explosive advances in genetic engineering within the history of agriculture, breeding, and artificial selection in general. The image, a wide-angle view of a cultivated soybean field, is constructed to be read from left to right. The image begins with the ancestral versions of internationally familiar animals, the cow, pig, and chicken, and moves across to an informed speculation about how they might look in the future. Also included are geometrically transformed vegetables and familiar images relating to the history of genetics. In The Farm I am interested in how the present and the future look of things are influenced by a broad range of pressures – human consumption, aesthetics, domestication, and medical applications among them. The flora and fauna of the farm are easily recognizable; they are, at the same time, in danger of losing their ancestral identities."

[Alexis Rockman]

\ FF-2 \

Five cloned piglets: Noel, Angel, Star, Joy and Mary
Born on Christmas Day 2001 in the US Scottish-based firm PPL Therapeutics

These are not the first pig clones, but PPL, a commercial offshoot of the Roslin Institute in Scotland, says the pigs are the first to be engineered in a way that should help prevent their tissues being rejected by the human body.

The animals' biological make-up is slightly different from ordinary pigs. PPL says that it intends to use the pigs as part of its programme to seek a cure for humans suffering from diabetes.

\ F****D UP FROG

\ FUF \

Garnet Hertz
Experiments in Galvanism, 2003 - 2004

Clicking on "LEFT LEG" or "RIGHT LEG" activates motors inside of the frog's body. These motors make the frog's legs physically move in the gallery space. After clicking the leg activation links, a "LEFT LEG ACTIVATED" or "RIGHT LEG ACTIVATED" screen is displayed for about two seconds while the specimen's legs are in motion.

"Garnet Hertz has implanted a miniature webserver in the body of a frog specimen, which is suspended in a clear glass container of mineral oil, an inert liquid that does not conduct electricity. The frog is viewable on the Internet, and on the computer monitor across the room, through a webcam placed on the wall of the gallery. Through an Ethernet cable connected to the embedded webserver, remote viewers can trigger movement in either the right or left leg of the frog, thereby updating Luigi Galvani's original 1786 experiment causing the legs of a dead frog to twitch simply by touching muscles and nerves with metal.

Experiments in Galvanism is both a reference to the origins of electricity, one of the earliest new media, and, through Galvani's discovery that bioelectric forces exist within living tissue, a nod to what many theorists and practitioners consider to be the new new media: bio(tech) art."

[Sarah Cook and Steve Dietz]

\ SMART BY NATURE

\ SN \

Froginator
Cyber Frog By Terrence for the Cybergenics 7 contest

\ BIOMIMETICS

\ B \

Design inspired by nature. Biomimetics is the application of methods and systems found in nature to the study and design of engineering systems and modern technology. The transfer of technology from lifeforms to synthetic constructs is desirable because evolutionary pressure typically forces natural systems to become highly optimized and efficient. A classical example is the development of dirt- and water-repellent paint (coating) from the observation that the surface of the lotus flower plant is practically unsticky for anything (the lotus effect). Examples of bionics in engineering include the hulls of boats imitating the thick skin of dolphins; sonar, radar, and medical ultrasound imaging imitating the echolocation of bats; and the arch imitating the spinal column. In the field of computer science, the study of bionics has produced artificial neurons, artificial neural networks, and swarm intelligence.

For decades, scientists have looked to scorpions and other eight- and six-legged creatures for inspiration. Imagine a creature that can withstand extreme temperatures – from below freezing to a brutal 50 degrees C – and survive in almost any environment on earth. Scorpions are among the best-adapted animals in the world. Now imagine a creature that can mow your lawn, vacuum your living room, guard a museum, build a car and explore the surface of Mars all without oxygen or food. Scientists have been using robots designed after scorpions for years.

\ INDUSTRIAL MELANISM

\ IM \

The evolution of the peppered moth over the last two hundred years has been studied in detail. Originally, the vast majority of peppered moths had light coloration, which effectively camouflaged them against the light-colored trees and lichens which they rested upon. However, due to widespread pollution during the Industrial Revolution in England, many of the lichens died out, and the trees that peppered moths rested on became blackened by soot, causing most of the light-colored moths (typica) to die off due to predation. At the same time the dark-colored or melanic moths (carbonaria) flourished because of their ability to hide on the darkened trees.

Since then, with improved environmental standards, light-colored peppered moths have again become common, but the dramatic change in the peppered moth's population has remained a subject of much interest and study, and has led to the coining of the term "industrial melanism" to refer to the genetic darkening of species in response to pollutants.

Melanism is the opposite of albinism and occurs naturally with about the same frequency. The genetic basis is not clearly understood, but inbreeding is considered partially responsible.

\ BODY DOUBLE

\ BD-1 \

Some scientists argue that animals like Dolly are not 100 percent clones because they have genetic material both from the adult cell they were taken from, and from the egg that is hollowed out to make the clone. Tetra was produced by a technique called "embryo splitting". Here's how it works:

- An egg from a mother and sperm from a father are used to create a fertilized egg.
- After the embryo grows into eight cells, researchers split it into four identical embryos, each consisting of just two cells.
- The four embryos are then implanted into surrogate mothers. Schatten said that in effect, a single embryo becomes four embryos, all genetically identical.

In the case of their experiment, three of the embryos didn't survive. The fourth, Tetra, was born 157 days later. Her name means "one of four". Tetra isn't the first monkey to be cloned, but she is the first using the embryo-splitting technique. More are on the way.

\ BD-2 \

BEAVERTON, Oregon (CNN) – Oregon researchers say they have cloned a monkey by splitting an early-stage embryo and implanting the pieces into mother animals.

The technique has so far produced only one living monkey, a bright-eyed rhesus macaque female named Tetra, now 4 months old.

Tetra the monkey is different from Dolly the sheep, which was produced by Scientists at Scotland's Roslin Institute using a process called nuclear transfer – taking the nucleus out of an adult cell and using it to reprogram an unfertilized egg.

\ HALLUCIGENIA

\ H \

Martin Walde
AHIS, 2009

Thin-walled blown glass sculptures, filled with gasses that are induced by high frequency technology to emit varicolored light. They are modelled after bizarre small animals that lived 500 million years ago, whose fossils were found by Charles Walcott in the famous Burgess Shale in Canada in 1911, but who were only in 1979 discovered to be an entirely new species by Simon Conway Morris. He called them "Hallucigenia".

\ PREHISTORIC PETS

\ PRP-1 \

The tadpole shrimp (scientific name = Triops longicaudatus, which are in the order Notostraca in the class Branchiopoda) inhabits freshwater, ephemeral ponds ranging from the southern regions of western Canada, through the United States and into Central and South America. Triops translates in Latin to three eyes and longicaudatus refers to the elongated abdomen and associated structures. Two genera (Triops [formerly Apus] and Lepidurus) constitute nine to twelve species within the Notostraca taxa. Triops is distinguished from Lepidurus by the absence of an anal plate. Fossil records indicate that these crustaceans evolved over 350 million years ago during the Devonian period and have remained relatively unchanged in external morphology. The persistence of these taxa during several geological extinctions may be related to the ability to remain in embryonic stasis for several decades.

Populations of Triops are comprised of males and hermaphrodites, with wide variation in the numbers of both sexual types. Most populations have many more hermaphrodites than males, and in some ponds, no males are found at all. The hermaphrodites can fertilize their own eggs, or can mate with a male. The fertilized eggs are called "cysts" or "resting eggs", and can be dried for several years to decades before being made to hatch when rehydrated. In this cyst form, Triops can withstand extremes of heat and cold. (This is why they can be sold in plastic bags in novelty stores!) The eggs are carried by the hermaphrodites in small "brood pouches" located on two of their swimming appendages (about half-way down the length of the body, on the left and right sides). The eggs are either white or pinkish in color, and are carried in these pouches for between 12 and 24 hours before being laid in the ponds. The Triops have two large mandibles that they use for grinding up both live and dead food items. They eat plants, other animals, and sometimes even each other.

\ CHAOTIC WARFARE

\ CW-3 \

Pascal Bernier
Butterfly, 1996 - 1998

"According to theories on chaotic systems, the fluttering of a butterfly's wing can eventually produce a hurricane. Waging war against butterflies could perhaps become the ultimate weapon in the chaos strategy."

[Pascal Bernier]

\ DARWINS NIGHTMARE

Charles Darwin's Origin of Species (publ. 1859) is a pivotal work in scientific literature and arguably the pivotal work in evolutionary biology. The book's full title is On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. It introduced the theory that populations evolve over the course of generations through a process of natural selection. It was controversial because it contradicted religious beliefs which underlay the then current theories of biology. Darwin's book was the culmination of evidence he had accumulated on the voyage of the Beagle in the 1830s and added to through continuing investigations and experiments since his return.

Theory in a nutshell

Darwin's theory is based on key observations and inferences drawn from them:

1. Species have great fertility. They make more offspring than can grow to adulthood.
2. Populations remain roughly the same size, with modest fluctuations.
3. Food resources are limited, but are relatively stable over time.
4. An implicit struggle for survival ensues.
5. In sexually reproducing species, generally no two individuals are identical.
6. Some of these variations directly impact the ability of an individual to survive in a given environment.
7. Much of this variation is inheritable.
8. Individuals less suited to the environment are less likely to survive and less likely to reproduce, while individuals more suited to the environment are more likely to survive and more likely to reproduce.
9. The individuals that survive are most likely to leave their inheritable traits to future generations.
10. This slowly effected process results in populations that adapt to the environment over time, and ultimately, after interminable generations, the creations of new varieties, and ultimately, new species.

\ DN \

Koen Vanmechelen
The Cosmopolitan Chicken, 2000

Belgian artist Koen Vanmechelen's Cosmopolitan Chicken Project is an attempt to create a universal chicken or superbastard by cross-breeding national chicken breeds. To Vanmechelen (1965), cross-breeding is the quintessence of dynamic, fertile and creative life, and of peaceful coexistence of different species and races.

The story officially started in 2000, in the Flemish village of Watou, at the French-Belgian border. For the exhibition "Storm Centers", curated by Jan Hoet, Koen Vanmechelen crossbred the Belgian chicken "Mechelse Koekoek" (cuckoo of Malines) with the French pride "Poulet de Bresse".

This hybrid, named "Mechelse Bresse" was in its turn crossbred with the typical English chicken "English Redcap"; this happened in 2000 too, at the group show "A Shot in the Head" at Lisson Gallery, London.

By 2003 the sixth generation of the Cosmopolitan Chicken hatched out.

Obviously, "The Cosmopolitan Chicken Project" is a project with a high metaphorical value that touches a lot of contemporary social issues such as genetic manipulation, cloning, globalisation, multiraciality, multicultural society etc.

Although Vanmechelen has a lot of inspiring contacts with the medical and scientific worlds, "The Cosmopolitan Chicken" has found its ideal setting in the world of art.

(www.koen-vanmechelen.be)

\ TRANSGENICS

\ T \

Eduardo Kac
Genesis, 1999 - 2003

Transgenics is a field of biomedical research transforming the use of test animals. It involves the genetic modification, cloning, and breeding of animals for specific use in testing. It can involve the production of specific cell matter via breeding and DNA recombination, so future tests can be conducted on cells alone without a living host. Transgenicists often use computer simulations of cell cloning, so that researchers in labs around the world can be involved in team experiments taking place in real-time.

For his work "Genesis", bioartist Eduardo Kac translated a sentence from the book of Genesis into Morse code, and converted this into DNA base pairs, according to a specially developed transposition key.

"Let man have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moves upon the earth." (Genesis 1:26, the Bible)

He then implanted the resulting "artist's gene" into unspecified bacteria, placed them in a Petri dish and allowed online viewers to cause – through the use of ultraviolet light – real, biological mutations in the bacteria. This action changed the biblical sentence in the bacteria as well, leading Kac to declare on his web site:

"The ability to change the sentence is a symbolic gesture: it means that we do not accept its meaning in the form we inherited it and that new meanings emerge as we seek to change it."

Do you want to play God? Go to: http://genesis.ivam.es/

\ BACTERIOLOGIC SYMBIOSIS

\ BS \

Jelte van Abbema
Symbiose, 2006

Printed media can create a harmful impact to the environment. Solutions like soy ink and natural pigments are a better alternative, but Jelte van Abbema takes this approach even further. His fascination for nature allows him to investigate the possibilities of bacteria in a visual culture. To stay within scientific guidelines, he completed a course at the department of microbiology at the University of Wageningen. The result is a radical concept within printed media in that the image is still materializing when it rolls off the press. By converting a bus stop poster box (manufactured by JCDecaux) with controlled conditions, van Abbema creates an environment for his print to thrive. With time, the bacteria transform and begin to shape their own aesthetics and dimensions by growing over their printed boundaries.

\ EMBRYONIC SECTION PAINTINGS

\ ESP \

davidkremers
Paraxial Mesoderm, 1992
(agar, x-gal, iptg, neutral red n-2880, ecoli tb-1, synthetic resin on acrylic plate, 24 x 24 in)
© davidkremers, 1992

Abstract

given evolution as a step of physiologically based intelligence.
method paintings are grown on plates of clear acryl using bacteria genetically engineered to produce enzymes of various colors after maturation, the plates are dried and sealed in a synthetic resin the figurative subjects are chosen from embryonic structures common to all mammals.
q e d life is organization rather than substance. consciousness is inherent in the way molecules are organized, not in the substance of the molecules themselves.

\ ALIENATED NATURE

\ AN-1 \

Panamarenko
Archeopterix, since 1988

In his projects Panamarenko freely and inventively plays with the formal rules of mechanics and physics, thereby restoring the dream of free and unhindered movement, and bringing the wonderful world of science and technology and its aesthetic aspects back to where it belongs: in the realm of humanity trying to determine its place in nature.

Paradoxically, the more man deepens his knowledge of nature, the more he is alienated from it.

\ AN-2 \

Raven's Variable Matrix, 2000

\ JAPANESE GOLFBALL EGGS

Oology is the branch of zoology that deals with the study of eggs, especially birds' eggs. It can also be applied to the hobby of collecting wild birds' eggs (which is now illegal in many jurisdictions). Oology includes the study of the breeding habits of birds, and the study of their nests. (The study of birds' nests is sometimes called caliology).

Birds' eggs are conveniently classified as marked or unmarked, according to the ground color. Birds which lay their eggs in holes in trees or in the ground almost always have white, unspotted eggs. Birds which build in trees generally have blue or greenish eggs, either spotted or unspotted, while birds that build in bushes, near the ground, are likely to lay speckled eggs.

\ JGE-1 \

Guillaume Bijl
'Sorry', 1987

\ JGE-2 \

Maarten Vanden Eynde
Genetologic Research Nr. 17, 2004

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\ ZOOLOGY OF GENETOLOGY

EARTH WITHOUT PEOPLE

By Alan Weisman

Given the mounting toll of fouled oceans, overheated air, missing topsoil, and mass extinctions, we might sometimes wonder what our planet would be like if humans suddenly disappeared. Would Superfund sites revert to Gardens of Eden? Would the seas again fill with fish? Would our concrete cities crumble to dust from the force of tree roots, water, and weeds? How long would it take for our traces to vanish? And if we could answer such questions, would we be more in awe of the changes we have wrought, or of nature's resilience?

A good place to start searching for answers is in Korea, in the 155-mile-long, 2.5-mile-wide mountainous Demilitarized Zone, or DMZ, set up by the armistice ending the Korean War. Aside from rare military patrols or desperate souls fleeing North Korea, humans have barely set foot in the strip since 1953. Before that, for 5,000 years, the area was populated by rice farmers who carved the land into paddies. Today those paddies have become barely discernible, transformed into pockets of marsh, and the new occupants of these lands arrive as dazzling white squadrons of red-crowned cranes that glide over the bulrushes in perfect formation, touching down so lightly that they detonate no land mines. Next to whooping cranes, they are the rarest such birds on Earth. They winter in the DMZ alongside the endangered white-naped cranes, revered in Asia as sacred portents of peace.

If peace is ever declared, suburban Seoul, which has rolled ever northward in recent decades, is poised to invade such tantalizing real estate. On the other side, the North Koreans are building an industrial megapark. This has spurred an international coalition of scientists called the DMZ Forum to try to consecrate the area for a peace park and nature preserve. Imagine it as "a Korean Gettysburg and Yosemite rolled together," says Harvard University biologist Edward O. Wilson, who believes that tourism revenues could trump those from agriculture or development.

As serenely natural as the DMZ now is, it would be far different if people throughout Korea suddenly disappeared. The habitat would not revert to a truly natural state until the dams that now divert rivers to slake the needs of Seoul's more than 20 million inhabitants failed – a century or two after the humans had gone. But in the meantime, says Wilson, many creatures would flourish. Otters, Asiatic black bears, musk deer, and the nearly vanquished Amur leopard would spread into slopes reforested with young daimyo oak and bird cherry. The few Siberian tigers that still prowl the North Korean-Chinese borderlands would multiply and fan across Asia's temperate zones. "The wild carnivores would make short work of livestock," he says. "Few domestic animals would remain after a couple of hundred years. Dogs would go feral, but they wouldn't last long: They'd never be able to compete."

If people were no longer present anywhere on Earth, a worldwide shakeout would follow. From zebra mussels to fire ants to crops to kudzu, exotics would battle with natives. In time, says Wilson, all human attempts to improve on nature, such as our painstakingly bred horses, would revert to their origins. If horses survived at all, they would devolve back to Przewalski's horse, the only true wild horse, still found in the Mongolian steppes. "The plants, crops, and animal species man has wrought by his own hand would be wiped out in a century or two", Wilson says. In a few thousand years, "the world would mostly look as it did before humanity came along – like a wilderness."

The new wilderness would consume cities, much as the jungle of northern Guatemala consumed the Mayan pyramids and megalopolises of overlapping city-states. From A.D. 800 to 900, a combination of drought and internecine warfare over dwindling farmland brought 2,000 years of civilization crashing down. Within 10 centuries, the jungle swallowed all.

Mayan communities alternated urban living with fields sheltered by forests, in contrast with today's paved cities, which are more like man-made deserts. However, it wouldn't take long for nature to undo even the likes of a New York City. Jameel Ahmad, civil engineering department chair at Cooper Union College in New York City, says repeated freezing and thawing common in months like March and November would split cement within a decade, allowing water to seep in. As it, too, froze and expanded, cracks would widen. Soon, weeds such as mustard and goosegrass would invade. With nobody to trample seedlings, New York's prolific exotic, the Chinese ailanthus tree, would take over. Within five years, says Dennis Stevenson, senior curator at the New York Botanical Garden, ailanthus roots would heave up sidewalks and split sewers.

That would exacerbate a problem that already plagues New York – rising groundwater. There's little soil to absorb it or vegetation to transpire it, and buildings block the sunlight that could evaporate it. With the power off, pumps that keep subways from flooding would be stilled. As water sluiced away soil beneath pavement, streets would crater.

Eric Sanderson of the Bronx Zoo Wildlife Conservation Society heads the Mannahatta Project, a virtual re-creation of pre-1609 Manhattan. He says there were 30 to 40 streams in Manhattan when the Dutch first arrived. If New Yorkers disappeared, sewers would clog, some natural watercourses would reappear, and others would form.Within 20 years, the water-soaked steel columns that support the street above the East Side's subway tunnels would corrode and buckle, turning Lexington Avenue into a river.

New York's architecture isn't as flammable as San Francisco's clapboard Victorians, but within 200 years, says Steven Clemants, vice president of the Brooklyn Botanic Garden, tons of leaf litter would overflow gutters as pioneer weeds gave way to colonizing native oaks and maples in city parks. A dry lightning strike, igniting decades of uncut, knee-high Central Park grass, would spread flames through town.

As lightning rods rusted away, roof fires would leap among buildings into paneled offices filled with paper. Meanwhile, native Virginia creeper and poison ivy would claw at walls covered with lichens, which thrive in the absence of air pollution. Wherever foundations failed and buildings tumbled, lime from crushed concrete would raise soil pH, inviting buckthorn and birch. Black locust and autumn olive trees would fix nitrogen, allowing more goldenrods, sunflowers, and white snakeroot to move in along with apple trees, their seeds expelled by proliferating birds. Sweet carrots would quickly devolve to their wild form, unpalatable Queen Anne's lace, while broccoli, cabbage, brussels sprouts, and cauliflower would regress to the same unrecognizable broccoli ancestor.

Unless an earthquake strikes New York first, bridges spared yearly applications of road salt would last a few hundred years before their stays and bolts gave way (last to fall would be Hell Gate Arch, built for railroads and easily good for another thousand years). Coyotes would invade Central Park, and deer, bears, and finally wolves would follow. Ruins would echo the love song of frogs breeding in streams stocked with alewives, herring, and mussels dropped by seagulls. Missing, however, would be all fauna that have adapted to humans. The invincible cockroach, an insect that originated in the hot climes of Africa, would succumb in unheated buildings. Without garbage, rats would starve or serve as lunch for peregrine falcons and red-tailed hawks. Pigeons would genetically revert back to the rock doves from which they sprang.

It's unclear how long animals would suffer from the urban legacy of concentrated heavy metals. Over many centuries, plants would take these up, recycle, redeposit, and gradually dilute them. The time bombs left in petroleum tanks, chemical plants, power plants, and dry-cleaning plants might poison the earth beneath them for eons. One intriguing example is the former Rocky Mountain Arsenal next to Denver International Airport. There a chemical weapons plant produced mustard and nerve gas, incendiary bombs, napalm, and after World War II, pesticides. In 1984 it was considered by the arsenal commander to be the most contaminated spot in the United States. Today it is a national wildlife refuge, home to bald eagles that feast on its prodigious prairie dog population.

However, it took more than $130 million and a lot of man-hours to drain and seal the arsenal's lake, in which ducks once died minutes after landing and the aluminum bottoms of boats sent to fetch their carcasses rotted within a month. In a world with no one left to bury the bad stuff, decaying chemical containers would slowly expose their lethal contents. Places like the Indian Point nuclear power plant, 35 miles north of Times Square, would dump radioactivity into the Hudson long after the lights went out.

Old stone buildings in Manhattan, such as Grand Central Station or the Metropolitan Museum of Art, would outlast every modern glass box, especially with no more acid rain to pock their marble. Still, at some point thousands of years hence, the last stone walls – perhaps chunks of St. Paul's Chapel on Wall Street, built in 1766 from Manhattan's own hard schist – would fall. Three times in the past 100,000 years, glaciers have scraped New York clean, and they'll do so again. The mature hardwood forest would be mowed down. On Staten Island, Fresh Kills's four giant mounds of trash would be flattened, their vast accumulation of stubborn PVC plastic and glass ground to powder. After the ice receded, an unnatural concentration of reddish metal – remnants of wiring and plumbing – would remain buried in layers. The next toolmaker to arrive or evolve might discover it and use it, but there would be nothing to indicate who had put it there.

Before humans appeared, an oriole could fly from the Mississippi to the Atlantic and never alight on anything other than a treetop. Unbroken forest blanketed Europe from the Urals to the English Channel. The last remaining fragment of that primeval European wilderness – half a million acres of woods straddling the border between Poland and Belarus, called the Bialowieza Forest – provides another glimpse of how the world would look if we were gone. There, relic groves of huge ash and linden trees rise 138 feet above an understory of hornbeams, ferns, swamp alders, massive birches, and crockery-size fungi. Norway spruces, shaggy as Methuselah, stand even taller. Five-century-old oaks grow so immense that great spotted woodpeckers stuff whole spruce cones in their three-inch-deep bark furrows. The woods carry pygmy owl whistles, nutcracker croaks, and wolf howls. Fragrance wafts from eons of mulch.

High privilege accounts for such unbroken antiquity. During the 14th century, a Lithuanian duke declared it a royal hunting preserve. For centuries it stayed that way. Eventually, the forest was subsumed by Russia and in 1888 became the private domain of the czars. Occupying Germans took lumber and slaughtered game during World War I, but a pristine core was left intact, which in 1921 became a Polish national park. Timber pillaging resumed briefly under the Soviets, but when the Nazis invaded, nature fanatic Hermann Göring decreed the entire preserve off limits. Then, following World War II, a reportedly drunken Josef Stalin agreed one evening in Warsaw to let Poland retain two-fifths of the forest.

To realize that all of Europe once looked like this is startling. Most unexpected of all is the sight of native bison. Just 600 remain in the wild, on both sides of an impassable iron curtain erected by the Soviets in 1980 along the border to thwart escapees to Poland's renegade Solidarity movement. Although wolves dig under it, and roe deer are believed to leap over it, the herd of the largest of Europe's mammals remains divided, and thus its gene pool. Belarus, which has not removed its statues of Lenin, has no specific plans to dismantle the fence. Unless it does, the bison may suffer genetic degradation, leaving them vulnerable to a disease that would wipe them out.

If the bison herd withers, they would join all the other extinct megafauna that even our total disappearance could never bring back. In a glass case in his laboratory, paleoecologist Paul S. Martin at the University of Arizona keeps a lump of dried dung he found in a Grand Canyon cave, left by a sloth weighing 200 pounds. That would have made it the smallest of several North American ground sloth species present when humans first appeared on this continent. The largest was as big as an elephant and lumbered around by the thousands in the woodlands and deserts of today's United States. What we call pristine today, Martin says, is a poor reflection of what would be here if Homo sapiens had never evolved.

"America would have three times as many species of animals over 1,000 pounds as Africa does today", he says. An amazing megafaunal menagerie roamed the region: Giant armadillos resembling armor-plated autos; bears twice the size of grizzlies; the hoofed, herbivorous toxodon, big as a rhinoceros; and saber-toothed tigers. A dozen species of horses were here, as well as the camel-like litoptern, giant beavers, giant peccaries, woolly rhinos, mammoths, and mastodons. Climate change and imported disease may have killed them, but most paleontologists accept the theory Martin advocates: "When people got out of Africa and Asia and reached other parts of the world, all hell broke loose." He is convinced that people were responsible for the mass extinctions because they commenced with human arrival everywhere: first, in Australia 60,000 years ago, then mainland America 13,000 years ago, followed by the Caribbean islands 6,000 years ago, and Madagascar 2,000 years ago.

Yet one place on Earth did manage to elude the intercontinental holocaust: the oceans. Dolphins and whales escaped for the simple reason that prehistoric people could not hunt enough giant marine mammals to have a major impact on the population. "At least a dozen species in the ocean Columbus sailed were bigger than his biggest ship", says marine paleoecologist Jeremy Jackson of the Smithsonian Tropical Research Institute in Panama. "Not only mammals – the sea off Cuba was so thick with 1,000-pound green turtles that his boats practically ran aground on them." This was a world where ships collided with schools of whales and where sharks were so abundant they would swim up rivers to prey on cattle. Reefs swarmed with 800-pound goliath grouper, not just today's puny aquarium species. Cod could be fished from the sea in baskets. Oysters filtered all the water in Chesapeake Bay every five days. The planet's shores teemed with millions of manatees, seals, and walrus.

Within the past century, however, humans have flattened the coral reefs on the continental shelves and scraped the sea grass beds bare; a dead zone bigger than New Jersey grows at the mouth of the Mississippi; all the world's cod fisheries have collapsed. What Pleistocene humans did in 1,500 years to terrestrial life, modern man has done in mere decades to the oceans – "almost", Jackson says. Despite mechanized overharvesting, satellite fish tracking, and prolonged butchery of sea mammals, the ocean is still bigger than we are. "It's not like the land", he says. "The great majority of sea species are badly depleted, but they still exist. If people actually went away, most could recover."

Even if global warming or ultraviolet radiation bleaches the Great Barrier Reef to death, Jackson says, "it's only 7,000 years old. New reefs have had to form before. It's not like the world is a constant place." Without people, most excess industrial carbon dioxide would dissipate within 200 years, cooling the atmosphere. With no further chlorine and bromine leaking skyward, within decades the ozone layer would replenish, and ultraviolet damage would subside. Eventually, heavy metals and toxins would flush through the system; a few intractable PCBs might take a millennium.

During that same span, every dam on Earth would silt up and spill over. Rivers would again carry nutrients seaward, where most life would be, as it was long before vertebrates crawled onto the shore. Eventually, that would happen again. The world would start over.

Originally appeared in Discover Magazine, February, 2005.

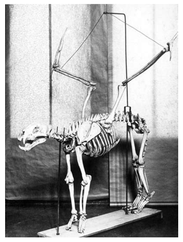
\ HBS-1 \

\ HBS-2 \

\ CC-1 \

\ CC-2 \

\ CC-3 \



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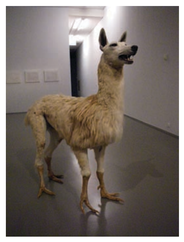

\ NG-1 \

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\ CW-1 \

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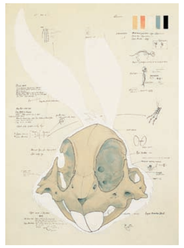

\ WCD \

\ AA-1 \

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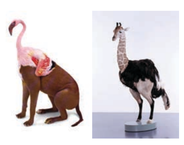

\ AA-3 \

\ MM-1 \

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\ BCW \

\ FGR \

\ BOR \

\ MC-1 \

\ MC-2 \

\ XS \

\ MT-1 \

\ MT-2 \

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\ MT-4 \

\ FF \

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\ SOS-1 \

\ SOS-2 \

\ SOS-3 \

\ BE \

\ FF-4 \

\ FF-2 \

\ FLF \

\ SN \

\ Y \

\ IM-1 \

\ BD-1 \

\ BD-2 \

\ H \

\ PEP-2 \

\ CW-3 \

\ DN \

\ T \

\ BS \

\ ESP \

\ AN-2 \

\ AN-3 \

\ IGE-1 \

\ IGE-2 \

www.geneticology.net

\ TURNING THE WORLD INSIDE OUT

\ TWIO-1 \

Anish Kapoor
Marsupial, 2006

Anish Kapoor is renowned for his enigmatic sculptural forms that permeate physical and psychological space. Most often, the intention is to engage the viewer, producing awe through their size and simple beauty, evoking mystery through the works' dark cavities, tactility through their inviting surfaces, and fascination through their reflective facades. Throughout, he has explored what he sees as deep-rooted metaphysical polarities: presence and absence, being and non-being, place and non-place, the solid and the intangible. His most recent works are mirror-like, reflecting or distorting the viewer and the surroundings.

\ TWIO-2 \
Iris, 1998
\ TWIO-3 \
Turning the World Inside Out II, 1995

\ AIR-PORT-CITY

\ APC \

Tomás Saraceno
Iridescent Plant Medium with Lamp, 2009
Photo by Tom DuBrock

\ DARK MATTERS

\ DAM-1 \
The balloon awaits release from the launch vehicle / T. Gregory Guzik / Nature.

In 2008 the Gamma-ray Large Area Space Telescope (GLAST), later renamed the Fermi Gamma-ray Space Telescope (FGST), was launched into a low Earth orbit. One of its objectives was to shed some light on the nature of the mysterious dark matter, supposed to constitute 80% of the matter in the universe. Scientists expected that the mission would decisively complement the data already coming in from another satellite, the Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics (PAMELA), launched in 2006. Our view of the universe would be dramatically changed, necessitating new laws of physics.

At the end of 2010, however, the riddle of dark matter remained unsolved.

\ DAM-2 \
(Photo: NASA)

\ FOLDING SPACE

\ FS \

Martijn Hendriks
Gradually, Then Suddenly (white version), 2010
Still from a single channel video, 1 min 59 sec

\ ESLÖV METEORITE

\ EM-1 \
Meteor impact at 06.41 am

In the early morning of November 3, 2007, Eslöv, reputed to be the most boring town in Sweden, was hit by a meteor. The event was witnessed only by a few. The blast, with an energy estimated to have been between 1 and 2 megatons of TNT, left a hole of 15 metres wide in a field near Eslöv. The meteorite was dug up by Maarten Vanden Eynde and put on display in front of the Medborgarhuset as part of the 2nd Eslöv Biennale.

\ EM-2 \
Meteor crater near Eslöv
\ EM-3 \
Maarten Vanden Eynde
Eslöv Meteorite, 2007

\ THE SEARCH FOR EXTRATERRESTRIAL LIFE

\ SEL-1 \

Jim Plaxco
Martian Crater, 2005
Source: Mars Global Surveyor Narrow Angle Camera in July 1998. The target area lies in the Cebrenia quadrangle of Mars and is centered on 33.25° latitude, 238.6° longitude. The crater is approximately 4 kilometers in diameter.

The National Aeronautics and Space Administration
In 1958, the United States Congress created the National Aeronautics and Space Administration, or NASA. Its purpose was to coordinate and conduct all aeronautical and space activites for the United States of America, except those of the military. Among the many programs which NASA now runs, one is the search for life outside our home planet. NASA is currently examining our neighbor planet Mars for signs of life, as well as the moons of other planets in our solar system. It has also developed highly advanced technology for the search of life outside of our own solar system, such as special radars and infrared telescopes.

Mars
For centuries now, a fierce debate has been going on over whether there is or has been life on Mars. The observation of so-called canals on the red planet at the end of the 19th century led some scientists to propose a long-gone highly intelligent civlization of Martians. Others argued that the extreme environmental conditions on Mars made life as we know it impossible. The two Mars landers, Viking I and Viking II, that Nasa sent in 1975, failed to detect any organic compound on the surface.

ALH84001
In 1984, a meteor was found in Allan Hills, Antarctica. This 4 billion year old meteor fell to Earth 13,000 years ago. It was thought to hail from Mars. In 1996, scientists announced that it might contain evidence of Martian life, in the form of chain structures of carbonate globules, that could be the fossilized remains of bacteria.

\ SEL-2 \
Apart from these biomorphs, whose intriguing pictures already seem convincing enough, the case for life on Mars further rests on the presence in the meteorite of complex organic molecules (polycyclic aromatic hydrocarbons), and on the occurence of a form of the mineral magnetite that, on Earth, is associated only with biological activity.

However, skepticism still remains. The biomorphs could have been formed by inorganic processes. The presence of organic molecules could be due to contamination from the Antartic ice. The "biological" magnetite could have abiotic origins. And it is agreed that to be really convincing, pro-lifers would have to produce evidence of cell walls, of cell division, and of chemicals more closely associated with living organisms as we know them. And so the debate rages on, while the scientific community continues to look for signs of life on Mars, extant or extinct.

Pathfinder, Sojourner
On July 4, 1997, NASA dropped another Mars lander, called the Pathfinder, on the red planet. Safely packed in airbags, the lightweight, low-cost spacecraft bounced several times before coming to a stop. The airbags deflated, the pod opened, and out came a small radio-controlled Mars rover. Its mission, directed by the Jet Propulsion Laboratory in Pasadena, California, was to examine the Martian atmosphere and soil.

\ SEL-3 \
During the following three months, far longer than programmed, this rover, called Sojourner, analysed rocks and soil samples on 16 locations near the lander. No Mars probe since Viking has tested the Martian soil specifically for signs of life. Recent missions focused on the question whether there was or ever had been water on Mars, which would be a requisite for life as we know it. In the near future, NASA will continue to send landers and rovers to examine the Martian soil. Possibly by 2016, ARES will be launched, with the explicit mission statement to search for life on Mars. If organic macro-molecules were to be found in the Martian soil, their chirality would be analysed. Molecules are said to be chiral if they occur in two asymmetric mirror images, like a left and right hand. Most amino acids are chiral. In order to function properly, proteins have to be homochiral: all the constituting amino acids must have the same chirality. A mix of left and right simply would not do. The ocurrence of homochirality would be strong evidence for life on Mars.

\ COMPOSITION OF THE UNIVERSE

\ CU \

Marjolijn Dijkman
Composition of the Universe (variations), 2010

\ SPACE TIME

\ ST \

Mungo Thomson
TIME, 2007

\ WHEN SUDDENLY IT HIT ME

\ WS-1 \
Rinus Van de Velde
When It Suddenly Hit Me, 2009
\ WS-2 \
Maarten Vanden Eynde
Dip-Stick, 2005

\ THE SCALE OF THE UNIVERSE

\ SU \

Toril Johannessen
The Scale of The Universe The Past 100 Years, 2009

At the beginning of the 20th century the estimate of the size of the universe increased radically.

At that time, an extensive project to photograph and map the entire sky was under way at the Harvard College Observatory in Cambridge, Massachusetts, under the direction of Edward Pickering. Stellar photographic plates amassed, waiting to be examined. A group of women, known as the Harvard Computers, or Pickering's Harem, was brought in as an accurate and cheap labor force to count the stars in the immense photographic plate collection, to measure their brightness, and to catalogue them. Although they had no scientific status, they made several important discoveries. Henrietta Swan Leavitt was put to work on Cepheids, counting thousands of them in the Magellanic Clouds. Cepheids are pulsating variable stars, whose brightness changes in a very regular way. Leavitt discovered a simple linear relationship between the maximum brightness of a Cepheid and the duration of its cycle. It was published by Pickering in 1912. This period-luminosity relationship provided an easy way to calculate distances to objects in space. In the following years, the use of this Cepheid distance scale led to the increase of the measured size of the universe by billions of light years.

\ NEGATIVE SPACE

\ NS-1 \

Mungo Thomson
Negative Space, 2006
Full color, 160 pages, 10-1/8" x 7" x ½" / Designed by Mungo Thomson with Conny Purtill / Published by Christoph Keller Editions and JRP|Ringier, Zurich

Thomson's ongoing *Negative Space* project tempers profound ambivalence with assurances of earnest conciliation. The works in this series – including Negative Space (2006), an artist book, and Negative Space (STScI-PRC2003-24) (2006) and Negative Space (STScI-PRC2007-41a) (2007), large-scale photographic murals – comprise psychedelic images culled from an online archive of copyright-free starscape shots taken by the Hubble Space Telescope that the artist downloaded and reversed. (Thanks to a simple Photoshop operation, the inky chasm of outer space becomes the antiseptic pallor of the empty gallery in another act of reversal.)

[Based on a text by Suzanne Hudson, a New York-based critic and an assistant professor of modern and contemporary art at the University of Illinois.]

\ NS-2 \
Dark Matter (Running Man), 2010
Photo-luminescent ink on museum board, 39-¼" x 52"
Dark Matter (Orion), 2010
Photo-luminescent ink on museum board, 44-¼" x 33-¼"
\ NS-3 \
Dark Matter (NGC-6397), 2010
Photo-luminescent ink on museum board, 35-¾" X 27"

Thomson's silkscreens invert photographs of starscapes taken by amateur astronomers and turn them into glow-in-the-dark prints whose negative space glows, rather than the stars themselves.

\ GRAVITATION OF TIME

The Universal Law of Gravitation has several important features. First, it is an inverse square law, meaning that the strength of the force between two massive objects decreases in proportion to the square of the distance between them as they move farther apart. Second, the direction in which the force acts is always along the line (or vector) connecting the two gravitating objects.

In 1687 Sir Isaac Newton first published his Philosophiae Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy) which was a radical treatment of mechanics, establishing the concepts which were to dominate physics for the next two hundred years. Among the book's most important new concepts was Newton's Universal Law of Gravitation. Newton managed to take Kepler's Laws governing the motion of the planets and Galileo's ideas about kinematics and projectile motion and synthesize them into a law which governed both motion on earth and motion in the heavens. This was an achievement of enormous importance for physics; Newton's discoveries meant that the universe was a rational place in which the same principles of nature applied to all objects.

Between two stationary objects A and B, there is one point where the gravitational forces exerted by A and B on a third object C are equal (L1 point, named after Lagrange). At this point, C is in equilibrium between the two attracting masses. If it is slightly moved towards A or B, the balance is lost. If you wanted to move C from this fixed position towards say A, and yet keep its gravitational balance, you would simultaneously have to increase the mass of B, decrease that of A, or work out a suitable combination of the two. If B grows too fat, A has to loose weight.

Time is constantly moving. When you read this word, it's history already. The future is catched up instantly. The present is an elusive point always on the move.

If time were linear, and A were the past and B the future, the Lagrangian point would be the present. The past is getting longer (and thus bigger), while the future is getting smaller, so in order for the present to keep being equally drawn towards A and B, it needs to keep moving towards the future. And on top of that spacetime, created in the Big Bang, is expanding at an accelerating rate. Time moves faster and faster towards its final destiny. Will this be the end or a new beginning?

\ GT-1 \
The Lagrangian points are the five positions in interplanetary space where a small object affected only by gravity can theoretically be stationary relative to two larger objects (such as a satellite with respect to the Earth and Moon). They are analogous to geosynchronous orbits in that they allow an object to be in a "fixed" position in space rather than in an orbit in which its relative position changes continuously.

\ GT-2 \
A more precise but technical definition is that the Lagrangian points are the stationary solutions of the circular restricted three-body problem. For example, given two massive bodies in circular orbits around their common center of mass, there are five positions in space where a third body, of comparatively negligible mass, could be placed which would then maintain its position relative to the two massive bodies. As seen in a frame of reference which rotates with the same period as the two co-orbiting bodies, the gravitational fields of two massive bodies combined with the centrifugal force are in balance at the Lagrangian points, allowing the third body to be stationary with respect to the first two bodies.

\ BLACK HOLE HOUSE

\ BHH-1 \
Dan Havel and Dean Ruck
Inversion, 2005

A black hole is an object with a gravitational field so powerful that a region of space becomes cut off from the rest of the universe – no matter or radiation, including visible light, that has entered the region can ever escape. The lack of escaping electromagnetic radiation renders the inside of black holes (beyond the event horizon) invisible, hence the name. However, black holes can be detectable if they interact with matter, e.g. by sucking in gas from an orbiting star. The gas spirals inward, heating up to very high temperatures and emitting large amounts of light, X-rays and Gamma rays in the process while still outside of the event horizon.

While the idea of an object with gravity strong enough to prevent light from escaping was proposed in the 18th century, black holes as presently understood are described by Einstein's theory of general relativity, developed in 1916. This theory predicts that when a large enough amount of mass is present within a sufficiently small region of space, all paths through space are warped inwards towards the center of the volume. When an object is compressed enough for this to occur, collapse is unavoidable (it would take infinite strength to resist collapsing into a black hole). When an object passes within the event horizon at the boundary of the black hole, it is lost forever (it would take an infinite amount of effort for an object to climb out from inside the hole). Although the object would be reduced to a singularity, the information it carries is not lost.

While general relativity describes a black hole as a region of empty space with a pointlike singularity at the center and an event horizon at the outer edge, the description changes when the effects of quantum mechanics are taken into account. The final, correct description of black holes, requiring a theory of quantum gravity, is unknown.

\ BHH-2 \
Simulated view of a black hole in front of the Milky Way. The hole has 10 solar masses and is viewed from a distance of 600 km. An acceleration of about 400 million g is necessary to sustain this distance constantly.

\ DARK MATTER MACHO

\ DMM-1 \
Impression showing the approximate extent of the dark matter halo around a large spiral galaxy such as our own (Photo: Jose Wudka)

\ COLD DARK MATTER

\ CDM \
Cornelia Parker
Cold Dark Matter: An Exploded View, 1991

Cold Dark Matter began life as a garden shed filled with objects from Cornelia Parker's own and friends' sheds, and things bought at a car boot sale. She then asked the army to blow up the shed under very controlled conditions. The objects, along with the fragments of the shed, were collected and suspended in a closed room in an attempt to recreate the moment just after the explosion. The installation is lit with a single light-bulb at the very centre of the arrangement, casting shadows on the walls. The title gives us a whole new way of understanding the artwork, making us think of other dramatic moments of destruction and creation in the much wider universe.

\ EXTRATERRESTRIAL ART

\ EA \
On June 2, 2003, for the first time in the history of mankind, a work of art was send to another planet. The trademark Damien Hirst spot painting, resembling a child's watercolour paint box, consisted of 16 multi-coloured spots on a 5 by 5 cm aluminium plate. After a previw at London's White Cube Gallery, it was bolted to Beagle 2, a British Mars lander named after Charles Darwin's famous ship. Beagle 2 was carried by the Mars Express, launched from Kazachstan by the European Space Agency.

The material had to be able to withstand the extreme conditions on Mars, with temperatures dropping to minus 70 °C, and the prelaunch sterilisation which heated the painting to 155 °C.

The painting was integrated in the technology of Beagle 2. The colour spots were to be used to calibrate the X-ray spectrometer, the camera, and the instrument to analyse iron in the minerals in the Martian soil.

The pop group Blur wrote the call sign that Beagle 2 would have send to mission control when it landed on Mars (listen to the song on the BBC website).

But Beagle 2 never made it. It was last seen heading for the red planet after separating from the Mars Express on December 19, 2003. Part of a mission with an estimated to cost of $85 million, it vanished without a trace …

\ BIG BANG THEORY

The Big Bang theory is the dominant scientific theory about the origin of the universe. It states that the universe literally started with a bang: the "explosion", 13.7 billion years ago, of an unimaginable and undescribable "something" called a singularity, not even a single point, that nevertheless "contained" all matter. Time and space were created on the spot. Fractions of a second later the universe was an incredibly hot and dense ball, expanding and cooling rapidly.

In 1927, the Belgian mathematician and Catholic priest Georges Lemaître was the first to propose an expanding universe, based on Albert Einstein's general theory of relativity and inspired by the growing number of redshift measurements for distant objects. In 1929, Edwin Hubble published a simple linear relationship between redshift and distance: the farther away an object, the faster it sped away from us, as predicted by Lemaître.

In 1931 Lemaître went a step further. He argued that if the universe was expanding, it should be shrinking if you went back in time, till you came to an initial point, which he called the primeval atom, and described as an exploding cosmic egg.

\ BBT-1 \
In January 1933, Lemaître and Einstein traveled to California for a series of seminars. After the Belgian detailed his Big Bang theory, Einstein supposedly stood up, applauded, and said, "This is the most beautiful and satisfactory explanation of creation to which I have ever listened." Lemaitre's theory of a beginning of time and space, marked with fireworks on "a day without yesterday", was a radical departure from the prevailing cosmologic model of a perfectly static universe without beginning or end.

The Big Bang theory received its strongest confirmation in 1964, when Arno Penzias and Robert Wilson, who later won the Nobel Prize, discovered the background radiation, the residual "afterglow" of the "explosion", as predicted by the theory.

\ BBT-2 \
Maarten Vanden Eynde
Pre-Genetologic Research, 2000
(400cm x 400cm x 400cm)

This work was made without the use of glue, welding, binding or screwing. The parts generate forces in a small square core. The tension is holding everything together. It creates an implosion as well as an explosion. But because the inward and outward forces cancel each other, everything freezes in an eternal standstill that represents the end as much as the beginning.

\ THE CONTROLLER OF THE UNIVERSE

\ CU-1 \
Damián Ortega
Controller of the Universe, 2007

Damián Ortega's *Controller of the Universe,* a collection of found hand tools suspended in mid-air, is a site of danger and otherworldliness. As if in mid-explosion, the objects appear to have been frozen in time and space by a force of nature.

\ CU-2 \
Cosmic Things, 2002

\ CHAOS THEORY

Unlike what is commonly thought, chaos theory isn't merely an elaborate way of stating the obvious fact that the world is chaotic. Nor does it refer to entropy, the natural tendency of systems toward disorder. Chaos theory is concerned with the uncertainty inherent in measurements and predictions, and with the non-linear behavior of seemingly linear systems. It studies the behavior of dynamical systems such as the weather, that are highly sensitive to initial conditions, popularly referred to as the butterfly effect.

Chaos theory became a much misunderstood buzzword in the late 1970s. It was applied in many disciplines, and led to a lot of multidisciplinary approaches.

Chaos is not random, but is an occult, hidden, or implicit order. Chaos is a major influence exerted by the microcosm on the macrocosm.

Creation came out of chaos, is surrounded by chaos and will end in chaos.

[Anonymous]

\ CT \
Maarten Vanden Eynde
Genetologic Research Nr. 10, 2004
(back: 100cm x 100cm x 150cm - front: 40cm x 70cm)

The work consists of wooden, plastic and metal ojects trouvés, collected during one month in the streets of Naples, Italy, and pressed into an oval hole in a 40 cm thick wall. The front presents a flat, orderly, "abstract" image. The back shows an explosion of energy, scrap sucked in or puked out. The tension was so high that the wall started to crack. The seemingly quiet, almost sacral image of the front side (facing the interior of the gallery) originates from but contradicts the chaotic and violent back (facing the street and the turbulent city life of Naples).

\ EXPANSION IN FINANCE AND PHYSICS

\ EFP-1 \
Toril Johannessen
Expansion in Finance and Physics, 2010
\ EFP-2 \
Abstraction in Finance and Physics, 2010
\ EFP-3 \
Detail from Expansion in Finance and Physics, 2010

\ THE GOD PARTICLE

\ GP-1 \
Alexandra Mir
The Dream and the Promise, 2009
\ GP-2 \
The Large Hedron Collider
(Photo: Maximilien Brice, CERN)

If you were to dig 300 feet deep right in the center of the charming French village of Crozet, you'd pop into a setting that calls to mind the subterranean lair of one of those James Bond villains. A garishly lit tunnel ten feet in diameter curves away into the distance, interrupted every few miles by lofty chambers crammed with heavy steel structures, cables, pipes, wires, magnets, tubes, shafts, catwalks, and enigmatic gizmos.

This technological netherworld is one very big scientific instrument, specifically, a particle accelerator – an atomic peashooter more powerful than any ever built. It's called the Large Hadron Collider, and its purpose is simple but ambitious: to crack the code of the physical world; to figure out what the universe is made of; in other words, to get to the very bottom of things.

There's one puzzle piece in particular that physicists hope to pick out of the debris from the LHC's high-energy collisions. Some call it the God particle.

The preferred name for the God particle among physicists is the Higgs boson, or the Higgs particle, or simply the Higgs, in honor of Peter Higgs, a physicist with the University of Edinburgh, who proposed its existence more than 40 years ago. Most physicists believe that there must be a Higgs field that pervades all space; the Higgs particle would be the carrier of the field (the way a Jedi knight in Star Wars is the carrier of the "force") and would interact with other particles. The Higgs is a crucial part of the standard model of particle physics – but no one's ever found it.

[Joel Achenbach]

\ LOST ASTRONAUT

\ LA \
Alicia Framis
Lost Astronaut, 2009

\ DARK MATTER MACHO

\ DMM-2 \
Dennis Feddersen
Dark Matter #02, 2009

The works of Dennis Feddersen truly occupy space. He experiments with different types of materials. Flexibility is one of the most important criteria for his choice of materials, thus emphasizing the possibilities that may arise during the creative process. He constantly adjusts his flexible sculptures in a series of trials: i.e. he reacts to the surrounding architecture and adapts his sculptures accordingly.

\ THE EARTH SEEN FROM THE MOON

\ ESM \
Maarten Vanden Eynde
The Earth seen from the Moon, 2005
(25 x 20 x 20cm)

The Earth seen from the Moon (2005) is a work made for an exhibition of the same name curated by Marco Altavilla in the Cesare Manzo Gallery in Pescara, Italy. A 3D map of the moon was copied on a dented blue helmet of the UN peacekeepers. The dents corresponded with seas and craters. The helmet was placed in a confined space, and started spinning around when a button was pushed. You had to look at the helmet through a telescope.

The Moon is the Earth's only natural satellite. It is a barren, heavily cratered world, lacking water or an atmosphere. Tidal forces have ensured that the same side of the Moon now always faces the Earth. In the course of a month, it undergoes the familiar cycle of phases. The illuminated portion depends on the relative alignment of the Sun, Earth and Moon.

The terrain on the visible side comes in two basic types: the heavily cratered, light-coloured highlands, and the darker, less cratered maria (seas).

How the Moon was formed is uncertain, but it has existed as a separate body for around 4,500 million years. In its early days it was hot and molten. A crust formed as it cooled, but it was heavily cratered by meteorites, the largest of which created the mare basins. These were then filled with dark basaltic lava. Significant volcanic activity has ceased at least 2,000 million years ago.

The mean distance from Earth to the Moon is 384,400 km. The Moon's radius is 1,738 km; mean density is 3.34 g/cm3.

\ PAPER MOON

\ PM \
Paul Ramirez Jonas
Paper Moon (I Create as I Speak), 2007

\ DARK MATTERS

\ DAM-3 \
(Photo: DUSEL)

The Advanced Thin Ionization Calorimeter (ATIC) is a balloon-borne instrument flying in the stratosphere over Antarctica to measure the energy and composition of cosmic rays. ATIC was launched from McMurdo Station for the first time in December 2000 and has since completed three successful flights out of four.

\ DARK MATTER MACHO

\ DMM-3 \
In general relativity, matter (mass) curves spacetime, and the path of a light ray will be deflected as a result. This is called gravitational lensing and is analogous with the deflection of light by an optical lens. Lensing has been used to detect any kind of matter (mass), including dark matter, and more specifically MACHOs (massive compact halo objects). Although MACHOs, being dark matter, cannot be observed directly, if they pass in front of a nearby star, they can cause the star to appear brighter for days or weeks. This effect has been observed but evidence of dark matter remains inconclusive.

[Based on a text by Joanne Cohn]

\ DMM-4 \
3D map of the universe's dark matter
(Photo: NASA, ESA and R. Massey)
\ DMM-5 \
Gravitational lensing caused by dark matter (Photo: NASA)

\ SAN FERNANDO GALAXY

\ SFG \
Piero Golia
San Fernando Galaxy, 2006
Photo 30×40 inches
Night vision of San Fernando Valley, California, USA

\ DEAD MATTER

\ DEM-1 \
Death Star (from Star Wars)
The Death Star is a fictional moon-sized space station and superweapon appearing in the Star Wars movies and Expanded Universe.
\ DEM-2 \
Impression of a neutron star with a powerful magnetic field, called a Magnetar (Photo: NASA)

Neutron stars are the cold remains of massive stars that exploded as supernovas. They tend to have masses similar to the sun, but are barely 25 km in diameter. Their extreme density makes neutron stars exceptionally good at capturing WIMPs (Weakly Interacting Massive Particles), another hypothetical dark matter candidate. Physicists in search of WIMPs have placed detectors deep underground in mines, and are waiting for a dark matter particle to hit them, as yet to no avail. Particles up to 100 times smaller than the ones detectable by underground detectors could still be captured by neutron stars. But if WIMPs annihilate each other whenever they meet, as some models suggest, thereby releasing lots of energy, dark matter could reheat these cold stars. The minimum temperature for a WIMP-burning neutron star has been calculated. If a neutron star with a lower temperature could be found in a region were dark matter is thought to be abundant, like the center of the galaxy or globular clusters of stars, new limits could be put on the properties of dark matter, and the theories could be refined considerably. The center of the galaxy is dusty and difficult to observe, and most globular clusters are so far away that a cold, tiny neutron star hiding inside them would be beyond today's telescopes. The next generation of ultraviolet telescopes could be up to the task.

[Based on a text by Lisa Grossman]

\ DARK ENERGY

\ DE-1 \
Even weirder than dark matter – the invisible stuff constituting most of the mass of the universe – is dark energy, a mysterious force pushing the universe apart at an ever-faster rate. Dark energy has been around for most of the history of the cosmos. "Nine billion years ago, dark energy was already wielding its repulsive influence on the universe," explains Johns Hopkins University astrophysicist Adam Riess. But the repulsion didn't win out against the force of gravity until 5 billion years ago, when cosmic expansion kicked into high gear and began accelerating.

Fortunately, a pioneering space mission called the Wilkinson Microwave Anisotropy Probe (WMAP) clarified this muddle by delivering the first accurate account of the overall makeup of the universe. The answer is decidedly strange. Dark energy makes up 73 percent of the universe, dark matter another 23 percent. Atomic matter – everything around us and everything astronomers have ever seen – accounts for just 4 percent.

Calibrating images from the Hubble Space Telescope's high-end cameras against those from the Wilkinson Microwave Anisotropy Probe – a satellite that maps the heat signature of the early universe – Riess and his colleagues retraced the growth history of the universe with unprecedented accuracy and depth. "It's as if you mark the height of a child against a doorframe to measure growth spurts," Riess says. "While dark matter retards expansion, dark energy propels it." For reasons as yet unknown, the antigravitational effects of dark energy are greater now than they were in the distant past. One theory, which the Hubble data support, is that empty space is pregnant with residual energy from the Big Bang. As space expands, there is more dark energy, while matter becomes more spread out, weakening the inward pull of gravity. But a universe of questions still remains. "This is another clue," Riess says, "and we know so little about dark energy that anything we can find out is important."

[Based on a text by Alex Stone]

\ DARK MATTERS

Dark matter is one of astrophysics' greatest enigmas. It is thought to be five times more common than visible matter, but there is no proof of what it is made of. Until now, the best evidence for dark matter was that orbital speeds of stars in a galaxy do not decrease with increasing distance from the galaxy's center, as would seem to be necessary to keep the stars from flying off into space. The fact that the galaxies are held together suggests that unseen mass provides extra gravity. Some researchers have tried to explain the steady orbital speed with alternative theories of gravity, but dark matter is the most likely explanation of the phenomenon.

Most cosmologists are convinced that the answer to the riddle of dark matter lies in theoretical physics, which predicts the existence of fundamental particles that have not yet been discovered. They are called Weakly Interacting Massive Particles, or WIMPs

\ DAM-4 \
(Photo: NASA)

A few exotic particles have been suggested as dark matter ingredients; the Kaluza-Klein particle, the Axion and the Neutralino. The most wanted particle however that might account for the missing matter is the Higgs boson particle, also known as the 'God-particle'. The existence of the particle is postulated as a means of resolving inconsistencies in current theoretical physics, and attempts are being made to confirm the existence of the particle by experimentation, using the Large Hadron Collider (LHC) at CERN and the Tevatron at Fermilab.

The Higgs boson is the only Standard Model particle that has not been observed and is thought to be the mediator of mass. Experimental detection of the Higgs boson would help explain the origin of mass in the universe.

Both deep underground and high in the sky scientists are attempting to capture the mysterious dark matter particle.

The Cryogenic Dark Matter Search (CDMS) detector at the Soudan Mine in the state of Minnesota, uses very cold germanium and silicon crystals. The crystals, each about the size of a hockey puck, are cooled to about 50 millikelvins, and are coated with a layer of aluminium and tungsten.

\ DAM-5 \
One of the hockey puck-sized detectors used in the CDMS experiment.

In SNOLAB, a Canadian underground physics laboratory at a depth of 2 km in Sudbury, Ontario, scientists are conducting two experimental programs, LEAP-1 and PICASSO, in order to find the missing WIMPs.

\ DAM-6 \
At the Kamioka Observatory, Institute for Cosmic Ray Research, a neutrino physics laboratory located underground in the Mozumi Mine near Hida in Gifu Prefecture, Japan, several studies are being carried out to find a WIMP. The particle detector is a cylindrical tank containing 3,000 tons of pure water, with about 1,000 photomultiplier tubes (PMTs) of 50 cm wide attached to the inner surface.

\ DAM-7 \
Andreas Gursky
Kamiokande, 2007

In 2016 the deepest research station will become operational. The Deep Underground Science and Engineering Laboratory (DUSEL) is a major project under consideration by the National Science Foundation. DUSEL will be a series of large laboratories, caverns, and cleanrooms for the study of extremely rare nuclear processes, like neutrino scattering and dark matter interactions that can only be studied in the absence of cosmic rays.

\ DEAD MATTER

\ DEM-3 \
Katie Paterson
All The Dead Stars, 2009

A map documenting the locations of just under 27,000 dead stars - all that have been recorded and observed by humankind.

Katie Paterson's artistic practice is multi-disciplinary, cross-medium, and conceptually driven, often exploring landscape by means of technology, and connectivity by way of moonlight, melting glaciers, and dead stars.

\ DARK ENERGY

\ DE-2 \
Chu Yun
Constellation, 2006
Galaxy made out of LED lights from various devices.

\ DEAD MATTER

\ DEM-4 \
Katie Paterson
History of Darkness, 2010

History of Darkness is a slide archive; a life-long project, it will eventually contain hundreds upon thousands of images of darkness from different times/places in the history of the Universe, spanning billions of years. Each image handwritten with its distance from earth in light years, and arranged from one to infinity.

\ EUTOPIA

\ EU \
Maarten Vanden Eynde
Europe 2006 - 2014

\ TIME TRAVEL - SHAPING THE FUTURE

by Neil Johnson

The idea of travelling forward into the future or back into the past has always fascinated science fiction writers. The 'grandfather paradox' is the argument many people use to suggest that time travel is impossible. What if you went back in time and prevented your grandfather from meeting your grandmother so that your mother was never born? Then you would never have been born … and so on. Until very recently such arguments led most scientists to believe that time travel could never exist outside science fiction. But amazingly, some interpretations of the weirdness of the quantum world now suggest that time travel is possible – at least in theory.

Gravity and black holes
Einstein's theory of relativity brought space and time together in a single, four-dimensional arrangement that he called spacetime. We know that we can travel forwards, backwards and sideways in space, so why not forwards and backwards in time?

Four dimensions are difficult to imagine, so physicists usually suggest you think of spacetime as a rubber sheet stretched out flat. If there are no large masses around, the sheet stays flat, and so any object placed on it will move around in straight lines. But a large mass, such as the Sun, makes a dip in the sheet because it actually warps spacetime. Now any other object with smaller mass, like our Earth, moving about in spacetime rolls into the dip as it comes past the Sun. It appears 'attracted' to the large mass. This effect of warping spacetime is what gives rise to gravity.

The Universe is full of heavy objects exerting gravitational effects and the net result is that spacetime is not flat at all but curved. Everything, including light, has to follow curved paths in spacetime. We know Einstein was right about this because astronomers can sometimes see distant stars that ought to be masked by nearer objects such as the Sun. Instead of travelling in straight lines and hence being blocked, the light from the stars bends round the obstruction.

When a star reaches the end of its life it may collapse inwards under the influence of its own gravity to such an extent that all its matter becomes concentrated into an extremely dense object a fraction of its original size. This is a black hole. Black holes have such a huge gravitational pull that nothing can escape from them, not even light. We cannot see them but we have good evidence that they exist. We can see stars behaving in ways which suggest that they are being pulled about by a nearby invisible object with enormous mass.

What does a black hole do to spacetime? Relativity predicts that at the centre of a black hole is an infinitely dense point, called a singularity, within which all the normal laws of physics no longer apply. Time, space, matter and energy no longer have any well-defined meaning. Einstein's equations show that such a singularity doesn't just make a dip in the imaginary rubber sheet of spacetime, it makes a tunnel that goes right through and momentarily opens out on the other side.

Where is 'the other side'? It could be somewhere else in spacetime, either in the future or in the past, or it could even be in another Universe! If you could take a spaceship through such a tunnel, or wormhole, you would have discovered the secret of time travel. This is of course impossible with today's technology. But in the future, who knows?

Mini wormholes
Einstein's equations describe a spacetime that is perfectly smooth, like the rubber sheet. His theory of relativity only deals with the physics of what happens on big scales. It cannot deal with what happens at the centre of a black hole, or what happened during the moment of the Big Bang at the birth of the Universe when spacetime itself was infinitesimally small. That takes us back into the world of quantum physics.

If you could look at spacetime with a magnifying glass so powerful that it reached down to the quantum scale, you would not see the smooth, continuous sheet of Einstein's spacetime. Just as a foam rubber ball looks smooth from a distance but rough and ragged close up. In this picture of spacetime it is quite likely that tiny holes could open up, entrances to little tunnels between now and other times, or between here and other universes. Another option for future time travellers would be somehow to harness these tiny wormholes and expand them.

Many worlds, many futures?
To return to the question that has puzzled thinkers since Newton's day, is the future preordained? Or are there an infinite number of futures? One way of looking at the quantum world suggests that not only are there an infinite number of futures, but they are realised in an infinite number of universes.

Photons and electrons sometimes behave as waves and sometimes as particles, but never both at the same time. So far, the argument for interference between one universe and another applies only to events occurring at the quantum level.

But the idea of parallel universes provides a possible resolution to the 'grandfather paradox' that might otherwise cause problems for time travellers. If we travel back in time and change history, we launch ourselves into a new future in a parallel universe - but we have no effect on the present one from which we started out.

Scientists of the future may well pursue a new form of futuristic technology based on quantum effects. Such applications could include quantum teleportation, by which a quantum particle can be teleported from one point in space to another; and quantum computation, where calculations can be carried out which would take many years on a conventional computer. Although we now know how to measure time very accurately, have we come any nearer to answering the basic question 'What is time?'.

Neil Johnson is a Physics lecturer at Oxford University where he heads his own research group.

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\ COSMOLOGY OF GENETOLOGY

玄 DARK
氣 MATTER/ENERGY
光 LIGHT
滑 SMOOTH

Without a doubt, the single most important problem in physics and cosmology today is Dark Matter. Consider after all of the incredible advancements in science and technology in the 20^{th} century, today, a decade into the 21^{st} century, we still do not know what more than 96% of the universe is made of! Not a clue!

How is this possible when we are able to peer through powerful telescopes in spacetime back to the beginning of the universe, almost at the instant of the Big Bang, that we don't know what constitutes most of the universe? It brings into question our concept of knowledge, the world, reality, our very being. What is this dark universe to which we belong yet without awareness for so long?

And yet, the world is even more marvelous than we can ever imagine. I present here only one of many theories of dark matter that is being studied by scientists today. It is one which I think is the simplest and the most elegant, called the Brans Conjecture, named after the general relativist, Carl Brans, who first conceived this theory in 1991. The Brans Conjecture explains dark matter as a phenomenon created by a topological property of spacetime called exotic smoothness. We shall explain these strange sounding terms shortly, but for now, the point is that there may not be any "real" dark matter at all according to Bran's theory. Instead, just as Einstein told us that spacetime is curved by gravity, Brans is telling us that another geometric property of spacetime may be a new type of "smoothness". When viewed from a part of spacetime with ordinary smoothness such as our own, the distant regions of spacetime with exotic smoothness will appear to have extra forces appearing as dark matter and dark energy.

What is smoothness? The Chinese word for smooth consists of two characters: 光滑. 光 means light, empty, free of things that can obstruct. 滑 means slippery, the three dashes on the left is the radical for water, and the character to the right is for "bone". My interpretation is that the water makes the floor slippery so you can break your bone on it. Mathematically, this concept can be made very precise: something smooth can be locally approximated by flat surfaces, which is the "differential" – a linear approximation which forms the basis for calculus. Hence smooth objects are also known as "differentiable" and the smooth structure on a smooth object is called its "differential structure".

Since the invention of calculus by Newton and Leibnitz, mathematicians have taken for granted that there is only one kind of "smoothness" or "differential structure" on an object of any dimension. These smooth regular objects are called manifolds, conceived and described first by Riemann in the early 19^{th} century. Ever since Descartes coordinatized space by "Cartesian Coordinates" like the regular grids of vertical Avenues and horizonal Streets used to coordinatize Midtown Manhattan (New Amsterdam), we think of N-dimensional space, called R^N, as the set of points each with a lable $[x_1, x_2, \ldots x_N]$ where x_1 is the coordinate in the first dimension, x_2 is the coordinate for the second, and so on. From this point of view, there really isn't that much difference between a 3D world coordinatized by $[x_1, x_2, x_3]$ and the 4D world coordinatized by $[x_1, x_2, x_3, x_4]$. You just add another coordinate and everything is more or less the same – or so it seems.

In reality, each dimension is an entirely different beast. Although coordinate-wise all dimensions look the same, $[x_1, x_2, \ldots x_N]$, geometrically every dimension is different in its own way. The situation is so utterly fantastic that even mathematicians themselves had a hard time believing this phenomenon. In 1954, while researching the fabled "Poincaré Conjecture" to characterize the simplest manifold we know, the sphere, John Milnor chanced upon the discovery that S^7, the 7-th dimensional sphere, had more than one smooth structure! He called these "exotic spheres". In fact, there are exactly 28 different smooth structures on S^7. More over, it is different in every dimension! The computation of the number of exotic structures in each dimension is very complicated involving Bernoulli numbers.

Table 1. Number of exotic spheres, N, in each dimension D from 1 to 20.

D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
N	1	1	1	?	1	1	28	2	8	6	992	1	3	2	16256	2	16	16	523264	24

Now, you will notice from Table 1 that in every dimension from 1 to 20, the number of exotic spheres is known – except in dimension 4, the dimension of spacetime in which we live. This number is the famous "Smooth Poincaré Conjecture in Dimension 4" which is still an open problem. In fact, dimension 4 is truly unique in the context of exotic smoothness.

- In every other dimension, exotic manifolds (high dimensional surfaces) can have only finite numbers of distinct exotic smooth structures. In dimension 4, every known exotic manifold has infinite number of exotic smooth structures.
- In every other dimension, the N-dimensional Euclidean space, R^N, given by the set of all coordinates $\{[x_1, x_2, \ldots x_N]$, where $x_1, x_2, \ldots x_N$ is a real number$\}$, has only one smooth structure. In dimension 4, R^N has an uncountable number of smooth structures.

One cannot help but see that dimension 4 is truly unique in a way which we are still grasping to understand. These facts about exotic smoothness in dimension 4 were only discovered in the 1980's.

As strange as the ideas of invisible dark matter/energy and exotic smoothness seem to us today, one day in the near future, we will understand what they are and how to manipulate matter, energy, and spacetime with these new concepts. Consider Einstein's equation $E = MC^2$ and the vast consequences it brought to the world, we cannot but sit up and pay attention when something so fundamental as our knowledge of the nature of matter has been put into doubt! What we think we know best, our material world, is now but a mere shadow of a vast universe we have absolutely no knowledge of. And we can't even see it! It goes right through us, like phantoms and ghosts. We will turn our attention to the three key aspects in which these concepts touch our lives.

Dark matter cannot be directly observed since they reflect no light thus is completely dark. Hence the only way to detect it at the present is to infer its existence from the way it affects the motion of nearby ordinary matter which we can see. This is how it was discovered. While studying the Coma galaxy cluster in 1933, Fritz Zwicky first noticed that the motion of the cluster indicated there were missing mass in order to account for the faster velocities of the galaxies observed. He coined the term "Dark Matter" for this missing mass. It was not taken seriously at first until in the 1960's Vera Rubin, using more sensitive instruments, was able to measure the velocities of stars in a galaxy with great precision. She expected stars at a distance further from the center of the galaxy would move slower according to Keplerian orbital theory. To her great surprise, she found all the stars in the galaxy have nearly the same velocties even for stars at the edge of the galaxy where they should move much more slowly. The current accepted theory is that this could only be explained by the existence of dark matter.

When we speak of dark matter and dark energy, there really are two distinct phenomena here. While dark matter is invisible matter in the universe, dark energy is a type of repulsive force causing an accelerated expansion of the universe. From the equivalence of mass and energy from Einstein's famous equation, dark energy also forms a part of the mass energy of the Universe.

At the moment, exotic smoothness remains a mathematical curiosity without any physical expression or application. However, as we have noted the very unusual multiplicity of exotic manifolds in dimension 4, the dimension of our space-time, suggests that perhaps there are real physical expressions of this phenomenon. At the moment, the problem is that we don't even know how to work with these exotic manifolds numerically. No one knows how to coordinatize exotic R^4, the 4-dimensional Euclidean space, for instance. The standard coordinates $[x_1, x_2, x_3, x_4]$ is not smooth for exotic R^4's. So when a 3D fluid is in motion, the 4D simulation object (here time is the 4^{th} dimension) can reach singularities as in turbulence, wave breaking, etc. Is it possible that some of these effects can be described by a change in the smooth structure from the standard smoothness to an exotic smooth structure?

As to the philosophical implications, our species has been in existence on Earth for millennia, yet we are just beginning to discover that the solid real world is not what it seems. It is just 4% of the real Universe. This brings into question our sense of reality, of the solidness of the world, of material things. What is the reality of the other 96% of the Universe which we can neither see nor touch, of which we have absolutely no idea what is involved?

What is called into question is not the scientific method which continues to be one of the few lights we have to guide our way around the universe. What is called into question is the hubris that we now know everything there is to know about the world. What is left unknown is just a few details to clean up our theory. But the Tree of Knowledge is much bigger than we can ever imagine. We see but a small branch and that through a glass dimly. For example, the mathematician Göedel showed that any logical system is incomplete. This great theorem means that if we start out with a set of assumptions (called axioms), there are statements we can make based on these assumptions which can neither be proven to be true or false within these assumption. This means our logic is inherently unable to solve all of our problems. What there is beyond logic is yet to be discovered.

Exotic Smoothness, like Dark Matter, was only discovered in the mid 20^{th} century, a phenomenon which only occurs in dimensions 4 and higher. Whether or not this topological property of spacetime may explain Dark Matter or Dark Energy is not the main point of interest here. What is of interest here is the fact that, like our understanding of the material physical world, our mathematical concept of space is extremely limited by our 3D view of things. The world is a much stranger place than we can ever know or realize.

This should all make us question our materialistic point of view about the nature of reality. We should be more humble and open to other possibilities and other paths to knowledge. But, this is not a call to abandon rationalism or logic in any sense. Reason and logic are the only certain tools we have for dealing with reality. We must use them to discover and climb the other branches of the Tree of Knowledge. As to what these new tools beyond logic might be, I don't have the slightest idea at the moment. But based on our experience with Dark Matter, our logical system may also represent only a small fraction (maybe 4%?) of various systematic methods to explore and understand the Universe. Intellectually, there may be a transcendental form of reasoning and method of knowing beyond Aristotelian logic yet to be discovered.

One person who has come up with an alternate method of knowing is Carl Jung and his theories of the Collective Unconscious and Synchronicity. This brings us to the world of human psyche, spirituality and religion. This also brings us to the world of art because in both these worlds, symbols play a key role. Truth may be expressed in symbolic form through dreams, visions, and art when words and equations are inadequate. As an illustration, I mention Plato's Symposium where he explains what love is all about in one of the most profound and beautiful stories. Of course, this is not factual. It's a parable. Surely even in ancient Greece no one believed in this story verbatim. It's not meant to be factually true. And yet, when you read it, it touches a profound truth within you which delights you heart and makes you say "Oh, yes! That's how it is. I fall in love when I find and recognize my missing half!" This truth about falling in love is very different from that of the chemistry of attraction and feromones. However, we need both. Neither is complete by itself. It must be integrated.

The knowledge that comes to us through dreams and visions must be understood and interpreted properly. 20^{th} century intelligentsia tended to treat this as inconsequential and bordering on superstitions. Given the waves of rising fundamentalism around the world, this is understandable. But this is a big mistake to think of the non-rational aspects of the psyche as irrational; it is transcendental. What we must achieve is to integrate the two aspects of our mind, the rational with the transcendental to become Whole as Jung would see it.

The ideas about Dark Matter, Dark Energy, and Exotic Smoothness should shock us into realization that Reality is much more profound than the material world we know through our senses alone. We have by no means reached the end of the road so far as our knowledge of what Reality is all about.

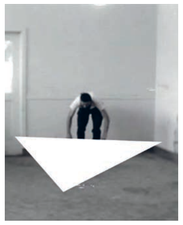
Martin Wen-Yu Lo 馬丁 羅聞宇

\ TWIO-1 \

\ TWIO-2 \

\ TWIO-3 \

\ APC \



\ EM-1 \

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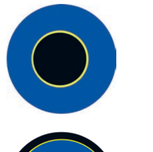
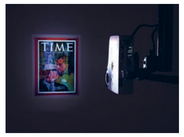


\ CU \



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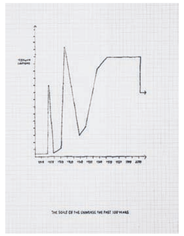
\ WS-1 \

\ WS-2 \



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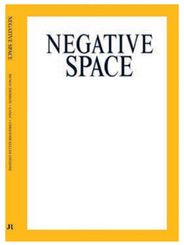

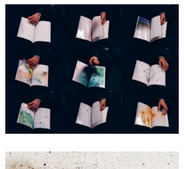

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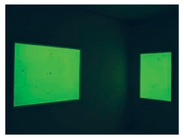

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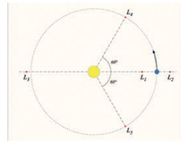
\ NS-3 \

\ GT-1 \



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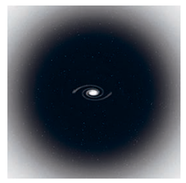

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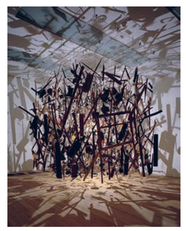

\ CDM \

\ EA \

\ BIT-1 \

\ BIT-2 \

\ CU-1 \

\ CU-2 \

\ CT \

\ EFP-1 \

\ EFP-2 \

\ EFP-3 \

\ GP-1 \

\ GP-2 \

\ LA \

\ DMM-2 \

\ EFP-4 \

\ EFM \

\ PM \

\ DAM-5 \

\ DMM-3 \

\ DMM-4 \

\ DMM-5 \

\ DEM-1 \

\ DEM-2 \

\ DE-1 \

\ DAM-4 \

\ DAM-5 \

\ DAM-6 \

\ DAM-7 \

\ DEM-3 \

\ DE-2 \

\ DEM-4 \

\ EU \