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Palimpsest

Something having usually diverse layers
or aspects apparent beneath the surface

The Palimpsest

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Paleolithic Cave (Fontainebleau)
Photo by Geir Harald Samuelsen, 2019

WE—THE POSTERITY

According to Marcel Duchamp, there are two important poles in the creation of art: the artist and the spectator, who later becomes the posterity.

When encountering prehistoric art, we, as spectators, are the posterity. We help to introduce mysterious signs, that might turn out to be art, for the external world. In doing so, we create a layer of meaning that might be passed on to the future. How then does this transmission come about? By observing traces, we imagine gestures. By imagining gestures, we feel and see ourselves as observers. We might even see ourselves entering the shadows of the ancient artists. We imagine the postures of the long since dead artists sitting inside a cave, painting or scraping on stone or shells thousands of years ago. Then we produce something as a way to manifest this new knowledge. To further root this identity, we might scrape stone lines ourselves, we might draw lines on paper with ochre, we might take some photos, we might produce objects, or we might carefully clean the traces to examine them from all possible angles and distances to put them in a museum or in a magazine. When confronted with the traces from ancient minds, we decode and reenact the creative spirit of those people: what were they thinking when engraving those lines? Why did they do it like that? Could I have done that? ... and so on. Or we might go on thinking: I want to make some art too. Now!—I want to do some research to find out more about the lives of the people who made those traces. Now!

In this publication, and in the exhibition which it follows, the floating roles we all have; as spectators, scientists, artists, the posterity, and the future, are activated and even unified. The different content of the publication has been juxtaposed and placed in layers on top of each other to explore what kind of light might shine from the pages and from the exhibition halls. It may be the light of a palimpsest: something having usually diverse layers or aspects apparent beneath the surface. A layered light. A light with many shadows and with paradoxical memories.

The initiative for this publication originates from the international Artistic Research Project: *Matter, Gesture and Soul*, based at the Art Academy—Department of Contemporary Art, Faculty of Fine Art, Music and Design, at the University of Bergen. The publication is to be viewed as an extension of the exhibition *Dig It Up and Put It in a Bag*, autumn 2021, at the University Museum of Bergen.

The work involving both the exhibition and this publication has, in its totality, taken place during the 2020–21 Corona pandemic. Thus, the work in the project has become unusually lonely, erratic, and delayed, but also strangely reversed. The result has become more than simply planned individual approaches to specific themes; it now also reflects the manifestation of knowledge in general. The original intention was to meet and to work together early in the project period, and to produce and display results later. The timeline for the project has, because of the pandemic, been turned around. Both exhibition and publication are now not only visible artistic and scientific manifestations from (a few) discussions and fieldwork, but also a fresh start for new discussions, new forms of fieldwork, new questions, and new artistic approaches for the project, and for the public.

Geir Harald Samuelsen
Matter, Gesture and Soul



DIG IT UP AND PUT IT IN A BAG

Marit Paasche

In Fontainebleau, France, time feels like both a landscape and memory: to walk around there is to dwell in eras that saw the creation of objects like gogottes and calcites, fantastic forms in limestone tracing back to the Oligocene or Mesolithic period. Gogottes consist of quartz crystals and calcium carbonate and formed when superheated water was extruded through crevices into a basin of extremely fine white silicate sand. The swirls and eddies of the water became fixed in the gradually concreting stone, creating the most peculiar and perfect formations. They look like manmade sculptures, but they are not.

The antithesis of the gogottes' gently curving lines is the regular, geometrical look of the calcites. Outlines etched into the walls of many caves during the Mesolithic period are closer to our time, but still silent in a strange way. Human beings communed with nature and its rocky formations differently back then; understanding how seems imperative. Yet the earth has orbited the sun countless times, and the landscape seems indifferent to our queries. We do not exist, as far as rocky formations or the past are concerned.

II.

In 1929, Niels Bohr wrote: "We must, in general, be prepared to accept the fact that a complete elucidation of one and the same object may require diverse points of view which defy unique description."¹ The cross-disciplinary project *Matter, Gesture and Soul* investigates the extent to which points of contact between contemporary art and archeology are possible. The project has established a collaborative environment for artistic, poetic, and scholarly work in response to prehistoric "art." The framework is loose, and the participants are respected and recognized artists and academics.

For something to qualify as research in the traditional sense, it must be *scientific*, that is to say, based on scientific principles and methods. According to its etymology, the term first appeared in 17th century France in relation to the natural sciences, but it also has roots in the Greek word for knowledge.² Its history recognizes that research also accommodates a more general production of knowledge, and that it is therefore legitimate "to consider art as a species of knowledge". Nevertheless, the wide disparities between art, geology and archeology as disciplines are difficult to ignore; some of these disparities have to do with the questions posed and methods for obtaining answers, while others are about the use of *pronouns*.

Bohr's statement evinces an openness to complete elucidation, although a variety of perspectives makes it difficult, if not impossible, to describe a specific thing in any consistent way. If we replace Bohr's thing with a prehistoric image or object and examine that object from the vantage points of the different disciplines involved in this project, it becomes clear that art's great and defining strength is that it is subjective and driven by a *first-person truth*. "Pure" scientific disciplines more often rely on a third-person truth which can indicate or offer an ostensibly more objective form. "Hardcore" scientific methods are also more prevalent in archeology: analysis of satellite imagery or use of multispectral light-imaging technology, for example.

¹ Hustvedt [2016] 2017, p. 343

² Merriam-Webster, 2021

Art's first-person truth is more ambiguous in form and does not offer concrete evidence or definite answers. It can get caught up in and by its material, contradict itself, make subjective descriptions and contort itself around logical problems. Art can also ask entirely unrelated questions. Art's first-person truth is not free, however, as some believe; it is responsive to everything around it and subject to trends and tendencies. In 2009, the curator, critic and philosopher Dieter Roelstraete published an interesting essay titled "The Way of the Shovel: On the Archeological Imaginary in Art" in which he maintained that contemporary art's self-preservation strategy has been to ascribe itself a protective function: contemporary art has turned to the past, and it uses history as its raw material.

In this connection it is interesting to point out that contemporary art's relation to historical facts has been strong, as is the case with archives and archival work. Excavation is often used in contemporary art, both as metaphor and method, along with approaches or devices like recreation and reenactment. Where history-telling is a theme, linguistic clichés flourish as well, such as "history's darkness" or the idea that something can be "brought into the light" or "reawakened." Romanticism's (and psychoanalysis's) desire to arrive at hidden truths has, in other words, kinship with art in which the historiographic and retrospective perspectives are emphasized.

Roelstraete makes good points in his effective and polemical text, but with the following paragraph he really captures my attention:

"The reasons for this oftentimes melancholy (and potentially reactionary) retreat into the retrospective mode of historiography are manifold and are of course closely related to the current crisis of history both as an intellectual discipline and as an academic field of enquiry. After all, art's obsession with the past, however recently lived, effectively closes it off from other, possibly more pressing obligations, namely that of imagining the future, of imagining the world otherwise ..."³

Much historically oriented art has been marked by nostalgia, yet that is far from the whole truth. Studying history is essential to understanding hierarchies of power, privileges and structures, their traces in our own era, and biases that inform our interpretation of discoveries from the past. Findings and new insight from feminist research, queer studies, post-colonial studies and intersectional studies support this. Here is one example. Many Viking graves were discovered in the 1800s, and those containing weapons were automatically assumed to be men's graves. This was the case with "the Birka grave," an archetypal, high-status warrior grave discovered near Stockholm in 1885. The assumption proved to be wrong, however: a woman had been buried there. Recent research has shown that although the notion of female Viking warriors was an established one and can be found in older literature, it had been both idealized and mythologized, for example in descriptions of so-called "shield maidens." As a result, the idea of an actual female Viking warrior had not fully resonated before now.⁴

Archeology and art history are both replete with white, Western researchers who have studied other cultures or cultural expressions and drawn their conclusions based on a specifically Western set of biases. Roelstraete's conclusion that art's obsession with the past precludes it from envisioning the future is too categorical. One of the great revelations of the turn toward history in recent decades is that the reciprocal influence between history, the present and thereby the future has become so obvious.

3 Roelstraete, 2009, p. 3

4 Price et al., 2019, pp. 181-198

III.

*whatever returns from oblivion returns to find a voice*⁵

Nature has been our companion throughout humanity's existence on earth. Abalone shell, ochre residue, the geometric markings on the rocky formations at Fontainebleau, cave drawings in South Africa, the passage tomb at Newgrange, and spoors of our more immediate past all testify to the myriad ways human beings have interacted with each other and their physical surroundings. What we are in relation to our surroundings has not changed, but our conditions for survival have most definitely gone through fundamental transformations.

In confronting the greatest challenge to humanity in our time—changing the way we impact the earth's ecosystems—we must call into question our customary ways of responding to reality. We are digging up the past in search of a new future, we dig to learn to see, listen and think in new ways. All research disrupts thought. That is the point. But we also know that when ideas find a voice and step out into the world as knowledge, it is frequently the result of collective effort that spanned a gamut of disciplines.

Art is a discipline that collects and presents without the strict premises, methods, or requirements of scientific inquiry. Art can perhaps be compared with a stretchy string bag, a tote or carry-all in which all our findings and processing can be gathered and carried further, another iteration of human beings' perpetual need for containers, as described by Ursula Le Guin in her essay "The Carrier Bag Theory of Fiction":

"If it is a human thing to do to put something you want, because it is useful, edible, or beautiful, into a bag, or a basket, or a bit of rolled bark or leaf, or a net woven of your own hair, or what have you, and then take it home with you, home being another, larger kind of pouch or bag, a container for people, and then later on you take it out and eat it and share it or store it up for winter in a solidier container or put it in a medicine bundle or the shrine or the area that contains what is sacred, and then the next day you probably do much the same again ..."⁶

We dig, we reap, we put stuff in our bags and move onward. Now and then we feel the need to stop for a moment, empty our bags of their contents and share them with others as we discuss the days to come.

⁵ Glück, 1992, p. 1

⁶ Le Guin, 1986, p. 168



Night Picture (Fontainebleau)
Photo by Geir Harald Samuelsen, 2020



Notes

I have borrowed the term *first-person truth* from Siri Hustvedt's discussion of the relationship between branches of sciences and pronouns in the essay "Borderlands: First, Second, and Third Person Adventures in Crossing Disciplines." The quote from Bohr is as it appeared in this essay.

On Merriam-Webster's website, we find "Scientific: borrowed from Middle French and Medieval Latin; Middle French *scientifique*, *scientifique*, borrowed from Medieval Latin *scientificus* 'producing knowledge, relating to knowledge' (translating Greek *epistēmōnikós*), from Latin *scientia* 'knowledge,' science + *ficus*." Additionally, it states that "The Medieval Latin transition in the sense from 'producing knowledge' to 'relating to knowledge' (in the text of a translation of Aristotle's *Posterior Analytics*) is described in detail in the *Oxford English Dictionary*, third edition."

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Anyone who has common sense will remember that the bewilderments of the eyes are of two kinds, and arise from two causes, either from coming out of the light or from going into the light, which is true of the mind's eye, quite as much as of the bodily eye.

Plato, *The Republic* ca. 375 BC

CAVE DIALOGUES

Geir Harald Samuelson

Prehistoric pictures, engraved or painted, are gestural signals from ancient minds without letters. We often use the word *art* to describe those early traces of the human creative impulse even though our knowledge of them is limited. It is not strange that we do so. The prehistoric traces are often beautiful, and they tend to radiate a mesmerizing aura. The *how* and *when* of prehistoric art are interesting and approachable questions. The answers can tell us something about the cognitive skills and craftsmanship of the ancient creators and sometimes also the context. The *why* surrounding the prehistoric painted caves or stone engravings is a much more open question, triggering a broad range of speculation, interpretation, inspiration, artistic amplification, and aesthetic dialogue for the spectator.

Haptic Research

For me, the curiosity towards prehistory was sparked by an encounter with ancient stone engravings in Fontainebleau, France. I had climbed in the area for 20 years and had a vast amount of experience in scaling the sandstone boulder formations. But I had no experience in interpreting the petroglyphs, neither scientifically nor artistically. The most natural and productive way for me to approach these mysterious signs was to let myself be inspired to make art. Through making art, I figured I could merge the haptic knowledge I unconsciously already had embodied through my climbing with an artistic approach to the prehistoric engravings. In that way I might add an aesthetic layer to the already existing documentation and interpretation of the signs. Perhaps then I could open a new space of meaning to accompany the historical aura of the signs. Metaphorically speaking, I could add yet another layer to the Fontainebleau Palimpsest.

This added layer would not only be inspired by the engravings themselves, but by the climbing as well and the totality of impressions from the surrounding nature and from the insights on prehistoric art as it presents itself to us here and now. The creators of these specific engravings could not read or write, so whatever meaning they had in mind, it was probably connected to materiality, gesture, and direct experience. I like to think they were approaching experiences of transformation and change.



Sandstone Palimpsest (Fontainebleau)
Photo by Geir Harald Samuelsen, 2020



The Heart of the Boulder

The motivation to look deeper into these signals came as an impulse when encountering a book depicting the stone engravings.¹ I had been traveling to this area to climb the sandstone boulders without knowing about the existence of the petroglyphs. I had climbed the boulders, gripping their holds, and experiencing their sandy surface through the skin of my fingertips. I was occupied with my hunt for boulder problems, failing to notice the subtle traces from thousands of years of human presence in the area. When I finally became receptive to the signals engraved in stone underneath shelters and inside shallow caves, they fascinated me with their beauty and mysterious radiance. I began to visit the caves instead of climbing the boulders. I crawled together with the archaeologists to get glimpses of the engraved lines in the dark; this time exploring the boulders from the inside, touching the lines and crevices made by our ancestors instead of only clinging to the exterior surfaces of the naturally eroded stones. A confusing yet enlightening question immediately occurred when encountering the engravings: Haven't I seen something like this before?

Rightly so. Some years before being introduced to the engravings, I had made a group of abstract drawings with faded color on large sheets of paper. They were called *Haptic Drawings* and were inspired and activated by my climbing in Fontainebleau. To my surprise, the prehistoric abstract grid petroglyphs had interesting aesthetic similarities with these tactile artworks. My tactile experiences of the sandstone boulders had created an aesthetic and, in a way, esoteric *anticipation of the past*. The pictures had predicted and prepared me for my encounter with the engravings. I had become a medium for the forces living inside and outside of the Fontainebleau boulders. The traces on the paper sheets resembled the character of the prehistoric lines. As if my abstract drawings were already there, in stone. They were engraved lines that could be perceived as pointing inwards, towards the heart of the boulder. Oppositely, in my drawings, the lines were protruding outwards, they are reliefs. In my mind's eye, I imagined the Mesolithic engravers standing at the back of my studio wall, engraving the paper from the backside, reaching out, touching the back side of my large black sheets of paper with their flint tools. Following this imaginary scene, it was as if I had helped them with my hands, pulling the paper outwards, using magnesium and lightly colored pigment to enhance the light and the friction on the surfaces, leaving white marks of chalk on the face of the drawings.

The Missing Link

In his text *The Creative Act* from 1957, Marcel Duchamp wrote: "To all appearances, the artist acts like a mediumistic being who, from the labyrinth beyond time and space, seeks his way out to a clearing. If we give the attributes of a medium to the artist, we must then deny him the state of consciousness on the esthetic plane about what he is doing or why he is doing it. All his decisions in the artistic execution of the work rest with pure intuition and cannot be translated into a self-analysis, spoken or written, or even thought out."

Duchamp gives artists the attributes of being mediums for messages they are not necessarily totally aware of themselves. He categorizes art as something which evokes emotions within the spectator that are not necessarily in tune with the original intentions of the creators. Duchamp's text came to my mind as I approached my own artistic work in the wake of the meeting with the prehistoric signs. Would I get any closer to understanding why these signs looked like they did, why they had been made, and why they had made such an impression on me simply by making additional art myself? Could I by acting like a Duchampian medium tune into the creative states of our prehistoric ancestors? And even more importantly: Would this encounter with prehistory make my art more interesting to myself and to the public?

¹ Breteau, 2016



Rocher de Sabots Sandstone (Fontainebleau)
Photo by Geir Harald Samuelsen, 2018

Duchamp continues: “In the chain of reactions accompanying the creative act, a link is missing. This gap, representing the inability of the artist to express fully his intention, this difference between what he intended to realize and did realize, is the personal ‘art coefficient’ contained in the work.”² Duchamp once more gives the artist a mediumistic role—a channel through time, if you may, whose intentions plays only a minor role in the reception and interpretation of his or her own work. Through this he describes a gap, a dark spot, a missing link, as he calls it, in the chain of events from creation to reception. Like many artists of the avantgarde, Duchamp drew inspiration from many sources, including different forms of spiritual practices and alchemy, the medieval art of transmutation of matter and non-matter.³ In an interview from 1953, Duchamp stated: “The true artist, true art, is always esoteric, [while] the modern approach to art is based on competition, on making art exoteric.”⁴

Unconscious Feelings of Self

Science is attempting to bridge this gap through excavation, dating, and constantly updated thinking. Abbé Breuil (1877–1961) and Henri Begouën (1863–1956), the men who were the first to examine the Lascaux Cave paintings in the 1940s, formed the hypothesis of *prescience magic*, suggesting that prehistoric humans attempted to influence the result of their hunt by painting, engraving, and drawing it in caves. A shamanic hypothesis was advanced by the Romanian writer and scholar Mircea Eliade (1907–1986), suggesting the figures depicted in the caves were representations of visions acquired during a trance-like or near-trance state.⁵ In the text *Middle Stone Age engravings and their significance to the debate on the emergence of symbolic material culture*, contemporary archaeologists Christopher S. Henshilwood and Francesco d’Errico write: “Engravings are perhaps the only category of potentially symbolic early material culture that still reflects the complete set of cutting actions performed by the artist. As is the case with drawing, engraving reflects deep unconscious feelings of self” (Freeman & Cox, 1985; Thomas & Silk, 1990) while, at the same time, engravings organize a shared visual culture (Cox et al., 2001).⁶

The Platonic Contrast

The engravings in Fontainebleau are mostly from the European Mesolithic era, approximately 10,000 years BP. They were first discovered in the 1860s but remained relatively unexamined until recently, when a team of archaeologists from Sorbonne led by Professor Boris Valentin began a project to document and examine them.⁷

There is presently a consensus concerning the dating of the engravings due to, among other things, extensive findings of lithic tools used for engraving purposes in close proximity to the shelters. Some stylistic comparative analyses have also been used. The engravings are mostly abstract with attempted straight and slightly bent lines, modernist looking grids,⁸ holes, and cross-hatched patterns which may resemble ladders and stars. They are located underneath shelters and inside shallow caves. The caves are usually quite small with space for one or very few individuals at the same time. Sometimes the engravings are carried out on vertical stone surfaces. At some places, the engravings are found on the cave floors or on the shelter ceilings. Occasionally they follow the shapes of the natural stone wall, making them into sculptural entities with tactile, three-dimensional qualities.

2 Duchamp & Dachy, 1994

3 Baas, 2019

4 Duchamp, 1969

5 UNESCO World Heritage Site, 2021

6 Henshilwood & d’Errico, 2011

7 Lesvignes et al., 2019

8 Krauss, 1979

When confronted with the engravings, you get a sensation that the creators wanted to pass on messages with a universal, geometric meaning. The signs might have been engraved to represent some kind of abstract Platonic, contrast to the organic, anthropomorphic, and biomorphic character of their surrounding boulders and hills.

The environments surrounding the engravings add a strikingly mysterious atmosphere to the experience especially when daylight is vanishing. Then the surrounding stones become animals and supernatural creatures, and you are transported to an animated world or another state of mind. It is not unreasonable to assume the prehistoric rituals had animistic overtones. Nature changes from being natural to being cultural.⁹ You feel observed by it.

Shadows and Gestures

After the initial conceptualization of the mentioned *Haptic Drawing* project in 2013, some years passed by before the interest to artistically retrace or to reenact the experience reappeared. This time I decided to rework the drawings in the wake of my encounters with the petroglyphs. Why?

Inspiration, yes, but not only. When working artistically with ancient traces, you are adding another layer of meaning to the experience. In a sense, you are tapping into and accompanying the silent, ancient creative impulse, not necessarily interpreting the traces. With your added artistic layer, you are amplifying your encounter with the inscriptions as well as your experience of the trees, the boulders, the birds, the moss, and the whole atmosphere in your own time.

I figured that the surfaces of my previous artworks had to be reworked and touched with the new embodied *finger tip knowledge* and totality of experiences from my encounters with the Mesolithic petroglyphs. I had observed how the archaeologists had bent down to examine them, unconsciously resembling and reenacting the Mesolithic bodily gestures. I had observed how they discussed the engravings and even touched them with careful respect, how they illuminated them and sometimes also watched them in dim cave light in the afternoon.

So, I accepted what I felt to be an invitation from the stone itself and from the ancient engravers: to dim the studio, to sit down in front of the dark surfaces, adding layers of light and matter to the existing pictures, observing them change in front of me — some signals being muted in the process and others being transmuted into new sequences of moving forms with a different material direction and energy. Transmutation through destruction and reconstruction. A continuous palimpsest of shadows, layer upon layer of invisible and visible gestures.

9 Tilley, 1994



Cul de Chien Sandstone (Fontainebleau)
Photo by Geir Harald Samuelsen, 2020




Mesolithic Cave Engravings (Fontainebleau)
Photo by Geir Harald Samuelsen, 2018

Haptic Drawing (Cave Dialogue)
Magnesium, Acrylic and Pastel on paper.
Geir Harald Samuelsen, 2013–2020.
Photo by GHS







Haptic Drawing (Cave Dialogue)

Magnesium, Acrylic and Pastel on paper. Geir Harald
Samuelsen, 2013–2020. (Detail). Photo by GHS

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“The artistic way of experiencing life is indeed so incredibly close to sexual experience, to its pain and its pleasure, that both phenomena are actually only different forms of one and the same longing, of one and the same bliss.”

Rainer Maria Rilke
Letters to a Young Poet
Leipzig 1929

INTERSECTING PERSPECTIVES VIA TWO PREHISTORIC FEMININE SEXUAL FIGURATIONS

Médard Thiry, Marie Nieves Liron & Marie-Claude Auffret

We would like to add that both hold the same vital impulse: that of leaving a trace of oneself, that of confining the opacity and the mystery of the world we live in. Scientific research also proceeds from such a thrust: to search and find the unknown to transmit it, to open new spaces and leave a trace of oneself that may rebound in the future. Opening new spaces is initially done by imagining and dreaming of what could be an argument for, or the outcome of, the research. It is the intimate dream, without any restraint or control, that is often the most fertile. It often ensues a long-term seeking of facts and arguments, with sufferings and disappointments, but each achievement brings closer the coveted object. Pleasure is born each time a veil of the unknown is torn. It produces the impulse and the adrenaline to go on to flush out the unknown. This pleasure ever shines and grows when the accumulated elements become consistent, fit together, and harmonize like the colors of a painting. Darkness illuminated by scientific creation engender a rupture by questioning what might have been taken for granted, considered as the norm. Such a rupture recalls the effect of an artistic work that engenders new sensitivity to gaze, hear, touch ... We started with a quotation from a poet and would like to mirror it with a quotation from a scientist.

“It has not to be forgotten that in scientific research success often goes to those who preserve game and dream in the most serious work they are doing.” Marianne Grunberg-Manago, first woman to preside the French Academy of Sciences (1995–1996).

We plan to present herein some archaeological research in which the science intersects human aspects and points to existential questions of prehistoric populations, or simply of Humans. Our focus is the intersection of artistic and existential approaches that may lie behind two prehistoric figurations, which we have raised questions about and inquired into in the context of our so-called modern world. What is the symbolism of these representations? How is it experienced today in our societal relationships? Is it distinct?

Is it universal? To what extent is it a depiction of the societal organization of that ancient time in which it was generated? Until recently, interpretation of these prehistoric female sexual representations was mainly permeated by male archaeologists and often tinged with a certain machismo. It appeared paramount to us to provide a feminine viewpoint to learn how women may interpret them.

Engraved Female Pelvic Triangle of La Ségognole 3 Shelter

A substantial aggregate of more than 2,000 carved shelters occurs within the sandstone that crops out south of Paris in the Fontainebleau region. The carvings are essentially non-figurative and geometric, including parallel straight grooves and grids, carved by the hunter-gatherers of the Mesolithic Period, about 9,000 years ago.¹ Amongst these repetitive patterns there is a much older figurative exception, left by the older Palaeolithic inhabitants of the Fontainebleau area, about 20,000 years ago. It shows a panel engraved with two horses arranged on either side of three slots, initially assumed to be natural, evoking a pelvic triangle.² A thorough re-examination revealed the artificial character of the slots as well as numerous anthropogenic interventions to modify the hydrology of the shelter to drain water to the slot representing the vulva.³ Such an “installation,” in the modern artistic sense, both functional and evolutionary, from the Paleolithic period, had never before been found.

Shelter Layout

One of the remarkable aspects of the *Ségognole 3 shelter* is its natural lighting through the openings to the galleries that cross the sandstone block from side to side (Fig. 1). The SE entrance is largely open to the outside and gives way to a wide gallery in which it is easy to squat. This divides into two galleries offset in height and which diverge towards the NW openings (Fig. 2): the wall separating the two galleries is initially reduced to a thickness of 20 cm and never exceeds 50 cm. From the other side (NW façade), the upper gallery has a narrow opening (height 30 cm) and two small, circumscribed basins dug in its floor just above and behind the carved panel with the pelvic triangle. The lower gallery is more isometric, with a wide opening to the outside. It consists of a space that resembles an entrance vestibule.



Figure 1. Orthophotogrammetry of *La Ségognole 3 shelter* and its sub-joined neighbouring blocks with the narrow corridors onto which the shelter opens. SEG3 is *La Ségognole 3 shelter* and the bars with arrows mark the placement and width of the three entrances. Orthophotogrammetry by society Summum 3D @Summum3D.

This constricts to form a narrowing that separates the vestibule from the chamber of the engraved panel, which reaches about 120 cm in height at its centre.

1 Colas Guéret & Benard, 2017, pp. 99–120

2 Bénard, 2010, pp. 521–536

3 Thiry et al., 2020

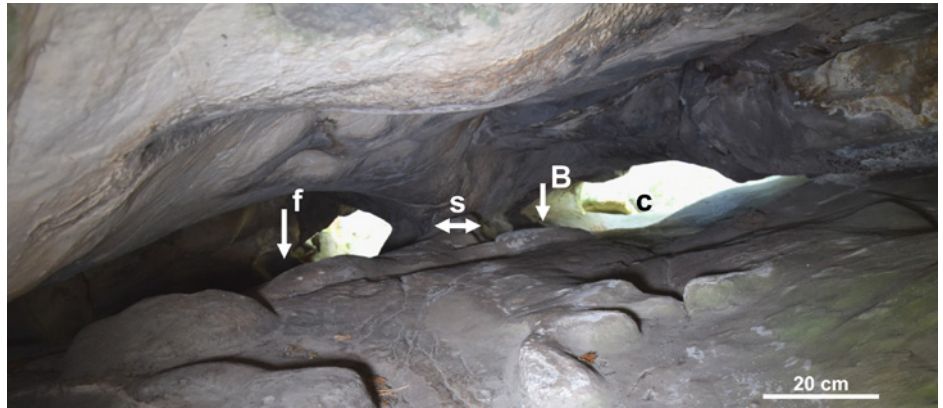


Figure 2. Views from the SE entrance. The gallery divides into two galleries separated by a narrow wall (s) accompanied by the narrowing of the upper gallery (c) that contains two basins (B) dug into its floor. The lower gallery drops an approximately 80 cm recess and gives rise to the chamber (f) where the engraved panel is located.

Chamber and Engraved Panel Layout

The chamber containing the engraved panel is relatively enclosed but spacious in volume, allowing for three to four people to crouch in front of the panel. The engraved panel is situated on an inclined surface that connects to the chamber floor (Fig. 3A). The female sexual figuration is particularly expressive. The pubic triangle is marked by two converging lateral slits that do not join, thus exposing the very elongated vulvar slit, the base of which marks the point of the triangle. At the top the pubic slits extend laterally through a less sloping slit that clearly evokes the groin fold. The triangle is surmounted by an organo-mineral crust delimited with a curved upper contour that evokes a pubic hair tuft. The panel is delimited on the left by the entrance narrowing and on the right by a curved slit: the two curves that limit the panel suggest the widening of hips. In addition, the outline of the meridian section evokes a woman's profile (Fig. 3B). The pubic triangle rests on a concave surface, then, above the slits corresponding with the groin fold, the panel continues to the ceiling of the chamber, which in this shape evokes a pregnant woman's belly with its pubic tuft at the base which overhangs the triangle.

The sexual representation is particularly impressive when entering the room by crawling through the narrow section: the curved panel supporting the pelvic triangle and the pubic hair overlook and dominate the visitor (Fig. 3C).

The most spectacular aspect of this sexual representation was discovered fortuitously on a misty winter's day. The room was literally steaming. The walls were dripping with moisture and covered with water droplets that shone in the light and, amazingly, two fine streams of water flowed from the vulvar slit! The pelvic triangle appeared to be alive! This imagery stemmed from the depths of prehistory. It had to be captured so as not to miss this exceptional moment, to give it reality and to retain the magic that emanated from it (Fig. 4).

Staging of a True Artistic "Installation"

Geological analyses of the panel revealed that fractures had obviously been enlarged and slots even dug de nihilo (Fig. 5). Archaeological analyses of wear patterns confirmed anthropogenic workings from grooving and percussion.⁴ Three "sculptural" features were reworked: (1) the slits of the pelvic triangle were completely engraved, and the sexual symbol was therefore created intentionally; (2) the fracture that emphasizes the groin fold had been widened and deepened on both sides of the triangle, but not

⁴ Thiry & Cantin, 2018, pp. 101–146

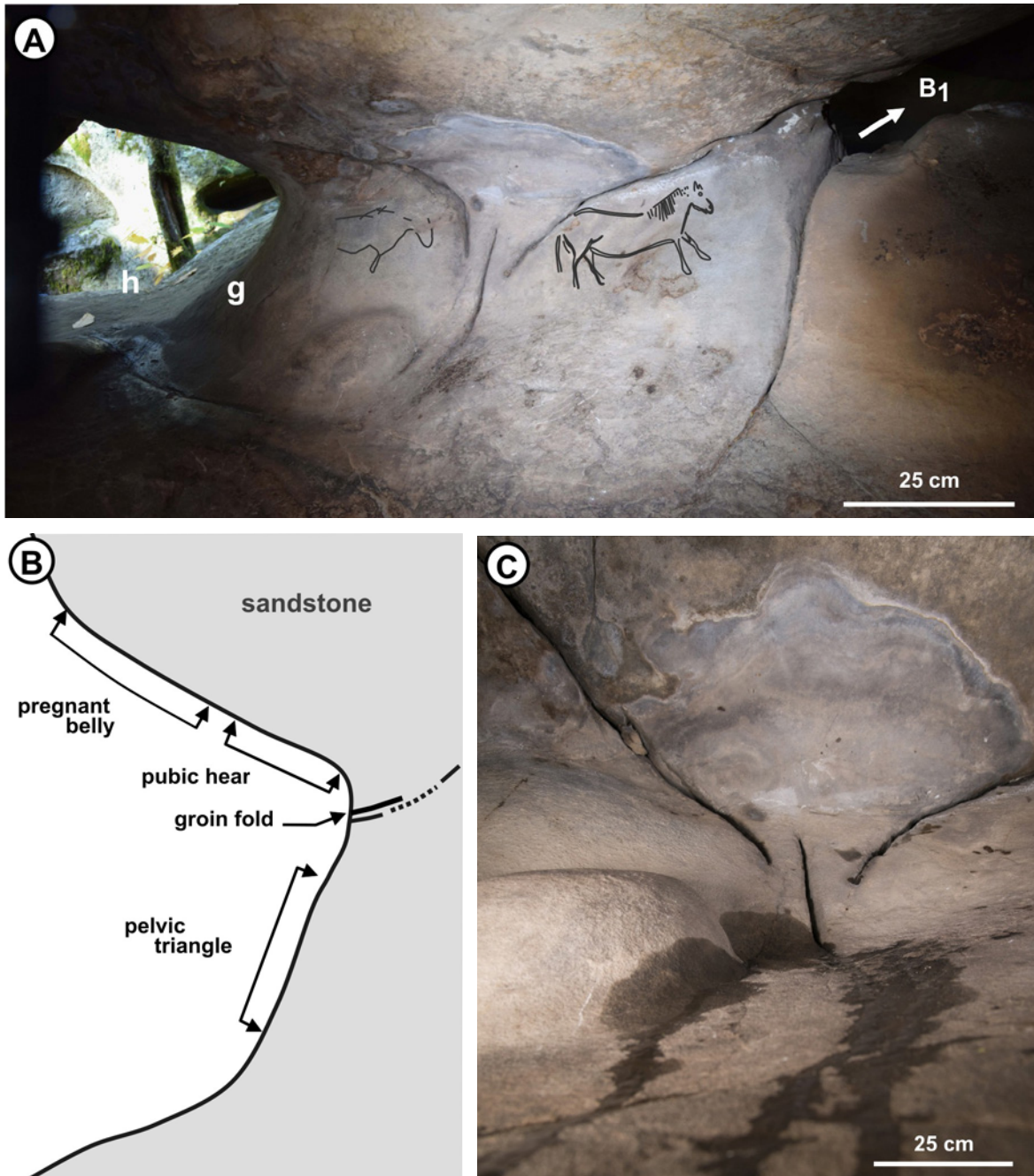
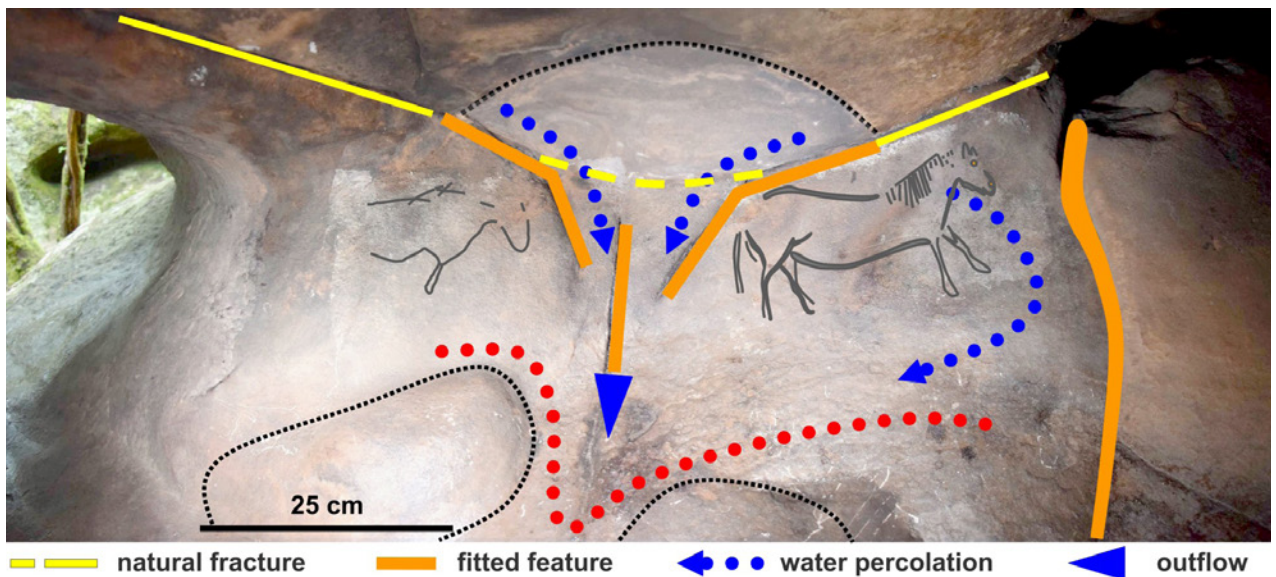
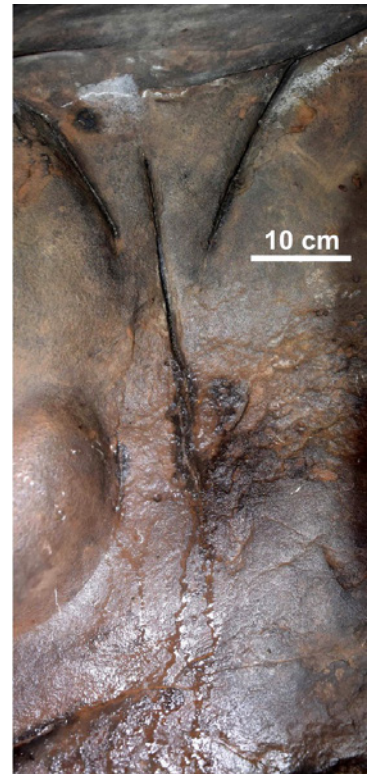


Figure 3. Views of the chamber and the carved panel. (A) Carved panel with the layout of the feminine sexual representation and the two carved horses (drawn on the photograph after Bénard 2010). NW entrance vestibule (h) beyond the narrow section (g) at left and Basin B1 of upper gallery behind the panel (arrow). (B) Panel in cross-section with the disposition of the main elements of the sexual representation. (C) Bottom-up view of the sexual representation, as it appears when one enters the chamber by crawling through the narrow section; notice water flowing out the base of the vulvar slit. Photo by Émilie Lesvignes/PCR ARBap.

Figure 4. Appearance of the water saturated panel on January 23, 2018. Leakage and water outflow at the base of the vulvar slot with water exuding from sandstone pores at the lower end of the panel.



— natural fracture — fitted feature ← • • • water percolation ← outflow

Figure 5. Diagram of the hydrological functioning of the horse panel. The anthropogenic workings channel pore water to outflow at the base of the pelvic triangle. The slots fulfil a dual function, aesthetic and functional, a full integration of the sexual representation in the natural environment. Diagram by the authors.

retouched in between to avoid a rupture with the triangle; (3) the slot that limits the panel to the right had been sharply widened to emphasize the curve of the hip. In addition, the basin at the rear of the panel had been deepened by chipping out sandstone flakes to clear and widen the fractures that run along its bottom. What was the point? Water infiltrating from the basin B1 (Fig. 3) is constrained to move along the side slots of the triangle towards the central slit and feed a “vulvar fountain” (Fig. 5). To prove this, an experiment was conducted by maintaining a constant level of water in the basin for a week during a dry period. After two and a half days and the addition of 50 litres of water (two buckets per day), the vulvar slit was flowing! Thus, Palaeolithic people could potentially have operated the ‘vulvar outflow’ on demand and without weather constraints.

Outstanding Shelter of Female Sexual Morphology of Courdimanche

Sexual representations are not often mentioned in the profuse literature on younger Mesolithic engravings in the Fontainebleau Sandstone, but they do exist. Some are unequivocal, but most cannot be inventoried as a sexual representation because they are only deep and wide furrows. Sometimes a simple detail reveals their character. For example, a deep furrow scraped by several grooves can be crowned by a few small grooves that undoubtedly evoke the pubic hairs surmounting a vulvar slit. You find a bas-relief sculpture of a pregnant woman’s belly adorned with a navel and grooves that could represent stretch marks. First and foremost is an outstanding sexual feature in a small cavity which, by its structure and wall morphologies, is a sculpture of a feminine sex in the form of what we today would call a 3D model! This very special sexual morphology was discovery by J-C and Marie-Claude Auffret in 2003 and described for the first time here.

Cavity with Sexual Likeness Morphologies

The cavity is contained within a Fontainebleau Sandstone boulder about seven meters long, 1.80 m high, and two meters wide. It is a small, rounded hollow with a geodic configuration of about 80 cm in diameter, and thus a volume of approximately 1/5 cubic metre, or 200 litres, like the capacity of a barrel of wine! It has a very narrow entrance about 40 cm wide and 20 cm high (Fig. 6A & B). The sexual morphology is visible at an angle from the outside through the entrance hole, illuminated by daylight. To view the whole cavity, one must enter by laying on one’s back, retract the arms, insert the head and push the body in with one’s feet. It is possible to penetrate and fit the entire body in the cavity by folding the legs and bending back (Fig. 6C). Two people folded up right next to each other might fit in the cavity, but it seems impossible it would accommodate three people.

Lying on one’s back is how one has a panoramic view of the geode. The entrance into the cavity is striking. It is almost always wet, has engravings on the vault, and a giant sexual morphology of about 60 cm in diameter facing you on the left (Fig. 7A). This means it is four times wider than your head and dominates your field of vision. It is a striking, dizzying view, and after a few minutes most visitors experience a headache. Prolonging the stay can induce a “seasickness” that settles and may last for 2–3 hours after exiting the structure. The sexual figuration consists of four superimposed sandstone reliefs: a pierced dome composed of three sandstone crowns like folds, the diameter narrowing towards the rear of the structure, and which emphasize at their centre a rounded protuberance that encloses the concentric structure (Fig. 7B). To the right of the sexual figuration there is a recess that forms a small secondary cavity about 50 cm in depth, and which ends in a cul-de-sac. On the left of the sexual figuration two sausage-like protuberances are superimposed on the wall (Fig. 7A). They contrast with the yellowish and grainy wall due to their dark greyish colour and smoother, glossy surfaces.



Figure 6. Shelter's access.
(A) entrance of the of cavity.
(B) outward view.
(C) curled up inside.



Figure 7. Overview of the sexual likeness morphologies and their surroundings. (A) Note the depth of the structure closed by a central protuberance (PR), the rounded and elongated sausage-like protrusions (SA) on the left, and to the right the cul-de-sac recess (RE) to which the engraved vault descends. (B) section through the sexual figuration. Notice the depth of the figuration with the emergence of the central protuberance (PR), crowned by a small depression, likely a peeling. 1-2-3 crowns.

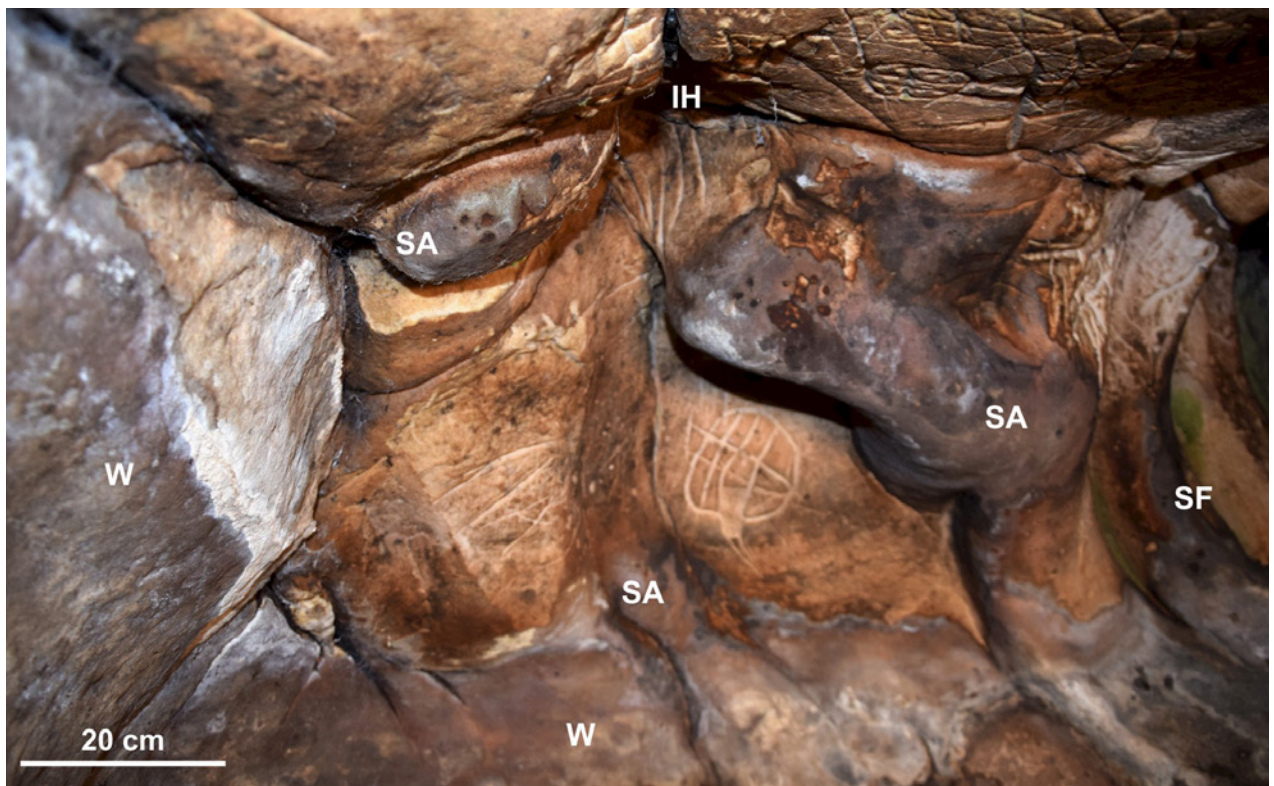


Figure 8. View of the ceiling of the cavity. (A) convergence of several reliefs and slots from which appear "emerging" grey and brownish bulbous sausage-like reliefs stuck on the cavity walls (SA) and descending along the sexual figuration (SF). Carvings at top of the photo are those of the carved panel between the entrance and the auxiliary hole. Note the few furrows from the infiltrating hollow (IH) that fed formation of the secondary silica deposits (SA) and circular and ogive-shaped carvings on two bulges in the middle of the picture. The grey and brownish surfaces at left and in the lower edges of the photo are the basal border of the cavity impacted and weathered by rising moisture (W).

They bring to mind the flow of a viscous material from the ceiling of the cavity and seem to emerge and flow from a point of convergence of several reliefs and slots in the vault (Fig. 8). The base of the walls all around the cavity is strongly weathered and the sandstone dark grey, encrusted, and pustular.

All morphologies within the cavity are natural and were not remodelled by pre-historic people. The cavity and its entrance were actually masses of sand that remained uncemented during the formation of the sandstone and spilled out when the outcrops of sandstone were developed.⁵ The same is true of the meso-reliefs on the cavity walls and, in particular, the recess to the right of the sexual figuration. They were generated by the flux of groundwater that cemented the sandstone. The sausage-like protuberances adjoining the vault and the walls of the cavity are also natural. They are secondary cementations that were fed by waters infiltrating through cracks in the vault when the sandstone slab was close to the land surface, but not yet broken into blocks nor flushed by uncemented sand masses. The sausage-like reliefs have not been engraved because they are very hard, with a cortex that is not scratchable by the use of a flint.

Carvings

The carved panel is the only large smooth surface of the cavity, located on the inclined vault between the recess to the right of the sexual figuration and the cavity entrance. At first sight, there are two types of carvings: deep grooves with a clear outline and shallow grooves with less precise outlines and less clear arrangements. These engravings correspond to different techniques and gestures of carving. The deep furrows are the



Figure 9. Engraved panel on the right of the sexual figuration. The most marked and deepest engravings have an overall orientation "pointing" towards sexual figuration.

result of repeated tool movements, which are estimated to be 10–20 repeated movements, calibrated on the length of the groove.⁶ They are typical of the profuse corpus of the Fontainebleau Sandstone carvings. On the other hand, the numerous engravings with shallow furrows in this cavity are uncommon in the carved shelters within the Fontainebleau Sandstone. They are more like drawing than carving and were probably made by a single movement of the tool.

In fact, there is only one engraved composition with deep furrows, and which presents an undeniable polarity in the direction of the recess and sexual figuration (Fig. 9). We have no legitimacy to analyse these figures. Future rupestrian surveys will discuss whether our groupings are warranted and may provide interpretations of these signs. On the engraved panel the shallow grooves assembled in geometric figures or forming very simple curvilinear traces are more abundant than the deep engravings (Fig. 9). Shallow grooves also exist elsewhere in the cavity, but do not form large compositions. The scatter of the engravings away from the engraved panel is due to the lack of flat and non-fractured surfaces with a suitably friable engravable cortex. Among these fewer neat engravings there are several symbols that presumably are vulva figurations. The most conspicuous are carvings directly attached at the outer sandstone crown of the sexual figuration. One is at the base, directly on the meridian line (Fig. 10A), and two others are on top of the crown, also close to the meridian line, but on the inner face of the sandstone crown, hidden from the frontal view (Fig. 10B). The three signs are crossed by a transverse engraving. On a ceiling bulge, left of the sexual figuration, three “furtively” carved V-shaped or ogive shaped signs may also be regarded as vulva figurations (Fig. 8 & 10C). Two of them are also crossed by a transverse groove. These later carvings are surrounded by percussion points from hammering the wall with a hard stone.

There are also several engraved circles, which are relative uncommon figures within the Fontainebleau Sandstone carvings. Left of the sculptural figuration is an engraved circle (10 cm in diameter) that presents an internal grid made of 3 parallel grooves intersected by two other perpendicular grooves (Fig. 8). Two of the three parallel furrows extend and meet outside the circle. The two perpendicular grooves close ogive-like on the inner edge of the circle and protrude on the opposite side, bounded by a perpendicular groove that closes the figure. To the right of the sexual figuration, on the upper right corner of the engraved panel, is a slightly smaller engraved circle (5 cm in diameter), punctuated by cupules engraved by an oscillating movement of the tool and cut by two parallel furrows (a deep one and another just marked), cut across by a third furrow (Fig. 9).

Assumptions and Conjectures

This shelter of Courdimanche has been known for about fifteen years but had not been studied particularly. It was regarded as exceptional. Apart from its aesthetics, there was no subject to study scientifically, so what if it's natural? The engravings are neither abundant nor exceptional, and there are nearly 2,000 similarly engraved shelters. These thoughts changed completely with the highlighting of the installation of the pubic triangle of the *La Ségognole 3 shelter*. What if there's more than just a natural sexual figuration? That triggered the urge to go back and see it again. The above descriptions are the result of an initial survey. These are raw readings, with no critical analysis yet. We do not claim to be able to make scientific interpretations at this stage of the study. However, we have decided to analyse situations, make hypotheses, and construct scenarios without

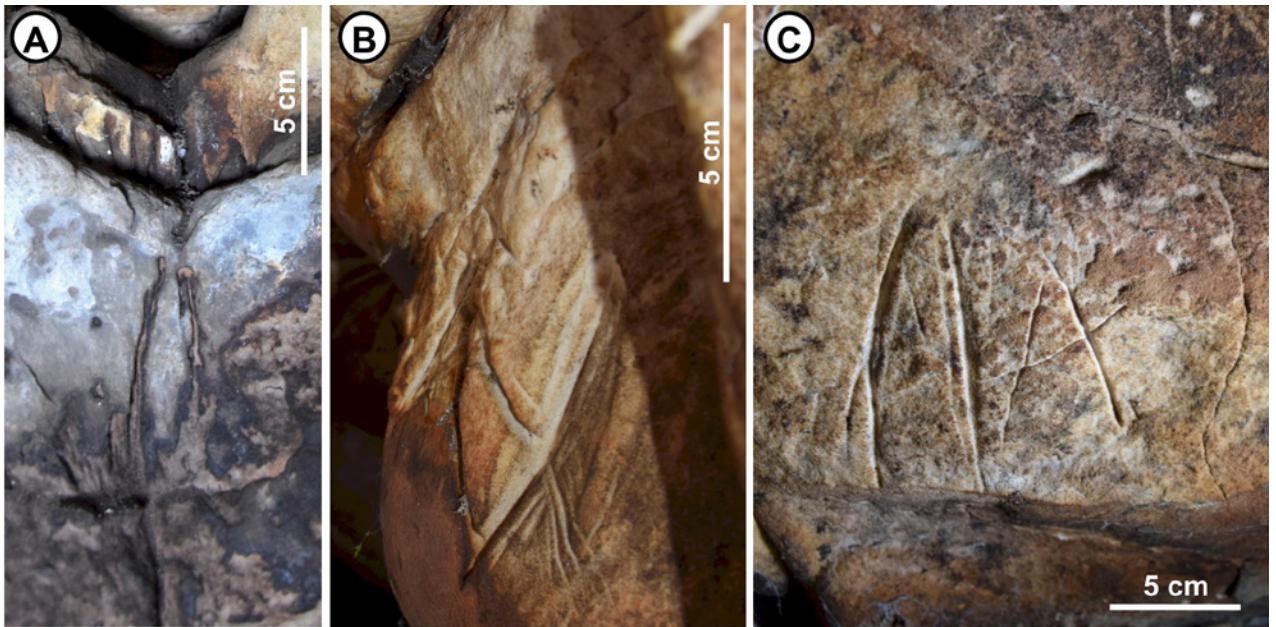


Figure 10. Vulvar figurations. (A) at base of the outer sandstone crown of the sexual figuration. (B) at top and inner face of the outer sandstone crown. (C) on a ceiling bulge, left of the sexual figuration (see position on Fig 8). Notice that all except one of these signs are crossed by one or more transverse grooves.

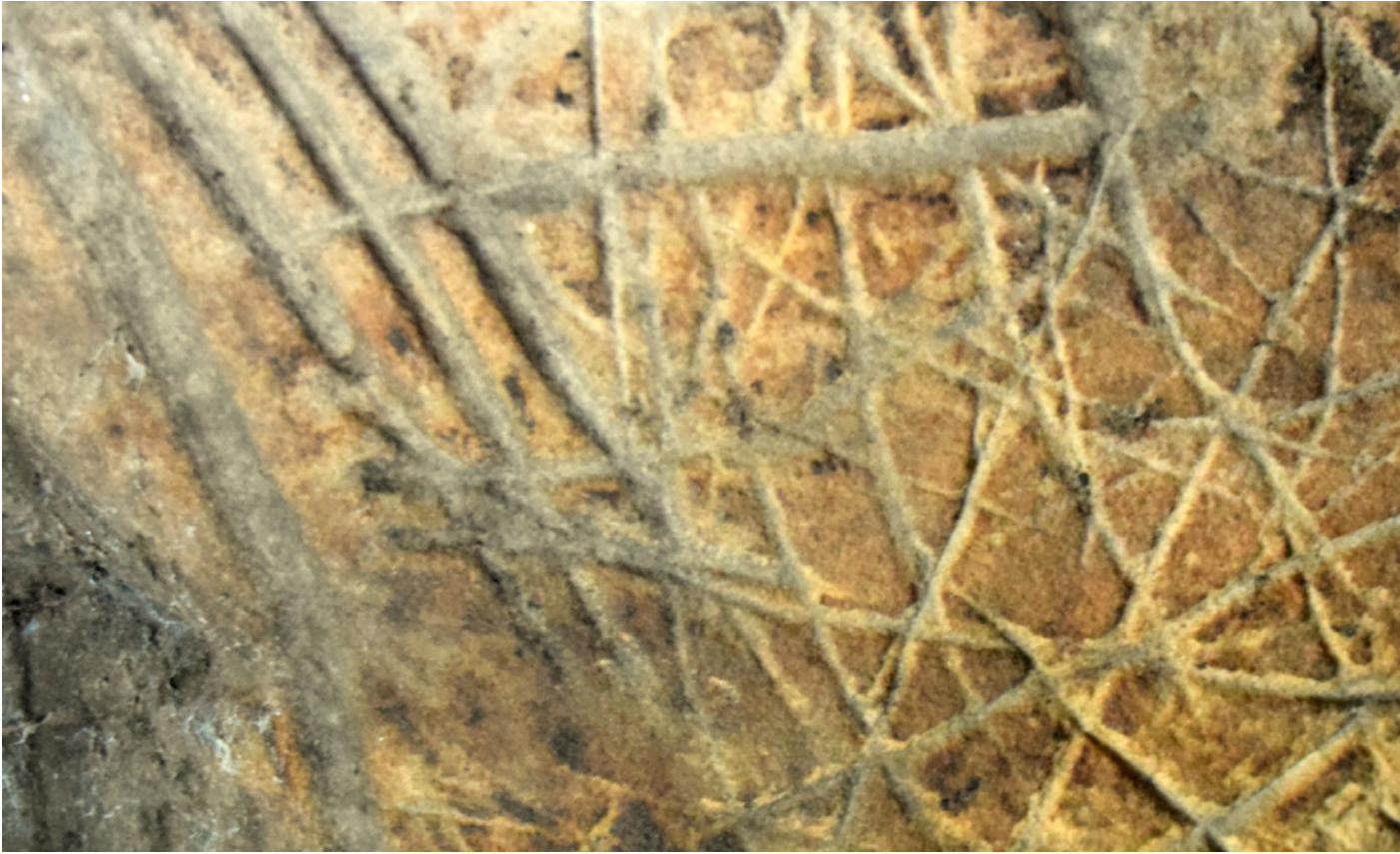
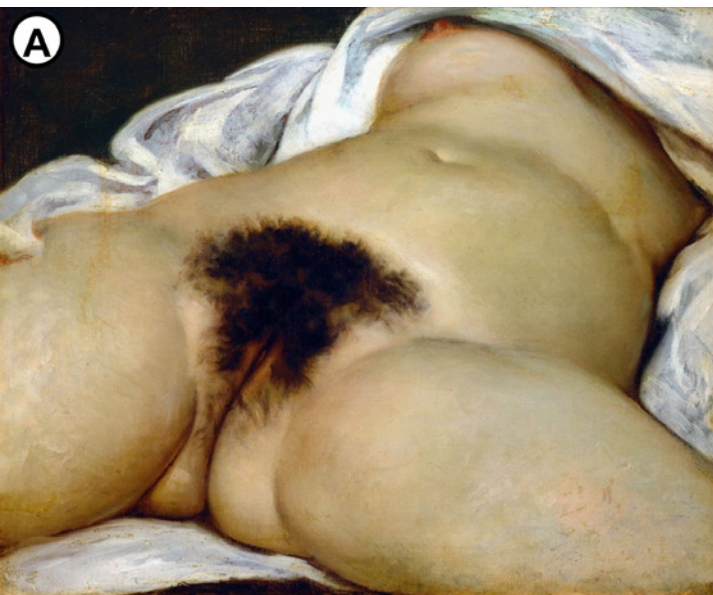


Figure 11. Engraved panel on the right of the sexual figuration (enlargement of figure 9). The shallow and the curved strips probably correspond to fast and spontaneous tracing gestures. They may testimony of impulses felt by the engraver housed in the cavity 10,000 years ago? Fossilized emotions?

Figure 12. Contrast of modern and Paleolithic female sexual representations, subtitled in the manner of René Magritte's 'trahison des images'. (A) 'Origin du Monde' by Gustave Courbet, 1866, Musée d'Orsay, Paris. (B) Female sexual figuration in relief in the sandstone of the Courdimanche shelter.



Ceci n'est pas une Femme



Ceci n'est pas un sextoy

worrying at this stage about how to argue or demonstrate their legitimacy. We ignore any constraints that could hinder our imaginations, we explore all possible paths to be sure that we are not missing one, at times being in the role of the shopkeeper. Imagination and dreams often give rise to working hypotheses. Then the game continues by imagining demonstration scenarios and where to look for evidence and arguments. This is when the research work begins. It is this snapshot of a research process being built, which is almost never commented, that we present below. Boris Vian, who adored the absurd, the party, and the game, wrote “This story is true because I invented it” in the novel *L'Écume des Jours* from 1947. We endorse this quotation in the hypotheses and conjunctures below.

In the first instance, we would like to sustain a sexual interpretation of the engraved circles. Elements that protrude from the circle could symbolize male elements that penetrate the circle sketching a female sex or even the described sexual geode and the meridian furrows depicting the vulvar slit. In any case, there is a great temptation to see a sexual figuration in the context of this emblematic shelter. Secondly, it must be emphasized that it is not the rule in the Fontainebleau engravings to have vulva figurations crossed by transverse furrows. These seem to be characteristic of the Courdimanche cavity. Thereby, with the below hypothesis that the sexual figuration may depict a penis penetrating the vagina, the grooves across vulvar representations could depict sexual intercourse.

Also, it may be that the shallow carvings and the curved strips are due to gestures hindered by the narrowness of the cavity. Nevertheless, there are also relatively complicated geometric figures engraved in this slight and easy-going way. They are of eminently faster execution than the typical engravings; they are probably made through fast and spontaneous tracings (Fig. 11). With these fine lines, and more particularly with the curvilinear lines, one has the impression of having left the field of formal carvings and being immersed in engravings executed, on impulse, like quick gestures scratching the friable cortex of the geode. The hammering of the wall around one of the vulvar signs probably also stems from a snap impulse. The opposition between artwork and graffiti is an ethnocentric reflex. But how do we perceive an impulse in a 10,000-year-old inert object? Only fixed gestures may be an index. Would the relative abundance of the slightly marked curvilinear engravings be the fossilization of impulsive and/or trance gestures born of the arrangement of this cavity of undeniable sexual character?

And finally, if all the reliefs of sexual figuration are natural, without prehistoric Man intervening to modify them, we can freely interpret them with our present anthropocentric gaze without worrying about being suspected or accused of over-interpretation. So, we will make a raw, direct, unconstrained analysis of what we are talking about. At first glance, it appears that the central figuration of the cavity evokes a female sex. This is how it has been designated throughout our description above. The three superimposed crowns depicting the big and small lips and their folds, it is an open vulva that shrinks inwards. The reading of the central protuberance can be dual, depending on one's position. A first reading is to see the figuration of the clitoris. So, we're facing the vulva, but the observation is done from a cavity. This cavity may itself have an anatomical connotation. The observer could be immersed in the vagina or the uterus. With this reversal of the position of the observer (actor?) the central protuberance could figure the glans that penetrate the vagina. And by pushing this last interpretation to the extreme, the sausage-like sandstone protrusions next to the vault and the walls would be cum! And who is the observer: a man or a woman? All fantasies are possible! And for a man this macho fantasy could be to fully penetrate the sex, to plunge into it to increase the surface of contact and pleasure and at its extreme an egocentric feeling, dominant and tinged with megalomania. But a gynocentric look may not be less extravagant.

Worthy Features from a Palaeolithic Perspective

In the *La Ségognole 3 shelter*, the central chamber with the engraved panel is isolated within the sandstone block and curtails access to reach the intimacy of the room where the key panel is located. The pubic triangle is therefore integrated into a natural space that possibly has feminine connotations, as often called to mind in the European Upper

Palaeolithic rock art.⁷ The fittings changed an evocative natural relief, featured in three dimensions, to a complex and functional installation including the fourth dimension of moistening cycles, which enables planning the “event” in a reliable manner. It presumably had symbolic force. In this perspective, some “initiates” could possess the secret and derive power from it! Whether or not this was so, there are without doubt religious myths and incantations practices behind the installation. The flow of the vulvar slit can refer to the lubricating flow accompanying sexual arousal, as intuitively imagined (by MT) at the time of the discovery of the phenomenon, or to the menstrual flow, or the flow of amniotic fluid from the loss of water and thus refer to birth, and more globally to the fertilization of the world, its perpetuation and immortalization.

In the Courdimanche shelter, the visitor is in woman’s body, not just in the vagina, but in the uterus, and one sees the anatomical details from the inside! All is natural—no element has been worked by man. It is the almost perfect illustration of the integration of Paleolithic parietal works into the natural elements to highlight cave graphics.⁸ But in this case there is not even integration! The visitor is at the centre of a 3D installation and can barely move, as if locked in this matrix. It remains for us to move forward in our research to determine if there too, as in *La Ségognole shelter*, the sexual figuration was staged with an animation.

In our eyes the two shelters differ sexually: at *La Ségognole* it is the female sex that is staged and animated with the flow of a vulvar fountain; at *Courdimanche*, with the protuberance that points from the back, it is the male sex that is at the centre of the figuration, and it remains to be seen if there was not an animation related to this male sex. From there, we can imagine that the two shelters were each dedicated to one of the sexes: to the women at *La Ségognole* and to the men at *Courdimanche*. Indeed, it is common in Australian Aboriginal societies to have very separate male and female places and ceremonies, with severe punishment for each intruding on the other.⁹ Some remote aboriginal societies still practice such things today but maintain great secrecy concerning their ceremonies and sites. It would not be surprising that this would also have been the case in early European Prehistorical societies. The shelters in the Fontainebleau Sandstone may be the key to demonstrating this.

La Trahison des Images—The Treachery of Images

The engraved female pelvic triangle of the *La Ségognole 3 shelter* was compared to the painting “Origine du Monde” (1866) by Gustave Courbet in an article published in the *Le Monde*, which reported the discovery of the installation of the shelter and the functioning of the “Vulvaire Fountain.”¹⁰ The comparison has since been taken up in writings and discussions during site visits. But into which extent is this rapprochement justified?

The “Origin du Monde” was commissioned by an Ottoman diplomat, Khalil-Bey, a collector of works celebrating the female body, for his private enjoyment. The painting remained hidden in his bathroom, and a century later it was acquired by the French psychoanalyst Jacques Lacan who, in turn, dressed it with a cache made by the painter André Masson and showed it only to selected visitors. In 1995 this painting entered the Musée d’Orsay, where it is visible to the public. In his “Origin du Monde” Courbet gives an anatomical and naturalistic representation of the female pubis that broke with centuries of Western art. He also freed himself from the alibis of mythological or historical staging which had been tolerated until then in the representation of a nude. Prior to this painting, Fernando Goya had dared to paint, in “*La Maja desnuda*” (1790–1800), the sensual body of a woman including the hair of her lower abdomen, thus a real woman and not a smoothed or asexual goddess.

7 Leroi-Gourhan, 1965, p. 482

8 Halverson, 1992, pp. 389–404; Lorblanchet, 2010, p. 480; Lorblanchet, 2020, p. 171; Testart, 2016, p. 380

9 Kaberry, 1939, p. 352; Hamilton, 1980, pp. 4–19; Merlan, 1992, pp. 169–193

10 Barthélémy, 2020

What strikes us first in the “Origin du Monde” are the choices made in its composition. In the foreground there is this female sex, with tight photographic framing, towards which Courbet deliberately focuses the view. With the opened thighs, the eye is caught by the bushy fleece. The vulva is exhibited, the woman is passive. Everyone who discovers this painting becomes a de facto voyeur, and in this Courbet skilfully exploits one of the fantasies of eroticism, the voyeurism. The other peculiarity of the composition is the absence of the face. As a subject, this woman does not exist. The body is truncated, it is a woman-object, an “obscure object of desire.” Was this the choice of the artist or an expectation of the sponsor? In any case, the canvas displays the image of a woman in the bourgeois society of the industrial era and reflects the duality of roles in which the collective unconscious will lock her up for decades: the Mother or the Whore. If the feminist movements and other currents of progressive thought today have somewhat deconstructed this representation, Western societal evolution is slow, and Orlan with the “Origine de la Guerre” (1989) denounces it with irony.

So, what is the relevance of establishing links between the “Origin du Monde” and the shelter of the *Ségognole*? Certainly, in each of these two pieces there is, violent or hypnotic, a female vulva. But going further in this rapprochement is perhaps one of those tendencies in our “rapid communication era,” an efficient media shortcut. And in doing so, it is a “trahison des images” (treachery of images) analogous to those conceived by René Magritte. Just as in the famous painting “Ceci n’est pas une pipe,” one could say of the vulva engraved of the *Ségognole*, “This is not a female sex!” Indeed, in the pelvic triangle of *La Ségognole* the framing of a particular anatomical element corresponds to a fragmentary representation characteristic of Palaeolithic art.¹¹ On the other hand, the history and symbolism of the engraved female pelvic triangle of *La Ségognole 3* is quite different. It represents neither a rupture nor a provocation, it is one element among hundreds, if not thousands, sculpted, engraved, or painted over tens of thousands of years. It is both part of and illustrative of a symbolism of the origin of the world, or more precisely of the origin of life and its becoming. It is the Mother-Goddess connected with worship practiced in many ancient religions, as shown by the anthropology of archaic populations, and envisioned as rooted in Palaeolithic myths. The Mother-Goddess would be the supreme and primordial power of life and fertility, responsible for the reproduction of human and animal species. The pelvic triangle together with the two horses also evoke the turnover of lives and the totemic approach of the Paleolithic religions, where life is latent in caves and sacred sites.¹² The two horses on either side of this powerful sexual representation could represent a cycle of rebirth. The vulva would symbolically give birth to the horse species and the Men who have it as a totem via the right horse, which springs out of it, while the left horse would symbolize the deceased individuals who come to “refill” the site. It is an anonymous work, without commercial value, but it is a work of the world’s heritage and so a universal symbol.

We are pleased to frame these intersecting perspectives via two feminine sexual figurations presented here with a graphic wink that summarizes the essence of these representations (Fig. 12).

11 Leroi-Gourhan, 1965, p. 482; Delluc & Delluc, 2009, pp. 629–661; Bourrillon et al., 2012 pp. 85–103

12 Testart, 2016, p. 380

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A SHAMANIC PERFORMANCE TO APPROACH THE ORIGINS OF ART

Performance: Dragoș Gheorghiu

Photography: Mihaela Moțaiianu











A Shamanic Performance to Approach the Origins of Art

The performance you see through my eyes is both material and immaterial: the hand draws lines, and the fire reveals the cuts in the cave rock.

The mind of my body is divided into two symmetrical parts that act together: my left hand cuts white lines in the flesh of the cave, and my right hand gives them life by moving the flame.

I breathe in the rhythm of cutting the stone, or maybe I cut the stone in the rhythm of my breathing.

I feel outside of my physical body, and the rock and the fire shape my heartbeat, the blink of my eyes and the rhythm of cutting the stone.

I cut the stone as I skin an animal, in the same rhythm, with the same short and pressed movements and I no longer feel my body weight, but only the sound of scratches, the heat of the flame and the smell of smoke.

This is the new reality in which I begin to exist, with gestures guided by the surface of the stone wall of the cave, which I kill with each cut of the bone blade.

The act of sacrificing the wall-animal, the movements of my body and the disembodiment were all transferred to the lines of the drawing on the wall.

Do you see my body movements in it?

Do you feel the pain of sacrificed stones?

Do you understand what art means?



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SOUND, MOVEMENT, AND JOURNEY OF THE SOUL

Igor Reznikoff

Musica est Ars Bene Movendi

Progressing through a tunnel of a Palaeolithic painted cave, sometimes crawling on the ground while making sounds, listening to echoes in order to discover the resonance of the tunnel, is a functional use of sounds.¹ And in ancient traditions, as it still is in a few oral ones, music was mostly functional: there was a precise purpose for which it was to be performed. Be it a song to the child in her/his mother's womb, sounds made by the woman during the moment of birth, the song to lull the child to sleep, working songs at home or in the fields, and of course, music for dance or war songs, trumpet voluntaries for retreat or for victory, laments for departure or death, healing songs, chants of prayer or praise addressed to the Spirits and to the Invisible World; all these demonstrate that the power of sound and music were—and sometimes still are—used functionally with a precise intention to obtain a specific effect. It is possible to show that in most cases, the functional aspect has objective—in the scientific meaning of the word—bases. These bases are built essentially on the notion of modality (see below): it is clear that e.g. the tone of a lament—the singer may indeed cry with tears—or the sounds of joyful dance music or of trumpets of victory actually impress in different ways and to a great extent as intended.

However, within the learned traditions of antiquity, especially the learned spiritual traditions, music progressively gains its autonomy, although, through modality, it remains in close relationship with its modal functional aspects. It is therefore very interesting that we have a definition of music belonging to one of these traditions of antiquity. St Augustine (fourth century AD) gives the following famous definition of music in his *De Musica* (I, 3, 4): “Musica est ars bene movendi,” which we can translate as “Music is the art of good movement.” “Good” here is understood in its Platonic sense: the *good* is what leads to the divine.

Contrary to a common opinion amongst musicologists who states that Augustine confuses music and dance, this definition is certainly one of the deepest concerning music. It indeed refers to 1) the movement of the sound in the body, and essentially to 2) the relation between the movement of the soul and sounds, particularly sounds of the voice.

Concerning the *movement of sound in the body*, it is easy to understand and to experience this twofold movement. The higher sounds of the voice vibrate in the higher parts of the body (throat and lower part of the head), while the lower ones vibrate in the lower part of the body (chest and back). It is a very simple and convincing experience to put one's ear on a person's upper middle part of the back and listen to the sound this person produces; the sound moving, let us say, in the range of a fifth: it goes up and down along the spine and the back of the singer. This notion of higher or lower sounds is a reality relating to the body and perception of sound; hence it is not purely conventional when we say that sounds are *high* or *low* (on the piano, higher sounds are on the right, on a guitar as it is played nowadays, the higher sounds are on the lower part of the instrument). Moreover, because of its movement, the sound structures the spine and therefore the body, already since early childhood. But while all this was about the movement of sound related to pitch, there is also a second movement of sound which is

¹ Reznikoff, 2014a, pp. 101–109

independent of pitch: the movement of vibrations of different vowels and consonants in the body. A simple experiment makes this evident: put your left hand on your chest and your right hand on the top of your head and simply say slowly or, even better, sing on the same pitch, alternatively A and M, and you feel the vibration going from the chest to the head and back again. Singing A O U M, you may feel the vibration raising up, respectively from the chest (A) to the throat (O), to the lower part of the face (U), and finally to the upper part of the head (M). This revealing experience shows the relationship between vowels and consonants and their locations in the body. Although the main features of this relation, as shown here, are clear, the relation is complex and subtle: each bone vibrates in its own way with different spectra of harmonics. It brings to our outer consciousness the importance of the *perception of sound*, actual perceptions of vibrations *in the body*, and this relationship, which we use in sound therapy, is also relevant to the approach of modality and possibly to the meaning of sounds.²

The second movement St. Augustine refers to, the *movement of the soul*, is not a notion familiar to us nowadays, but it is an essential one in antiquity and implicit in St Augustine's definition. It refers to the permanent changes in our consciousness, which goes through states, for instance, of happiness, joy, exultation, and then of sorrow, tears, anxiousness, wrath, fear, or courage, peace, and so on: emotions which correspond to different psycho-physiological inner states and different expressions of the voice. As mentioned above, the voice in a lament, in fear, or a joyful voice sounds differently; this change is not cultural; in all countries it sounds essentially the same. These different expressions by tone, timbre, pitch, or intonation are characteristic of the corresponding psycho-physiological inner states and give a musical elementary characteristic of each state. This defines the core notion of *modality*.³ For each *mode* in music its *core* is given by some timbre and one or two intervals slightly higher or lower that characterize the ethos, the inner state, which the mode is supposed to express. Thus, the *movement of the sound* reflects the change or movement of consciousness, and this makes the notion of *movement of the soul* so important in the Pythagorean and Platonic vision of the World, a notion still kept by St. Augustine and in the foundations of Christian sacred Art, since its ultimate meaning is the *becoming of the soul*. The *good* movements Augustine speaks about are those of consciousness that eventually leads the soul into the Everlasting Light of the Divine One. This journey of the soul of course takes place through a strong practice of meditation, *theoria*, contemplation, prayer, charity and devotion. In this field of devotion, music, of course, has to be understood in its higher meaning: given by the Muses i.e. given from the Divine.

From Sound and Movement to Musical Notation and Liturgy

The movement of the sound in the body, movement which is not visible, becomes visible when the hand follows it. For instance, as in the example above, following the movement of A O U M, the hand or both hands raise up from the lower chest to the throat and higher, a little above the head, in a gesture of offering and praise, actually offering the sound of the voice, the sound of a sacred word or syllable. This is the first and simplest devotion. The movement of the hand that follows the movement of the sound in the body is called *chironomia* (from *χειρ*, hand, and *nomos*, the law, and here sign). Chironomia practiced by Cantors and Masters of chant eventually gave the conductor's gesture. From chironomia, from its gesture, came naturally the ancient musical notation, namely notation in *neumes* (9th century). The very first notation that led up to the neumatic is called *ecphonic*; a higher sound—it refers to the body—is notated / *virga*, or acute accent, and a lower sound notated \ *punctum*, or grave accent as it still is in French; and then *clivis* notates successively a higher and lower sound, and *V pes* a lower and a higher, and so on ...

² Reznikoff, 2005

³ Reznikoff, 1987



Figure 1. Solsemhula cave in Norway. The procession of painted humans on the right wall is walking towards the recess at the bottom of the cave. In this recess the resonance is particularly strong. Photo by Adjun Selfjord



Figure 2. Chartres cathedral, the 12th century. Photo from private Collection



Figure 3. A crucifix from the beginning of the 7th century, collection of the Dublin National Museum. In the centre of the heart of Christ spirals and triskels represent the Divine Breath, the Breath of the Holy Spirit; it reveals a true spiritual anatomy. At the top the aureole is represented by a triskel, here a symbol of the Trinity. This crucifix is one of the greatest masterpieces of Christian art. Image courtesy of Dublin National Museum

From this, a beautiful and clear notation in neumes appeared in the 9th, 10th, and 11th century. Our modern notation comes from this principle: the higher in the body, the higher on the parchment or, now, on paper. So, this notion of *movement of sound* is always present in our practice and notation of music; it comes of course from inner and outer perception of the voice in the body. First it was an oral-written notation, not showing precise intervals, because melodies were memorized orally. Progressively lines were introduced to make notation visually clearer. Writing in neumes on beautifully ornate manuscripts in the Western Carolingian tradition was certainly in relationship with the Irish tradition of interlaced designs, which, by the way, reached Norway and Northern countries and later the north of Russia. These complex interlacings and endless spirals, which already appear on pre-Celtic megaliths, have a high spiritual meaning. They represent the expanding movement of Divine Breath and Word, the Breath of the Holy Spirit, as we can see them on Irish sacred parchments or bronze; they appear inside the Cross or in the inner divine body of Christ, and from the Cross, or from Him, spread gloriously throughout the whole Universe (Fig. 3).

All these movements that come from the Sound of Praise and, as we have seen with St. Augustine, recall the Becoming of Soul, these movements represented on illuminated parchments or engraved stones, could be seen extended in great ancient liturgies, liturgical movements, steps, and various processions. Still, in the year 1970 at the Convent of Saint Teresa of Avila, sisters entered the church half walking, half dancing, bending to the right and then to the left, proceeding into the church in a remarkable way. One must remember that churches were adorned by paintings, icons, frescoes, by the living light of candles and by a deep contemplative chant. Actually, the connection between sound, movement, and space is rooted in our deepest levels of consciousness; indeed, for a foetus in mother's womb, the main perceptions are those of sound and movement, and since the baby does not see at all, it is only with the help of sounds that he/she perceives sounds from above (mother's voice) or distant sounds (other voices, instruments ...), progressively discovering the notion of space.⁴ Great ancient liturgies, particularly Christian liturgies in Romanesque or Gothic churches, illustrated this deep and wide vision of space, sound, movement, light, and colours (see Fig. 2).

As we have lost traditions of embroidering, handcraft, and traditional (not touristic) folklore, following seasons and agricultural life, traditions of illuminated liturgical manuscripts, contemplative ancient chant, liturgies, and liturgical movements are lost long ago, with a few exceptions kept in some Orthodox or Eastern Christian Churches. However, one of the best and most ancient illustrations of this can be unexpectedly discovered in deep painted caves.⁵ They are often like huge cathedrals in height and width. Discovering or exploring them by means of echoes in almost complete darkness, but with small lamps like candles and possibly torches, in front of frescoes of painted animals was certainly a real liturgy, reminding of a return to Mother Earth's womb, addressing spirits of represented animals, in a unity of space, colour, sounds, and movement and reaching the deepest levels of consciousness, where, corporal and non-corporal, the soul is supposed to dwell. It is remarkable that Plato, about his Cave, speaks of echoes and shadows of animals (Rep. VII, 514–515). And since for Pythagoreans and Plato the Soul is essentially musical, following harmonic proportions, let us with them and with prehistoric Tribes, in a wide gesture of praise, sing joyfully to the Invisible.⁶

4 Reznikoff, 2005

5 Reznikoff, 2014b

6 Reznikoff, 2001; Reznikoff, 2021:

Listen to the CD *Le Chant du Mont St-Michel*, ADF-Bayard (ed.) 2001/2021



Figure 4. Oxocelhaya Cave draperies. Pays-Basque, France.
Image courtesy of Zigor (France)

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In South Africa, the marine snail with this hypnotically beautiful shell is called perlemoen, after the Dutch name *paarlemoer* meaning 'mother of pearl.' Its binomial name is *Haliotis midae*, and as one of five native South African abalone or sea ear species, perlemoen is chosen as the country's national shell. Two *Haliotis midae* shell toolkits were found in the Blombos Cave.

One of the two toolkits excavated at Blombos. Image courtesy of Grethe Moëll Pedersen & Christopher S. Henshilwood 2011

Images on the intro and outro pages are stills from the animation *Perlemoen*. Macro photographs by Petro Keene 2020

LIGHT—DARKNESS—LIGHT

Geir Harald Samuelson

The animated artwork *Perlemoen* represents a unique encounter between contemporary art and archaeology—across time, space and continents. The working process between Elin Tanding Sørensen (Norway) and Petro Cecilia Keene (South Africa), has been one-of-a-kind: Elin, who at that moment was deeply buried in completing her doctoral thesis, discovers the haunting history and aesthetic qualities of the marine snail abalone (Haliotidae), and comes up with an idea for a video: an artwork being difficult to realize without having the opportunity to interact with the shell in its natural habitat along South Africa's rocky shore. Archaeologist, Petro, sitting in her house in Cape Town close to Smitswinkel Bay, was likewise deeply engaged in the writing of a paper on Anthropomorphism. Both were confined to their homes due to the Corona pandemic. Both were taking part in the artistic research project *Matter, Gesture and Soul*. Elin contacted Petro, and over a period of a few months, they developed *Perlemoen*, a video of intertwined and hypnotic images of abalone shells, accompanied by a textual reflection on the shell's significance both spiritually, artistically and ecologically, as described by archaeologists studying early human relationship to nature and the development of a material culture.

“Abalone shells connect us emotionally to our ancient distant past”

The opening sentence of their joint text *Perlemoen*, sets the tone for the work's expressive ambition and perspective. The creative process is significant and becomes metaphorical: Petro's photographs of the shell's lustrous interior travel through the digital darkness, from the beach in Smitswinkel Bay to Elin's laptop at Nesodden. Much like the remarkable find of ancient abalone shells—excavated at Blombos Cave in South Africa—have been travelling from the hands of our ancestors, who used them as containers for ochreous pigment compounds, to the researcher's examining gaze under a microscope. A journey of 100,000 years through several layers of soil all the way to the museum's illuminated display cabinets and the researcher's laboratories. This is a movement from light via buried earthly darkness and back to light again.

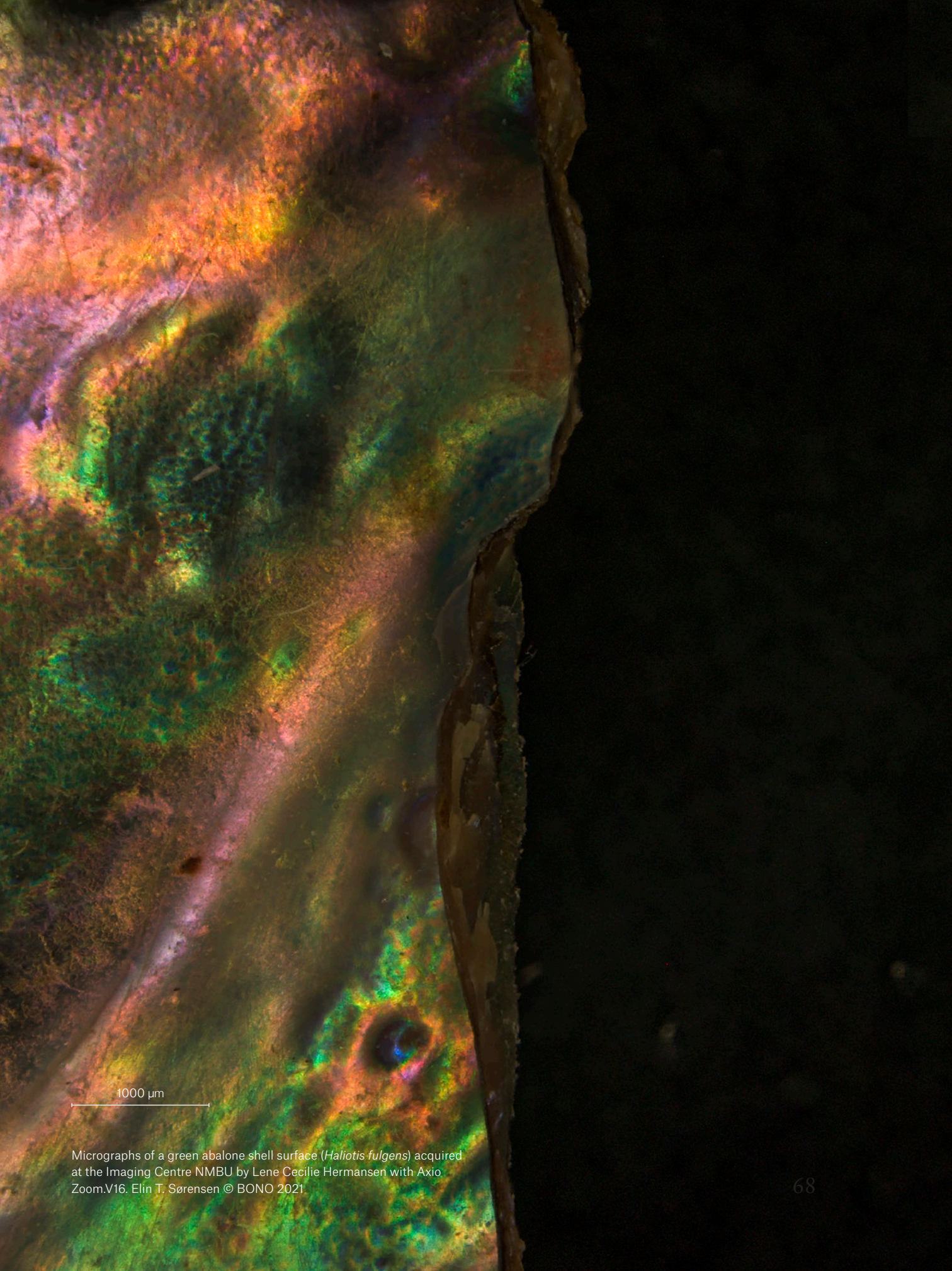
Presumably, our ancestors were captivated by the suggestive radiance and beauty of the shells and their mysterious aura. Perhaps they looked into the future, towards our reality? When we study the shell today, we are transported back in time towards an obscured existence: as if the past can be glimpsed through a fog arising from the play of iridescent colors, which in themselves form abstract landscapes and worlds. No wonder, the shells have played a role as regalia in rituals through time. So, if we metaphorically turn our gaze 180 degrees, maybe we too can grasp our future selves in the shell's shiny mother of pearl—through yet another time travel like the imaginative journey our ancestors made 100,000 years ago. Their way of life and thinking will forever remain hidden. Nevertheless, perhaps the mesmerizing shells can be perceived as carriers of signals, like a loudspeaker membrane, converting weak signals from a future that resonate with our souls.

Examining a lustrous abalone shell, or sitting in front of abstract engravings made by early humans, like the ones in the Fontainebleau forest, is both mind-expanding and a profound experience—as the artwork *Perlemoen* reflects. Going forward, we will keep searching for new meeting points: new encounters within art and history, between people, matter and culture. Hopefully we may learn more about the art of capturing ancient signals that might lead us towards a better future. Strengthening our presence in an effort to approach and convey their meaning and bringing them to life—possibly incorporating this wisdom from the past into our contemporary life and sensibilities.

IRIDESCENT LAMENT

Elin Tanding Sørensen

2000 μm



1000 μm

Micrographs of a green abalone shell surface (*Haliotis fulgens*) acquired at the Imaging Centre NMBU by Lene Cecilie Hermansen with Axio Zoom.V16. Elin T. Sørensen © BONO 2021

The Parent of All Abalones was neither male nor female but could produce offspring. The first abalone was the first creature to live in the sea. When it dies it will let out a cry that everyone would hear. If the first abalone ever died—that would mean all the abalones had died—all of the creatures. It would be like the end of the world.¹

I Cry

In an unfathomable darkness—within the timeless eternity—a crowd of dead sits about. Sometimes, in between infinite time scales, the dead talk to each other sharing their life stories. Suddenly, a loud, horrible roar cuts through.

From far down in the darkness they hear a strangely drawn out, bellowing cry—infinately plaintive, like a beast weeping. They all knew it, but they didn't know what it was. It was something that didn't belong with them. It was a man who had lived too long ago. He sat on his haunches, he had hair over his body, his nose was flattened, his mouth huge and half-opened. No one knew who he was, not even himself, he didn't remember having lived. He only remembered a smell, a smell of a great forest, of resin and wet moss. And a smell of another being, of something which was warm like him, something which was like him. He didn't remember it was a human being. He only remembered the smell. Then he sniffed around him in the darkness with nostrils distended and bellowed like a beast weeping. It sounded horrible. It was such an agonizing wail of boundless sorrow and yearning that they shuddered. But he wasn't one of them. They lived their life, seeking and seeking, they suffered and struggled, believed and doubted; they didn't bellow.²

Across a vastness of time beings are interconnected by an ear-splitting sound: a cry possibly being the closest we can ever get to our earliest ancestors and perhaps even the origin of life—whether that is a fossilized microorganism or the first abalone.

I think I hear a scream so loud—as if the world is falling apart.

The First Creature(s): the earliest physical evidence of life found so far are the microfossils from the Nuvvuagittuq Greenstone Belt of Northern Quebec. Microfossils are for example fossilized microorganisms, bacteria, foraminifera, diatoms, minuscule invertebrate shells or skeletons, pollen, tiny bones, and teeth of large vertebrates. The Nuvvuagittuq fossils are present in a metamorphic banded iron formation considered at least 3.8, and possibly 4.3, billion years old: indicating that life developed very soon after oceans formed.³

1 Florence Silva in Field et al., 2008, p. 66

2 Lagerkvist, 1934, p. 43

3 Dodd et al., 2017; Lipps, 2021



Metamorphosed volcano-sedimentary rocks of the Nuvvuagittuq supracrustal belt. Image courtesy of NASA 2010



Living abalones in display tank at Ty Warner Sea Center on Stearns Wharf, California. Image courtesy of Sharktopus 2011
CC-BY-SA-3.0

In Native Californian creation myths, stories about abalone as the *First Creature of the Sea* are still told by Pomo-speaking people at the Kashaya and the Point Arena reservation. The story of *The Parent of All Abalones* is unique: transcending gender and linking the fate of the ocean with a small yet outstanding marine snail. To the Native Californians, the abalone is a sentient being with agency and destinies linked to the humans with whom they cohabitate: *Abalone Woman* is one such spirit being.⁴

Lament: the Greek term *elegeia* (from ἔλεγος, *elegos*, “lament”) refers to sad and mournful songs. As a form of poetry natural to the reflective mind, it may treat any subject, though no subject for itself, and always with reference to the poet: as s/he will feel regret for the past or desire for the future, so sorrow and love become the principal themes of the elegy: presenting everything as lost and gone or absent and future.⁵

The Balancing Act

Abalone shells carry the essence of the ocean: “As if the animal that made the shell distilled silvery splinters from its watery home and then crystallized them. Like a painter catching on the canvas fleeting diamonds of light that glitter on the sea.”⁶ When an energy-dispersive X-ray microanalysis shows that the basic composition of the abalone shell is carbon, oxygen, calcium, and small traces of silicon,⁷ environmental historian Ann Vileisis’ descriptions stand out as astonishingly precise.

Calcium carbonate (formed by the elements carbon, oxygen, and calcium) is the key building block for most marine life, and the sea-dwelling creatures—from microscopic coccolithophores to coral-building algae and giant snails—engineer their own house-building materials directly from their watery environment. Just like magic, the dissolved chemicals are extracted to form solid composite shells. Since seawater holds as much calcium and carbonate as it can, the mineral forms more easily than it dissolve—and no less magical, the shells do not dissolve back into calcium and carbonate as soon as they are built.⁸

⁴ Field et al., 2008, pp. 3, 41, 82

⁵ Coleridge, 1835

⁶ Vileisis, 2020, p. 40

⁷ Yu, 2021

⁸ Encyclopædia Britannica, 2021

The six most abundant ions of seawater are chloride (Cl^-), sodium (Na^+), sulphate (SO_4^{2-}), magnesium (Mg^{2+}), calcium (Ca^{2+}), and potassium (K^+). By weight these make up about 99% of all sea salts. Inorganic carbon, bromide, boron, strontium, and fluoride constitute the other major dissolved substances. Among the many minor dissolved chemical ingredients, inorganic phosphorus and nitrogen are important for the growth of organisms inhabiting the ocean. Seawater also contains dissolved atmospheric gases, chiefly nitrogen, oxygen, argon, and carbon dioxide.⁹

In the ocean's eternal material cycle, the shell builders have adapted to thrive near the surface. This is a place abundant in calcium carbonate for the easy creation of protective homes. At greater depths, the water is less saturated with this chemical compound, and thus, the shells will readily dissolve. This fluid border, being dependent on the fluctuating concentration of calcium and carbonate, is called the *dissolving depth*. At a high concentration, the shells must sink deep before dissolving. Oppositely, when the concentration is low, the dissolving depth moves upward. As a typical feedback loop, dissolved shells add more calcium carbonate to the water, and so the dissolution depth decreases. This in turn protects other shells from dissolving. In this way, the chemistry in the deep ocean stabilizes the overall concentrations of calcium and carbonate in the sea. Also, the ocean interacts with the atmosphere at the surface when a small proportion of gases like oxygen and carbon dioxide dissolve into the water. This mix of oxygen helps the sea creatures breathe. The rising and falling concentration of the gases in the atmosphere and the amount of gas dissolved into the ocean constitute the ocean's *balancing act*.

With increased carbon dioxide in the atmosphere, the carbonate level in the ocean decreases. This makes the shell-building more difficult. In its own time cycle, however, the ocean's physics and chemistry will cause the dissolving depth to rise (or fall) and eventually balance the levels.¹⁰ Nevertheless, when excess of carbon dioxide accumulation in the atmosphere dissolves into the ocean, the pH of the seawater tilts toward acid. Both in lab experiments and by direct observations in the high-latitude oceans, researchers see that calcifying organisms such as molluscs and reef-building corals struggle to make shells and skeletal structures in water with elevated acid.¹¹

Crystallization

In addition to calcium carbonate, marine shells are composed of a small quantity of protein. In the process of building their protective armour, the shellfish secretes proteins and mineral extra-cellularly from mantle tissue that is located under and in contact with the shell. As opposed to crabs and lobsters that shed their exoskeleton, the molluscan shells enlarge as they grow. The abalone (*Haliotidae*), for instance, add new organic matrix and mineral to their outer edge—around their mouth or apertural. The role of the protein is to bind calcium ions while guiding and directing the calcification. In this operation, the protein and calcium ions are crystalised into precise hierarchical arrangements.

The shells of marine invertebrates such as snails, clams, oysters, and many others have three distinct layers. First, an outer uncalcified layer consisting of complex conchion protein and chitin, from which a strengthening, naturally produced polymer emerges.

⁹ Duxbury et al., 2021

¹⁰ Encyclopædia Britannica, 2021

¹¹ Vileisis, 2020, pp. 209–210

Next is a highly calcified prismatic layer followed by an inner pearly layer of calcified nacre. In abalone's mother of pearl, the prismatic layer is made from aragonite. This is a crystal form of calcium carbonate being different from the crystal shape of calcite, which constitutes the building block in the nacre of other seashells such as blue mussels (*Mytilus edulis*).¹²

Kaleidoscopic Architecture

Iridescence arises from the basic principles of wave optics. As light interacts with periodic structures, it diffracts. Periodic structures are the regular arrangement of atoms, particles, or unit cells which results in both dispersion and band gaps. Depending on the wavelength of light, the angle at which the light is spreading will change. Examples of such rainbow-like reflections can be found in shells, insect wings, gemstones, and CDs. The effect is also called *thin-film interference*—a phenomenon we can experience from the multiple colours seen in light reflected from soap bubbles or oil films on water.¹³

The lustrous interior of abalone shells originates from the layering architecture of the nacre. If a shell piece is studied through a microscope, a microstructure of tiny polygonal aragonite tiles perfectly stacked in pillar-like forms are discovered. The regular height of these minuscule towers is a key factor in producing the shell's iridescence.¹⁴

Microcosms Communicating New Properties of Light

The “natural magic” of mother of pearl deeply fascinated the Scottish physicist Sir David Brewster (1781–1868), leading on to his pioneering discoveries in optics and, among other things, the invention of the kaleidoscope. In a letter to the scientific academy of the Royal Society in 1814 he writes: “In my inquiries into the modification impressed upon light by the various bodies of the animal, the vegetable, and the mineral kingdom, I have had the good fortune of discovering several new properties of light.”¹⁵

In sensing that the nacre's magnificent colour play demonstrates “the operation of some unknown and extraordinary cause,”¹⁶ he started experimenting with making impressions of the shell surface in materials like gold leaf placed upon wax, tinfoil, balsam of Tolu, gum Arabic, fused bismuth and mercury, and lead.

Brewster found that the diffraction of light from mother of pearl came from undulating microcosms on the shell's surface. The imprints communicated “the same faculty of producing colour,”¹⁷ and in almost every variety of mother of pearl a new landscape was discovered: “This structure resembles very closely the delicate textures of the skin at the top of an infant's finger; or the lines parallel to the coast upon a map, by which the engraver marks the limits of the sea and land.” He also found the spaces between the grooves to vary. Some could be seen with the naked eye. Others were so small he counted more than three thousand elevations per 2.5 cm.¹⁸ Today, the optical scientists call this phenomenon *diffraction gratings*.¹⁹ As explained by Ann Vileisis: “Light hits the parallel surface of the fine gratings, and if the size of the wavelengths is just right relative to the spacing of the miniature canyons, the light will be split into its component colours and diffract in different directions. The undulating light waves ‘interfere’ with each—either ‘constructively,’ by coalescing into the same phase, which intensifies the

¹² Horne, 2006

¹³ Yu, 2021

¹⁴ Vileisis, 2020, pp. 40, 42

¹⁵ Brewster, 1814, p. 397

¹⁶ Brewster, 1814, p. 398

¹⁷ Brewster, 1814, p. 406

¹⁸ Brewster, 1814, pp. 409–410

¹⁹ Vileisis, 2020, p. 41

colour, or ‘destructively,’ by knocking each other out of sync, effectively shrinking the waves and diminishing the colour.”²⁰

In addition to this, Brewster found that some colours were not visible on the wax mold. These non-transferable colours he ascribed to additional diffractions and reflections occurring within the shell’s pearly layers: “... if mother of pearl polarises light in virtue of its laminated structure, the laminæ themselves must have the property of polarising light in a manner opposite to all other bodies.” What now is known as *layer diffraction*, he saw as a “new species of polarisation peculiar to mother of pearl.”²¹

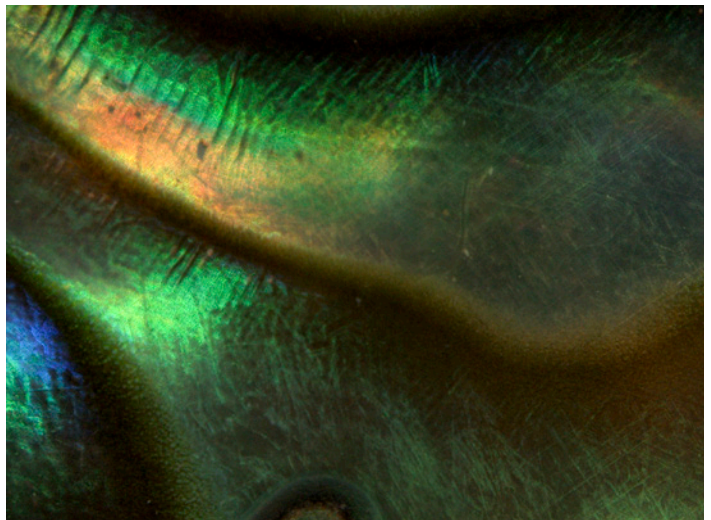
The microcosms of abalone shell surfaces resembles undersea landscapes from which the undulating formations produce the shells magnificent iridescence. Figuratively, the microstructure also resembles the natural rocky shore which is the habitat where abalone thrive. Most likely, the shimmering play of colours lining the abalone shells inside has ignited the abalone tales—linking the nanoscopic shell architecture to the wildest imagination. To some Native Californian tribes this hidden wondrous world even serve as a “looking glass reflecting visions for the future.”²²

Micrograph of a green abalone shell surface (*Haliotis fulgens*).

500 μ m

SE micrograph of an abalone shell cross-section. Both images acquired at the Imaging Centre NMBU by Lene C. Hermansen. Sørensen © BONO 2021

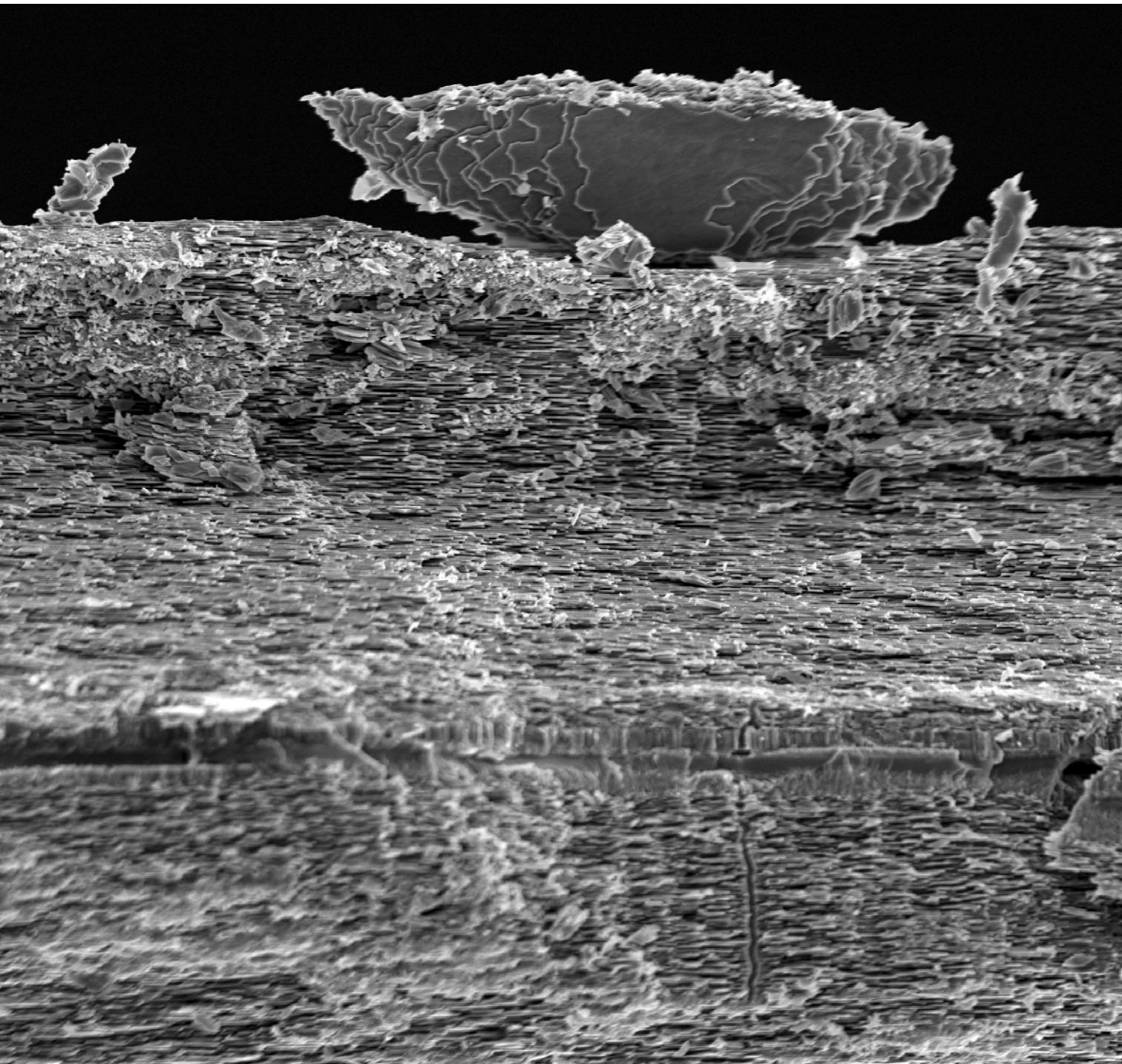
1 mm



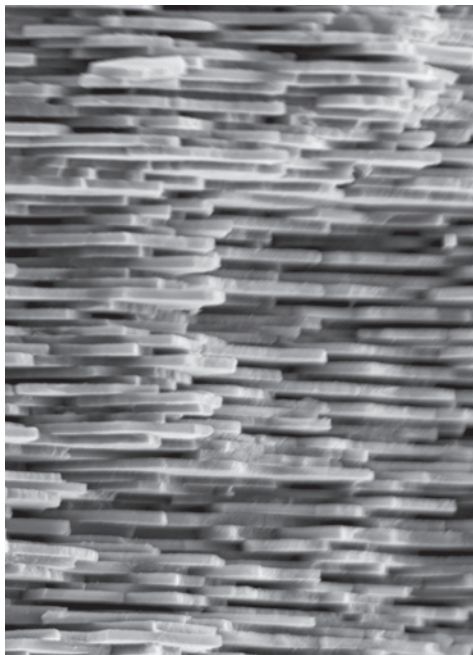
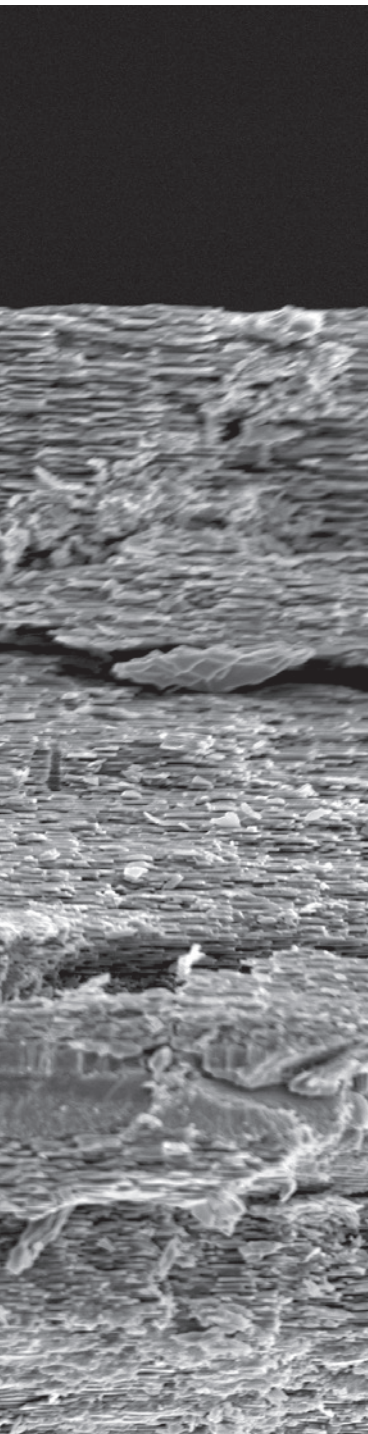
²⁰ Vileisis, 2020, pp. 41–42

²¹ Vileisis, 2020, p. 42; Brewster, 1814, pp. 417–418

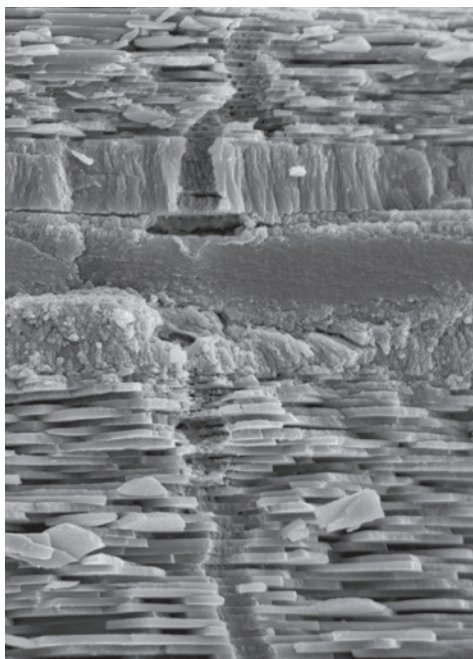
²² Vileisis, 2020, p. 27



10 μm



2 μm



1 μm

BiomimiCry: over the course of millions of years, the abalone have adapted an amazingly strong body shelter to protect them from predators and the power of the ocean—which again relate to the shell's nano-scale architecture. Marc Meyers, affiliated to the Nano Engineering Faculty at the University of California, engages in the field of “reversed engineering,” where the researchers seek discoveries within the basic mechanisms through which natural materials are formed for the sake of developing new technologies. The mentioned aragonite tiles are held together by a thin organic glue which constitutes the brick-and-mortar structure contributing to the shell's extraordinary strength and flexibility. Under stress, the calcium carbonate tiles can absorb a great deal of energy without breaking. Because the tiles are “glued” only on the top and bottom, the adjacent tiles can separate from one another and slide when a strong force is applied. If fractures occur, the marine snail can self-repair. In their search for “new generations of armour,” Meyers and his team have demonstrated that this highly ordered architecture is the “toughest arrangements of tiles theoretically possible.”ⁱ Not surprisingly, this composite is also one of the world's most researched natural materials.ⁱⁱ

SE micrographs of an abalone shell cross-section (vertical layers) recorded in different magnifications, acquired at the Imaging Centre NMBU by Lene C. Hermansen with Zeiss EVO50 EP. Sørensen © BONO 2021

i Meyers, 2005, p. 18

ii Vileisis, 2020, p. 44

In Utter Loneliness

The white abalone (*Haliotis sorenseni*) once thrived in the millions off the California coast. Today, factors such as climate change and past overfishing have severely reduced white abalone numbers from historical levels: for example, in the early 1970s, large colonies used to occupy the rocky reefs around the California Channel Islands. By the early 1990s, the marine snail had nearly disappeared. In 2001, the white abalone as first marine invertebrate was listed as endangered under the Endangered Species Act.²³

From April 1992 through December 1993, a Californian marine research team inspected locations known as thriving habitats for the white abalone. Still, after examining over thirty thousand square meters, only three living abalones were discovered.²⁴ In 1996, they set out on a new underwater voyage around the Channel Islands with the mini research submarine *Delta*. After several days, the team was filled with expectations when they discovered a white abalone on the seafloor. They turned the submarine back with high hopes of running into a white abalone neighbourhood. Though, as the survey documentation reveals, in the dark depths nearly 50 meters undersea can be glimpsed a small animal clinging to a rock—surrounded by a vast desert-like landscape.²⁵ After mapping seventy-seven thousand square meters of habitat, alarmingly few white abalones were found present: all of them living too far apart to successfully reproduce at the levels needed to support natural recovery; all being old animals approaching the species' 35–40 year lifespan. To offer a comparison, Buckingham Palace contains about 77,000 square meters floor space. Just imagine a hopeful Queen sitting all alone in her infinitely large castle ... and with certain similarities, this is exactly what the scientists found, as each of the eight specimens recorded were solitary beings. By and large, the researchers started to fear they were facing the last living white abalones on the planet.²⁶

Loneliness is a humiliating feeling that inhibits wellbeing. As a human being, I experience prolonged loneliness as being physically painful, with the corrosive effect of reducing joy, vitality, and room for manoeuvre. Social neuroscientist John Cacioppo—having studied the neural mechanisms within a defined social species such as the causes and effects of loneliness for decades—claims that the need for social connection is fundamental in humans. Without it we fall apart down to the cellular level. Over time blood pressure climbs and gene expression falters. Cognition dulls and immune systems deteriorate. Under the constant presence of stress hormones aging accelerates. Loneliness, he writes, is a survival impulse like hunger and thirst. It is a need that pushes us toward the nourishment of human companionship.²⁷

What about the wellbeing of other species: is loneliness eroding their quality of life too?

In fact, several social species are found to suffer. By using a new tracking system, a research team have compared the lifespan of isolated workers from timber ants (*Camponotus fellah*) with ants kept in groups of ten. They found that the lifespan of the isolated ants was shortened, and that social isolation resulted in behavioural changes amongst the lonely ants. The study emphasises social interactions “as key regulators of

²³ NOAA, 2021; Davis et al., 1996, p. 42

²⁴ Davis et al., 1996

²⁵ Channel Islands National Park, 2017

²⁶ NOAA, 2021; Vileisis, 2020, p. 162; Davis et al., 1996, p. 46

²⁷ Cacioppo & Patrick, 2009

energy balance, which ultimately affects aging and health in a highly social organism.”²⁸ Another study shows that social separation also makes cows struggle. When isolating a group of heifers from the crowd, all the animals showed increased heart rate and expressed themselves with loud grunting noises. So, this experiment also concludes that “social isolation is a severe psychological stress in cattle.”²⁹ Learning this, I cannot help but imagine that the utterly lonely white abalone must have experienced some kind of distress. Abalone reproduce by broadcast spawning—releasing their eggs and sperm into the water.³⁰ With no other abalones in sight, clearly, the single marine snail³¹ would never have the chance to produce offspring and become part of a viable community. Reminded of the cry of the creation myth *The Parent of All Abalones*, that if the first abalone ever died it would mean the end of the world,³² and considering the *sixth extinction*,³³ this tale certainly has a prophetic undertone.

Cryptic Habitats

Rocky habitats support productive marine communities of plants and animals that prefer settling on irregular hard surfaces. To them, all angles and variations grant multi-use spaces. Cracks and crevices give safe areas. Porous rocks and pools retain water and trap air, providing living spaces to breathe or to stay wet.

Corals, oysters, barnacles, and tube worms are one group amongst the marine plants, animals and microorganism acting as bioprotectors. These reef building species perform habitat-forming actions that either create new habitats or modify or change the geomorphological and ecological features of the intertidal. As marine eco-engineers they contribute to maintaining or changing the surface properties in ways that benefit later colonists of native species, and as such, forming a secondary layer enhancing the living conditions for others.³⁴

Before settling and metamorphosing into adult forms many hard bottom dwellers start out as free swimmers. In their early life stage, the larvae can recognize different textures by sensory organs mediating sensations of touch. They even orient themselves after chemical signals from the substrate and the surrounding community. Thus, minerals released from rocks, together with the species interaction, play a vital role for marine communities during several life stages.³⁵

The intertidal and shallow subtidal rocky shore is the preferred habitat of abalone, like perlemoen (*Haliotis midae*) of the South African Eastern Cape. In addition to depth and temperature regimes, their general habitat requirements include a good supply of food, good water circulation to remove wastes and sediments, and the correct substrate for attachment and protection from predators. Perlemoen is commonly found from the intertidal down to about 10 m depth. Snails smaller than 4 cm of shell length are *cryptic*, finding shelter beneath boulders. Medium sized and large animals seek crevices or live beneath boulder spaces and on exposed surfaces. To protect from predators capable of accessing sub-boulder spaces, young on-year-old perlemoen are observed hiding within the spaces beneath the spine canopies of adult urchins. Hence, identifying and understanding the species’ life history and habitat requirements are fundamental to the management of natural abalone stocks.³⁶

28 Koto et al., 2015

29 Boissy & Le Neindre, 1997, p. 693

30 NOAA, 2021

31 Channel Islands National Park, 2017

32 Silva in Field et al., 2008, p. 66

33 Kolbert, 2014

34 Noffke, 2012; Fitzer, 2019

35 Bavestrello et al., 2000; Cattaneo-Vietti et al., 2005, p. 75

36 Wood, 1993, pp. 10, 18, 32, with reference to Tegner & Butler 1989

Envisioning Mesolithic Microhabitats

Loss of habitat and blue forest, overfishing, and global warming pose a great threat to marine biodiversity. Globally, coastlines are becoming extensively modified as human-made infrastructure has hardened and transformed a good portion of the intertidal. One effect is that intertidal species become displaced and homeless. The overriding problem lies in the fact that humanity's current path is unsustainable. To coexist and thrive, humans and nature alike need a new deal. For the recalibration of humanity's relationship with nature, UN Environment puts forth *five transformations* of which one is the *promotion of a better built environment*. This is a call for innovative ecological solutions to replace human-engineered infrastructure for the benefit of nature and humans—together with the implementation of a nature-conscious consumption.³⁷

Regarding art and ecological restoration, these fields have something in common: both works experimentally with materials and involve processes that by nature are unpredictable. Yet, neither field can solve the current crisis alone. Therefore, to join forces across knowledge is urgent: thinking, creating, and acting together. If my previous research engaged in bridging art, ecology, and urban development through novel forms of co-learning and acting to envision new urban futures, the next step is a deeper examination of the power of art in transformative processes—that is the power of art as a driver of change.

The first time I saw the Mesolithic inscriptions discovered in the Fontainebleau Forest, they made such a strong impression it made my hair stand on end. I would guess that anyone who sees them would start wondering about their hidden meaning. A fascinating analogy is that these traces of a symbolic thinking from 10,000 years back in time resemble the signal paths of circuit boards as the engravings in stone store information to transmit meaning between people across time in a similar manner. Also, they look like abstract forms of the cracks and crevices within rocky shore habitats. Yet another analogy, the SE micrographs of abalone shell surfaces' undulating landscapes—capable of producing the mother of pearl vibrant color play—remind of rocky shore habitats. In this imaginative leap, the link between the Mesolithic inscriptions and undersea habitats gives rise to a dialogue across species and time.

In search of a marine landscape architecture, I am always attentive to patterns. Thus, the Mesolithic carvings immediately struck me as possible models for the development of housing opportunities for homeless intertidal species. Minding that the marine organisms “communicate” with their neighbours as well as the geological diversity of the rocky shore: textures, rock composition, and mineralogy are key topics in facilitating for the benthos—not least for the creation of new marine housing opportunities in the severely modified urban intertidal. What if these ancient communication patterns could be re-inscribed onto urban structures and surfaces to provide shelter and spawning ground for threatened marine life? In this way, the Stone Agers' actions could be transferred to the present, and finding their way into contemporary urban development.

By means of digital fabrication, the patterns from the archaeological photogrammetry models of Boris Valentin's research on petroglyphs in the Fontainebleau forest,³⁸ are transferred to sculptural restoration artifacts. As such, the relationship between nature and technology, people and other species' need for communication through time, are interlaced. As an experimental action, this cross-disciplinary conservation approach linking art and landscape architecture offers an opportunity to reconnect with nature. To change human behaviour, we need to do more than educate with science and facts; we must also find ways to connect people with nature. Art is an essential part of that process.

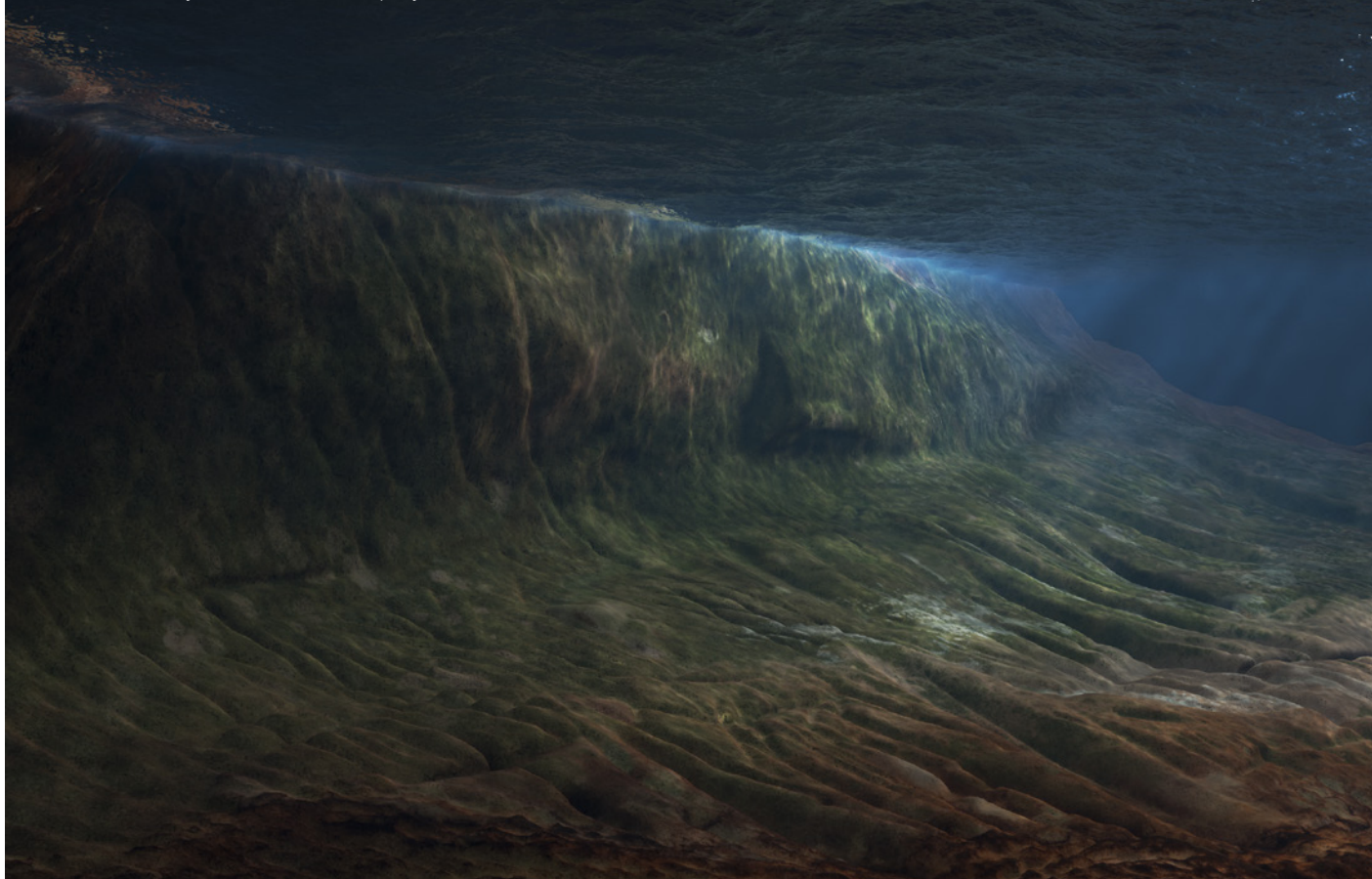
³⁷ UN Environment, 2020

³⁸ Valentin, 2016



Blue mussels living on a skerry at Kvaløya in Tromsø.
Photo by Elin T. Sørensen © BONO 2019

Mesolithic inscriptions transformed into settlement surfaces and kit-homes for vulnerable intertidal species.
Still image from 3D animation by Ivar Kjellmo based on Boris Valentin's archaeological
models made by Summum 3D. Concept by Elin T. Sørensen © BONO 2021



Abalone Woman

*

Ages ago when animals, birds and fishes had the forms of men and women, Ka-Luck, wild goose of the North, married Yer-ner, the abalone of southern rocky shores, and took her to his northern home.

They were very happy, gentle Yer-ner thinking only of the comfort of Ka-Luck and their many children.

Ka-Luck became troubled as he thought that during their many years together he had never seen Yer-ner partake of even a single morsel of food, though acorns, dried salmon, seaweed and all other kinds of Indian foods did thrifty Yer-ner prepare.

He watched until one day he saw Yer-ner broil a piece of kelp on the coals. This she ate with much relish. That Yer-ner would scorn good food that he provided for common kelp so angered him that he leaped from his hiding place and severely beat her. Heard her crying but he did not go to her although in his heart was only sorrow for what he had done.

In the morning she was gone, with only her footprints fading away toward the South. Though he followed rapidly he could not overtake her until Patrick's Point. As he came near, he saw that she was weeping and that the tears were filling to overflowing her little cup which she carried in her hands.

* *

Abalone looked sadly at Crane and said, "This shows how different we are. It is best that I go back to my people. What you call the best is not what I need [...] I cannot go back. I will do something for you though. I will send the children to you part of the year, and during fall you can send them back to me. That is why geese, their children, fly south during the fall and north in the spring.

We have only a few places this far north where you can find Abalone: those places where she stopped to cry. Her tears turned into the abalone found there.

* * *

She ran away, this time he came after her. He caught up with her at what was called Patrick's Point today.

She was crying as she walked along the shore, and her teardrops became the abalones. As she walked she prayed to the creator (above old man), that if she were to die, allow her death to be for the good of her people. Soon her husband was upon her. He slashed her back and then cut her up in pieces and threw her into the ocean. Today when you see an abalone shell the back is red depicting the slash marks on her back.

* * * *

She fled [...] and she travelled along the ocean. She could see her feet in the ocean, in the sand, and she knew he would follow her. So she started walking on the rocks, and she crawled on the rocks [...] And her feet, she would cut her feet on the rocks, and her feet would bleed, and she would cry. Her tears would form these abalone shells on the rocks, and the blood would fall over that, and that's the red that you see on the back of an abalone. That's her blood, and those were her tears.

* * * * *

Despair appears on her face. The beads of sweat at the hairline forming a transient tiara. She scratches her nails into her cheeks. Red stripes across the eyes, nose, mouth: swirling and pinkish, like an unfolding foetus. As rays of light strike her tears, the interference surrounding this being forms an eternally present rainbow.

Acknowledgment

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I wish to thank Ann Vileisis for her amazingly well written book about the history and faith of the Californian abalones. Amongst some threads to investigate further from this book are Chumash oral tradition that the soul after death is blinded and that the dead are given abalone shell eyes to see anew, and traditional Chinese medicine where powder ground from abalone shell has been considered as a remedy to improve vision.

This text reflects themes and phenomena forming the basis for *Oceans' Ears*, which is the author's contribution to the artistic research project *Matter, Gesture and Soul* (2019-2023)

*Excerpt from a collection of ancient legends collected among unnamed Yurok by the Yurok sisters Fay G. Aldrich and Ida Mc Bride (1939), found in Rosemary Bell *Yurok Tales* (1992) included in Field et al., 2008, pp. 165–166

**Told by Vivien Hailstone in Field et al., pp. 114–115

***From a prose-poem by Cheryl Seidner, former Tribal Chair of the Wiyot, in Field et al., pp. 54–58

****Told by Callie Lara from Hupa and Yurok family, in Field et al., p. 113

*****The authors' interpretation of *Abalone Woman*

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Abalone Woman: sunlight falling on teardrop-shaped crystal prisms that is broken into the rainbow of colours
Concept by Elin T. Sørensen © BONO 2021.
Photos by Geir Harald Samuelsen

“The transformation into a lion is considered as the template for all other transformations, of myth and lore, ritual and the hunt ... it is beset with danger and dread.”¹ The Ju’hoansi informant, Tshao Matze related:
“When I turn into a lion, I can feel my lion hair growing and my lion-teeth forming. I am inside that lion, no longer a person.”²

LAYERS IN CLAY AND ROCK

Petro Keene

The oldest statuette in the world, *Lowenmensch* (part-human, part-lion) from Hohlenstein-Stadel in the Lone Valley, Germany, was sculpted almost 40,000 years ago.³ The sculptor of this piece chose mammoth ivory tusk and stone tool(s) intent on creating a powerful “lion-man” object with an erect standing posture. The eyes are particularly impressive and hold an austere, contemplative gaze at the viewer. Captured in solid form, this intriguing figurative artwork remains timeless and hints of humans’ deep spiritual connection with an animal during the distant past. What was the motivation for this intriguing and beguiling piece?

I am captivated by the enigmatic powerful portrayals of the elements of ritual depicted by therianthropes (part-human, part-animal figures) in southern African rock art, some with elaborate painted detail and depictions of copious nasal emanations (Fig. 4). Contemplating therianthropes, I ponder the artistic processes of the ancestral San hunter-gatherer artists. Ochre pigments may have been sought in various and remote areas traversed by undertaking arduous and long journeys across valleys, rivers and majestic mountains. The preparation of pigment paints and its components (blood, water, plant sap, and animal fats), meticulously prepared, and, I imagine, forming part of a ritualised process.⁴

Rock art depictions are subject to human intervention and the elements of nature and regrettably fade over time. White pigments are particularly vulnerable. The creation of my sculptural piece named *Eldritch* is inspired by the translucent-white painting of a part-human, part-antelope figure at the site, Storm Shelter in the Maloti-Drakensberg, Eastern Cape. I created the sculpture to honour its presence of place in the landscape, and in solid form I aim to render a sense of timelessness. The Woodlot piece creation suggests a San trance metaphor, emulating a medicine-healer during a curing dance.

Manipulations of stoneware clay, placing layer upon layer to create form and symmetry, is a dynamic, slow and immersive process. The clay is soft and malleable, and from the activity of kneading and wedging I progress with a sculptural form. My creative process is entirely different to that of the *Lowenmensch* (lion-man). I have a choice of specialised tools to help delineate a particular form or shape as I add, carve, and smooth layers of supple clay. I deem the visual and tactile experience as similar in context to tracing a selected rock art image during fieldwork. Delicate and fine details of the contour, shape, angle and form, as well pigment colour, has the ability to hold my intense and keen interest as I sculpt.

1 Guenther, 2020, p. 165

2 Katz et al., 1997, p. 24

3 Conard, 2003

4 Jolly, 1986; Lewis-Williams, 1986



Figure 1. Clay stoneware ceramic of an anthropomorphised bull.
Photo by Mark Callanan

My tactile experience involving fingers, hands, clay and tools is accompanied by evocative background music. Time passes in phases and layers of clay to impart a three-dimensional piece over a period of weeks and months, to finally rest in preparation for the firing and glazing process. I use a Dremel tool to create grooves in the fired ceramic piece, and I apply ground ochre pigment powder ground from a red haematite stone to denote the red markings on the torso and face. The final stage of glazing has culminated in a lustrous ambiguous piece (Fig.1) that I intend to be perceived as its beguiling and mysterious energy “essence.”

Anthropomorphism and Figurative Expressions

The origin of figurative art has been considered by archaeologists as a critical event in human evolution.⁵ The archaeological finds of three figurines carved from mammoth ivory at Hohle Fels Cave in the Swabian Jura of southern Germany dating to older than 30,000 years ago represent some of the oldest figurative art traditions worldwide.⁶ The remarkable, well-known find of *Lowenmensch* (lion-man) from Hohlenstein-Stadel in the Lone Valley is an impressive therianthrope with an upright posture of 30 cm in height and appears to have no utilitarian value. It resembles one of the figurative finds from the Hohle Fels Cave and would suggest that inhabitants of these two caves belonged to the same cultural group with shared belief systems and practices that were linked to therianthropes of humans and felines.⁷

Anthropomorphism is also conveyed in a painting of a part-human, part-bison figure (Fig. 2) at the Grotte Chauvet in the Ardèche region of southern France, where rock paintings have been published dating as far back as 36,000 years ago.⁸ These spectacular discoveries demonstrate man’s close connection to animals during the Upper Palaeolithic in Europe, integral to their survival and adaptive processes.

Visual expressions 30,000 years ago

Excavations at the Apollo 11 Cave, Namibia, led to the discovery of seven stone plaques from 30,000 years ago, four of which bear figurative forms and one with zebra striped markings (Fig. 3b). These images signify that visual expressions of the ancient past spanned over tens of thousands of years. The depiction on one of the Apollo 11 stone plaques (Fig. 3a) has the body of an animal and hind limbs that appear to be human, widely considered to be that of a therianthrope.⁹

Figure 2. Chauvet Cave.
Anthropomorphised Bison.
Photo by Jean-Michel Geneste
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Ministère de la culture

San Rock Art and Ethnography

In the 1870s, Wilhelm Heinrich Emmanuel Bleek, a German linguist, and his sister-in-law, Lucy Lloyd, devoted themselves to recording the folklore of the /Xam (San). More than 12,000 pages of texts were produced revealing the /Xam’s personal histories and their rich folklore.¹⁰

Lewis-Williams¹¹ and his followers have approached the study of paintings of therianthropes by focusing on the details of the imagery and together with ethnographic data followed a shamanistic hypothesis for interpretations. Extensive anthropological research amongst the Ju’hoan (!Kung) San, who live in Botswana and the Kalahari Desert, Namibia, about 1,200 km north of the area occupied by Bleek and Lloyd’s /Xam informants, was undertaken by the Marshalls in the 1950s. The /Xam spoke of various types of shamans who were “possessors” of animal potency, such as shamans of the game.¹²

⁵ Conard, 2003

⁶ Conard, 2003

⁷ Conard, 2003

⁸ Quiles et al., 2016

⁹ Rifkin et al., 2015

¹⁰ Lewis-Williams & Pearce, 2004a

¹¹ Lewis-Williams, 1982; Lewis-Williams, 1985

¹² Lewis-Williams & Pearce, 2004a, p. 103



Figure 3a. Original image

Figure 3b. Enhanced image. Apollo 11 Cave, Namibia. Painted stone plaques, 30,000 years ago, with a depiction of a therianthrope and an enhanced image indicating zebra stripes. Photos by Magnus M. Haaland

Figure 4. Therianthrope with hand to nose posture, representing bleeding from the nose. Photo by Pieter Jolly



“Trance-formation,” Myth, and Spirits of the Dead

It has been suggested that generally humans “are prone to a compulsive anthropomorphizing,” and with modern hunter-gatherers the social and natural worlds appear to have no boundaries¹³ In terms of “thought about the natural world, cognitive fluidity allowed this to be integrated with that about the human social world and artefacts. The former allowed the possibility of anthropomorphism – attributing animals with human-like beliefs and desires – and totemism in terms of attributing humans with animal ancestors.”¹⁴

The “essential characteristics of San social organization and their religious beliefs and mythology are fluidity, ambiguity, ambivalence and liminality.”¹⁵ Guenther¹⁶ asserts that changing from human to animal and back into human form are mystical-ontological states, and the moment of full animal transformation is tenuous and brief. The shaman can be this or that, and in-between transformations he always reverts back into himself again.¹⁷ The experience of trance and transformation are processes that “need to be kept apart, conceptually although they are both altered or alternate states and in this sense, transformations; however, the one is of a person’s consciousness, the other, his or her being.”¹⁸

Jolly¹⁹ proposes that the paintings of therianthropes (Fig. 4) in San art are an expression of religious symbolism connected to dream and trance, the spirits of the dead including the mythical realm, and furthermore supports the idea that the therianthropes are connected to the people of the Early Race. Some paintings with antelope-headed figures may pertain to shamans wearing antelope-headed masks.²⁰

“Eland Potency,” ochre, blood and fat

The “potency of an animal derives from peoples’ anthropomorphic inferences about that animal’s physical characteristics,”²¹ and notably the species of animal was an important factor. For the Kalahari San, the eland (*Taurotragus oryx*) held a dominant role in ritual contexts and in terms of “potency.” Important were the “fat, marrow, certain bones and muscles, horns, tails, blood and urine.”²²

The eland was the animal selected in both the /Xam and Ju/’hoansi communities for a boy’s first killing and upheld in specific rites such as girl’s first menstruation.²³ In the ancient menarcheal rite of the Eland Bull dance, widely known among Khoesan groups, a symbolic “transference” of sex roles incorporates female to eland bull (male) that represents a human-to-animal anthropomorphic metaphor.²⁴

An intriguing description of paintings performed in a ritualistic context was related by a descendant of a San painter, an elderly woman named Manqindi Dyantyi, from the southern Drakensberg’s Tsolo District.²⁵ Manquinidi, while standing in front of a panel of rock paintings, stated that some of the paintings were executed with paints prepared with the blood and fat of a slaughtered eland that had been killed close to the shelter where her father had lived.²⁶ She elaborated that people would dance in the painted shelter and with arms raised draw out eland potency from paintings that were made from eland blood.²⁷ Further details by Manqindi of the eland ritual revealed that

13 Kennedy, 1992 cited by Mithen, 2006, p. 552

14 Mithen 2006, p. 556

15 Guenther, 2020, p. 170

16 Guenther, 2020

17 Guenther, 2020

18 Guenther, 2020, p. 164

19 Jolly, 2002, p. 85

20 Jolly, 2002

21 Hollmann, 2003, p. 44

22 Bieseke, 1975, p. 166

23 Lewis-Williams & Bieseke, 1978; Lewis-Williams, 1981a, pp. 55–67

24 Power & Watts, 1997; Knight & Power, 1998, p. 130; also see Power, 2019

25 Jolly, 1986; Lewis-Williams, 1986

26 Jolly, 1986

27 Jolly, 1986; Lewis-Williams, 1986; Lewis-Williams & Pearce, 2004a

cuts would be performed on the eland's forehead, underneath its rib cage and on the neck. Jolly states: "The blood taken from these cuts was mixed with a variety of ingredients, including fat from the eland's stomach, to make a 'medicine.' The remains of the mixture were used, mixed with paint, to make lines and patterns on the rock face of the shelter next to the river." This is a fascinating and important account in terms of an insight into the ritualistic elements of the art and humans' reverence for the animal's "potency."²⁸

Animal Behaviour and Painted Detail

In terms of anthropomorphism, postures of animals may have been carefully construed by a San painter when painting an image of an animal and also symbolically motivated in terms of animal behaviour.²⁹ Mithen³⁰ contends: "Modern hunter-gatherers make extensive use of the latter (anthropomorphism), effectively attributing human-like minds to animals, and this can also provide effective predictors of behaviour."

The painting at the Game Pass Shelter (Fig. 5), Kamberg Nature Reserve, Drakensberg, was of vital significance to interpreting imagery in rock art. Lewis-Williams³¹ pointed out that the posture of the split-bodied therianthrope (human figure with antelope head and hooves), portrayed with its legs crossed, is symbolic of a dying transformed shaman and represents the trancing medicine healer taking on the dying eland's potency. Notably in this painting, the eland symbolically holds the same stance as the therianthrope. Followers of the shamanistic hypothesis regard the "dying" shaman and dying eland as metaphors for trance. Solomon³² argues that the split-bodied figures are spirits and not shamans, and suggests that the therianthrope holding the eland's tail is an other-worldly entity as it has a slender body and body painting and may portray a rain-spirit who helps the living.

Significantly Differentiated Figures (SDFs)

An area formerly known as Nomansland in the region of the southern Maloti-Drakensberg has unusual paintings of images termed Significantly Differentiated Figures (SDFs) (Fig. 6).³³ This region is characterised by fine-line shaded polychrome paintings found throughout the south-eastern mountains, typical of the classic San rock art tradition, and also includes monochrome and bichrome images executed in the fine-line category with a paint medium that consists of a pigment and binder.³⁴ Blundell³⁵ suggests the white pigment symbolically adds information about the meaning of this art representation. Images termed *Eldritch Images*³⁶ are compelling, painted in translucent white pigment, some grotesquely portrayed bearing claws. In this genre of paintings is a sequence of images from the Storm Shelter that appear to be human, and others therianthrope—one with an antelope head and a human body possibly representing San trance metaphor³⁷ (Fig. 6).

Blundell³⁸ proposes that SDFs at rock art sites follow a certain pattern with a number of categories of imagery. The category termed large-headed SDFs (LH-SDFs) (Fig. 7) appears as anthropomorphic oversized elaborate heads (Fig. 6). It has been suggested that these figures are an expression of socio-political roles.³⁹

²⁸ Jolly, 1986, p. 3

²⁹ Lewis-Williams, 1985; Hollmann, 2003

³⁰ Mithen, 2006, p. 551

³¹ Lewis-Williams, 1981; Dowson, 1988, Lewis-Williams & Dowson, 1999

³² Solomon, 2008, p. 70

³³ Blundell, 2004

³⁴ Blundell, 2004

³⁵ Blundell & Lewis-Williams, 2001

³⁶ Blundell, 2004, pp. 97-112

³⁷ Blundell, 2004

³⁸ Blundell, 2004

³⁹ Blundell, 2004

Ezeljagdspoor—“Rain’s Sorcerers”

Renee Rust has examined imagery at the rock art site Ezeljagdspoor (Fig. 8) and asserts these are water maidens. Together with her extensive ethnographic research she has found this art form represented at various sites in the Southern Cape region. Rust points out that “Rock art research of the region includes therianthropic paintings that may represent the sacred personification of water, a spiritual value present in the folklore of the Klein Karoo today, of hallowed water creatures with half-fish, half-human physiognomies.”⁴⁰

An opposing viewpoint by Jeremy Hollmann⁴¹ stems from his analysis of bird behaviour of swallows and swifts, with specific details of the painted imagery together with symbolic associations in /Xam ethnography. Hollmann⁴² suggests that the compositions of the paintings of swift-people were expressions of sorcery and that “swift-people” were symbolic of ritual practitioners.

Interesting is the fact that the images from Ezeljagdspoor were termed “people” by the /Xam informant /Han#kass’o, who remarked: “People they are, sorcerers; rain’s sorcerers. They make the rain to fall and the rain’s clouds come out on account of them.”⁴³

Woodlot (RARI-LES-MTM1)

San trance metaphor is implied by the numerous depictions of cattle therianthropes at the Woodlot (RARI-LES-MTM1) rock art site in south-eastern Lesotho. Sello Mokhanya⁴⁴ suggests that the various paintings at the site portray clusters of images that pertain to a number of ritual practices. It has been hypothesised that, for some San groups, cattle, like eland, were revered for their “spiritual potency.”⁴⁵

The depictions of part-human, part-cattle paintings that are symbolically portrayed in postures that emulate movement are numerous. Striking features of the therianthropes are the copious emanations of nasal bleeding and the prominent displays of red pigment markings painted on their torsos and heads (Figs. 9 and 10). The analogy represented in these paintings is interesting, with San healers who, while in trance states (during curing dances), are known to have experiences of nasal bleeding.

San and Rain “Possession”

Certain rock paintings reproduced and subverted social relations by depicting images that were associated with rain control rites that embodied and projected both ritual potency and social influence.⁴⁶ Rainmaking rituals may well have occurred in specific places, but the capture of the rain animal took place in the spirit world and required entry into an altered state.⁴⁷ A rain-controller may have drawn on the power of the painted images for rain control or revisited the site for rites and ceremonies out of view of other rain-makers.⁴⁸

From ethnohistorical accounts it is widely known that black animals (sheep, goats and oxen) were chosen for rainmaking rites.⁴⁹ Black clouds are known to be a metaphor for black cattle in /Xam folklore and symbolize heavy rain.⁵⁰ Pertinent to this are the cattle paintings at the Woodlot site painted predominantly with black torsos and limbs.

⁴⁰ Rust, 2011, p. 1

⁴¹ Hollmann, 2005

⁴² Hollmann, 2005, p. 26

⁴³ Hollmann, 2005, p. 24

⁴⁴ Mokhanya, 2008

⁴⁵ Campbell, 1987; Jolly, 2007; 2015, Hollmann, 2015

⁴⁶ Lewis-Williams & Pearce, 2004b

⁴⁷ Lewis-Williams & Pearce, 2004b

⁴⁸ Lewis-Williams & Pearce, 2004a

⁴⁹ Hollmann, 2015

⁵⁰ Callaway, 1884, cited by Hollmann, 2015



Figure 5, above. Game Pass Shelter, Drakensberg. Therianthrope touching an eland. Photo by the author



Figure 6, below. Storm Shelter, Maloti-Drakensberg, Eastern Cape Province. White translucent paintings termed *Eldritch figures*. Photo by Jeremy Hollmann

Figure 7. Maloti-Drakensberg, Eastern Cape. Anthropomorphic figure with nasal emanations.

Figure 8. Ezeljagdspoor, Southern Cape. Part-flesh, part human figures representing "rain's sorcerers." Photos by Pieter Jolly



A Mythological Water-Bull, *!Khwa*

The /Xam held medicine men of the rain in high esteem, and folklore accounts inform of *!khwa-ka gi:ten*, or “shamans of the rain.”⁵¹ The /Xam storyteller, Diä!kwain narrated to Lucy Lloyd in 1875 how /Xam rain-controllers would capture a rain animal.⁵² “The medicine men cut up the water-bull, they broil its flesh. They treat the rest of its flesh this way, they throw it away on the places where they want the rain to fall. The rain does as follows, where they kill the water-bull, there rain runs along the ground.”

!Khwa, the mythical rain-bull, is regarded as a significant figure of power in /Xam folklore with the intriguing narrative of “she-rain” and “he-rain,”⁵³ as related by Lucy Lloyd’s informants. Clouds were described as the rain’s hair, falling sheets of rain were the rain’s legs, while “she-rain” (a cow) flowed gently to make the earth soft and wet. The informant, /Han#kass’o, described the rain to Lucy Lloyd as “trotting,” as having a breath, a smell, a tail, ears. He resembled a bull, he “felt that (he) was the rain’s body.”⁵⁴ //Kabbo related: “Rain must fall on all places, for I will milk a she-rain, I will cut her, by cutting her I will let the rain’s blood flow out, so that it runs along the ground.”⁵⁵

Conclusion

Humans’ anthropomorphic connection to animals has a long and ancient history, as expressed in enigmatic complex motifs that formed part of human cultures dating back 40,000 years. Rock art researchers have held a keen interest in these compelling objects and images and engaged in often contentious debates in attempts to establish their meaning. Regrettably, the human condition and man’s close connection to animals have dwindled over time, with adaptations to new and threatened environments coupled with the overwhelming pace of the modern world’s technological innovations. We nevertheless remain in awe of these evocative paintings and figurative forms found throughout the world. They evoke a sense of humans’ once deep spiritual connection to animals and of a “Primal Time” when humans felt driven to embellish rock surfaces utilising hand-crafted brushes and compounds of ochre pigments. With present-day threats to our existence, we may be encouraged to glimpse into our ancestor’s former adaptive processes and into their unrelenting quest for survival, while navigating their natural environments in the distant past when humans and animals were closely entwined.

51 Lewis-Williams, 1981 pp. 103–116; Lewis-Williams & Pearce, 2004b

52 Bleek 1933, pp. 375–376; Hollmann, 2004 p. 169 (notebook ref. L.V.3: 4078–4085)

53 Hoff 1998, p. 109; see also Hollmann, 2004, pp. 155–157

54 Hollmann, 2004, p. 156 (notebook ref. L.11.24: 2223–2225)

55 Hollmann, 2004, p. 156 (notebook ref. L.11.24: 2223–2225)



Figure 9. Woodlot (RARI-LES-MTM1), Lesotho Part-human, part-bull therianthrope with elaborate painted detail and emanations from the nose. Photo by Pieter Jolly



Figure 10. Woodlot (RARI-LES-MTM1), Lesotho. Cattle therianthrope, bleeding from the nose. Photo by Jeremy Hollmann

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Notes

Woodlot rock art site: Refer the Rock Art Research Institute, University of the Witwatersrand, Johannesburg, South Africa designation: RARI-LES-MTM1.

San: A corruption of Khoe terms for people who did not own cattle. Here it refers to Southern Africa hunter-gatherers, known to be the descendants of the earliest *Homo sapiens* inhabitants of southern Africa.

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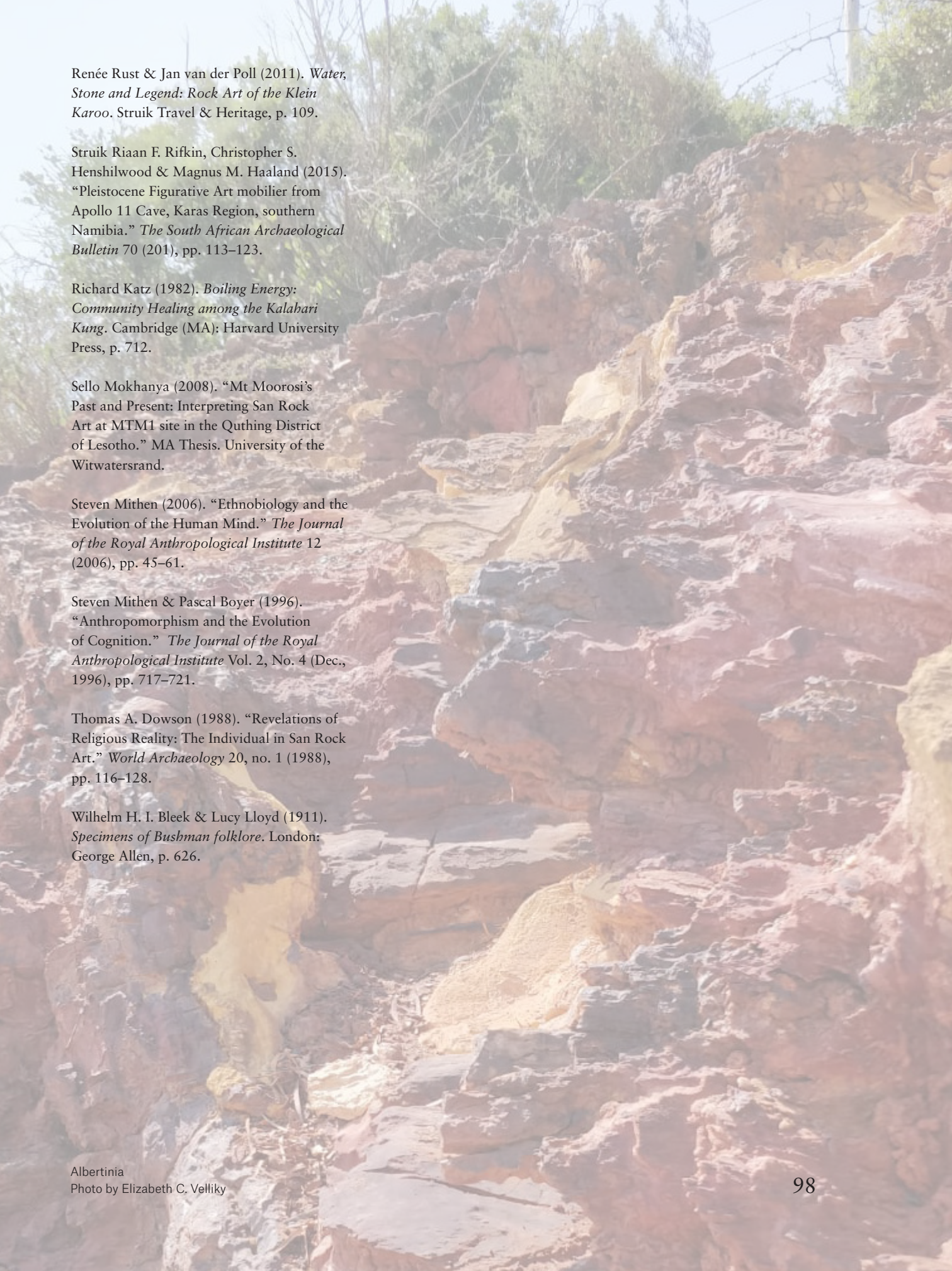
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Lion Man 2.0—The Experiment (2014) can be viewed at YouTube https://www.youtube.com/watch?v=hgbvT9_pjzo

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“My attention has, by sheer chance, been drawn recently to that peculiar substance—red ochre. The responses it evoked from humanity, have caused it to be of unusual, if not pre-eminent importance for localizing temporally and spatially the dawn of symbology.”¹

THE OCHRE WORKSHOP

Past and Present-Day Perspectives on Colour and Human Behaviour

Elizabeth C. Velliky & Francesco d’Errico

Introduction

One of the most significant questions in archaeology asks when hominins started to exhibit characteristics of “modern” behaviour, such as complex syntactical language, abstract thinking, planning depth, behavioural, technological, economical innovativeness, and symbolism. The pursuit of this question has led the inquiry into the ways that hominins interacted with the environment and materials around them. One such material is a mineral pigment called ochre. Ochre is often found in the form of red rocks or clays and can create a variety of colourful streaks. It can easily be transformed into powder that can then be used to colour various things, including rocks, bones, and skin. Ochre is often proposed to be one of the oldest pieces of evidence that can be used to study how and when our ancient ancestors become “behaviourally modern”—or when they started to think, speak, and organize themselves much in the same way as we do today.²

However, despite the evolutionary significance of ochre and pigments, considerably less emphasis has been placed on understanding ochre in the full context of idiosyncratic prehistoric lifeways, the impact of landscape and climate on ochre use and collection, and the cultural, social, and individual drivers behind the varied and diverse uses of ochre in the past. Because the ways in which hominins used ochre were likely complex and imbued with different layers and levels of meaning and significance, the ways and methods we use today to study these behaviours must also be equally cross-disciplinary and multidimensional. It is thus of increasing importance that different research disciplines cross thematic borders and collaborate on researching, understanding, and celebrating aspects of the human experience both now and in the past.

It is with this goal in mind that *The Ochre Workshop: Past and Present-day Perspectives on Colour and Human Behaviour* was formed. As part of the artistic research project *Matter, Gesture and Soul*, the goal of this workshop is to re-create a past ochre experience that was documented from the Blombos Cave site in South Africa some 100,000 years ago.³

1 Dart, 1968, p. 20

2 Barham, 1998; Barham, 2002; Brooks et al., 2016; Brooks et al., 2018; McBrearty & Brooks, 2000; Watts, 1999; Watts et al., 2016

3 Henshilwood et al., 2011

This recreation is both physical and experiential, with the goal to document, observe, and learn from a variety of perspectives: contemporary art, archaeology, cognition, aesthetics, museology, and public engagement/citizen science. Through this collective experiment, we hope to shed light on new aspects of this ancient ochre practice and perhaps build a greater understanding of how ochre and pigments shaped human lives and experiences in the past.

Ochre and Humans from the Past to Today

The term ochre is used to describe a series of ferruginous (iron-rich) rocks that can be used to produce a variety of shades of coloured powder. However, the word ochre can be quite ambiguous in different academic settings. When used in archaeological, academic, or colloquial contexts, ochre generally refers to any sediment, rock, or clay that can be used to create colourful streaks. Because of the different amounts of iron content in the material, the colours expressed vary from yellow to red to purple to brown (Fig. 1). Geologically, ochre is primarily a clay or weathered by-product from primary sedimentary, metamorphic, and igneous contexts.⁴ Artistically, ochre is used to describe a colour, generally a dark yellow or light red. A consensus in all fields is that the colouring properties of ochre stem from the minerals contained within it—primarily either iron oxides and oxyhydroxides.⁵ There are currently sixteen known types of iron oxides and oxyhydroxides, the most widespread and well-known being hematite ($\alpha\text{-Fe}_2\text{O}_3$) and goethite ($\alpha\text{-FeOOH}$),⁶ with color variations shown in Fig. 2.

Ochre is a mineral pigment with many faces, forms, and colours, that was collected from as far back as 500,000 years ago by archaic humans in Africa⁷ and 300,000 years ago in Europe.⁸ Since then, its use has spread around the world and has been found on every continent that humans have inhabited. Though it was likely used primarily as a paint or pigment, it may have served a variety of both practical and symbolic uses.⁹ It appears as a residue on stone tools¹⁰, human and animal bones,¹¹ shells,¹² personal ornaments or beads,¹³ as a component in ceramic vessels,¹⁴ and rock walls.¹⁵ It was likely used as a body paint by ancient societies,¹⁶ and is still used today by indigenous communities,¹⁷ artists,¹⁸ industry,¹⁹ and for medicinal purposes.²⁰ It was collected in specific areas and transported over great distances,²¹ and its use and recognition as an important and valuable item has persisted throughout time and space.

Ochre as a pigment appears in ancient, historical, and contemporary settings around the world, and has been used with relative consistency by humans throughout this deep span of time. Though the use of ochre is often discussed solely in relation to its role in the past, this is misleading as its use never ceased and is found in a wider range of practices today than in the past. Ochre is still in use today in a number of different

4 Singh et al., 1978

5 Cornell & Schwertmann, 2003

6 Cornell & Schwertmann, 2003

7 Watts et al., 2016

8 de Lumley, 1966; de Lumley et al., 2016

9 McBrearty and Brooks, 2000; Watts, 1999; Henshilwood et al., 2009; Watts, 2009

10 Lombard, 2007; Lombard, 2006; Villa et al., 2015; Wojcieszak & Wadley, 2018

11 Darchuk et al., 2009; Román et al., 2015; Román et al., 2019

12 d'Errico et al., 2005; Peresani et al., 2013; Vanhaeren et al., 2019

13 Dayet et al., 2017; Velliky et al., 2021a; Bouzouggar et al., 2007

14 Capel et al., 2006; Eiselt et al., 2019

15 Aubert et al., 2014; Aubert et al., 2018; Chauvet et al., 1996; Cuenca-Solana et al., 2016;

d'Errico et al., 2016; Huntley, 2015; Bonneau et al., 2021

16 Fiore, 2018

17 Matthews & Khahtsahlano, 1955; Rudner, 1982; Taçon, 2004; Rifkin, 2015)

18 Gustafson, 2020

19 Prim, et al., 2011; Kokins & Kostjukovs, 2017

20 Velo, 1984, Macintyre & Dobson, 2017, Abrahams, 2010

21 Brooks, et al., 2016; Velliky et al., 2021b



Figure 1. Colour varieties of ochre collected from the southern Cape, South Africa, near Blombos Cave
Photo by Elizabeth C. Velliky

Hematite ($\alpha\text{-Fe}_2\text{O}_3$) red—black—purple



Goethite ($\alpha\text{-FeOOH}$) yellow—orange



Figure 2. Colour varieties of the most widespread and well known types of iron oxides and oxyhydroxides
Diagram by Velliky & Sørensen. Photos by Velliky

settings, for example: in indigenous and descendant communities,²² in contemporary art as a paint or pigment, as a pigment for industrial paints or mixtures,²³ as a component in steel and concrete production, and as a dye in cosmetics. Because of this wide span of different uses, contexts, geography, and time, the role of ochre in both past and present-day settings is studied by researchers within a variety of disciplines, including archaeology, anthropology, history, geology, chemistry, engineering, cognition, psychology, biology, and contemporary art, to name a few. No other artefact has been so widespread in time, geography, and application: ochre is unique. Thus, studying the impact it had on the lives of ancient humans is crucial for us to understand how they perceived and interacted with the world around them, and how these behaviours formed theirs and our cultures over time.

Ochre in Africa

The earliest ochre finding associated with humans comes in a glittery, almost black form of specular hematite, or specularite (Fe_2O_3). This was found from about 500,000 to 300,000 years ago at Wonderwerk Cave in the Northern Cape region of South Africa.²⁴ Following this early example, there is only sparse evidence of ochre collection during this period. It was during the African Middle Stone Age (or MSA), roughly 280,000–40,000 years ago, that humans started to regularly collect and interact with colourful ochre materials.²⁵ The first sites in the MSA with anthropogenically modified ochre artefacts include an archaeological site labeled *Gn/h-15* in the Kapthurin Formation, Kenya, from around 285,000 years ago²⁶ and the Twin Rivers in Zambia, from 250,000 years ago.²⁷ It is this early appearance of anthropogenically modified red ochre, followed by a sudden explosion of modified ochre appearing at archaeological sites, that account for why such attention is placed on the origins of behavioural modernity in Africa, and more specifically Southern Africa. Following the discoveries at these locations, ochre use becomes a common behaviour at the majority of Middle Stone Age (MSA) sites during the Late Pleistocene. Ochre pieces with evidence of grinding striations (Fig. 3), traces of ochre powder on stone tools, and possible ochre grindstones were found at the sites Blombos Cave,²⁸ Die Kelders Cave,²⁹ Diepkloof Cave,³⁰ Klasies River Mouth,³¹ and Klipdrift Cave,³² and at numerous other rock shelters and caves across southern Africa.³³ The caves are located geographically in Fig. 4. One common observation regarding the use of ochre in the MSA is that ochre powder extraction becomes a habitual practice from approximately 160,000 years ago and onwards.³⁴

22 Taçon, 2004; Rifkin, 2015; Velo, 1984; Abrahams, 2010; Russell, 1993

23 Prim, et al., 2011; Kokins & Kostjukovs, 2017

24 Watts et al., 2016

25 Wadley, 2005; Wolf, et al., 2018; Watts, 1998

26 McBrearty & Brooks, 2000

27 Marean et al. 2007; Watts, 2010

28 Henshilwood et al., 2011; Henshilwood et al., 2001

29 Thackeray, 2000

30 Dayet et al., 2013

31 d'Errico et al., 2012

32 Henshilwood et al., 2014

33 Watts, 1998

34 d'Errico, 2008; Wadley 2001; Watts, 1999, 2002



Figure 3. Examples of different ochre modifications created by humans. Clockwise from top left: grinding striations; active grinding; scoring incisions; grinding striations; scoring incisions; grinding striations. Photos by Elizabeth C. Velliky

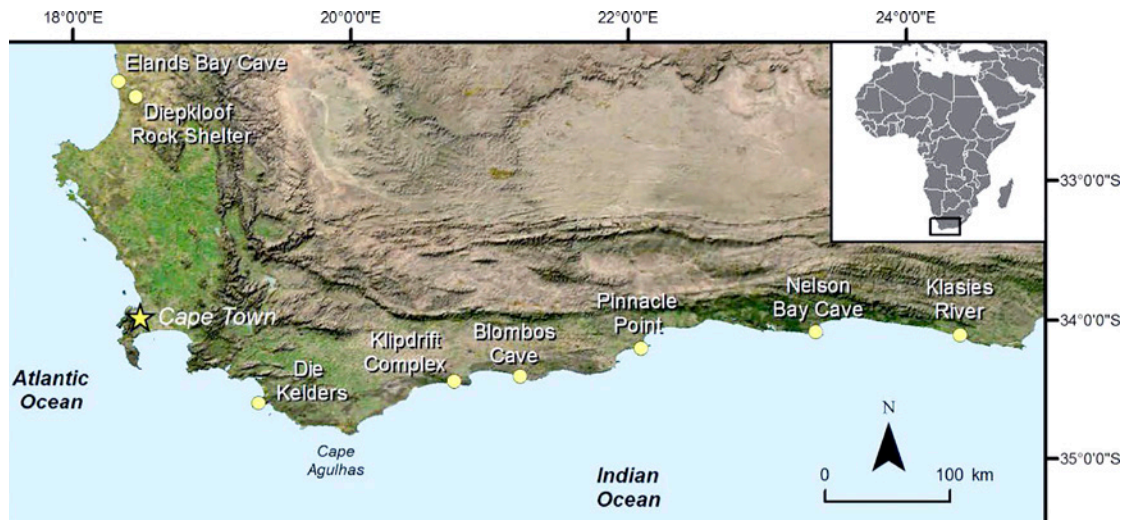


Figure 4. The location of the caves. Map by Magnus M. Haaland, 2018



Figure 5. View to the Indian Ocean from inside Blombos Cave.
Photo by Magnus M. Haaland

The Abalone Toolkit (Tk1)

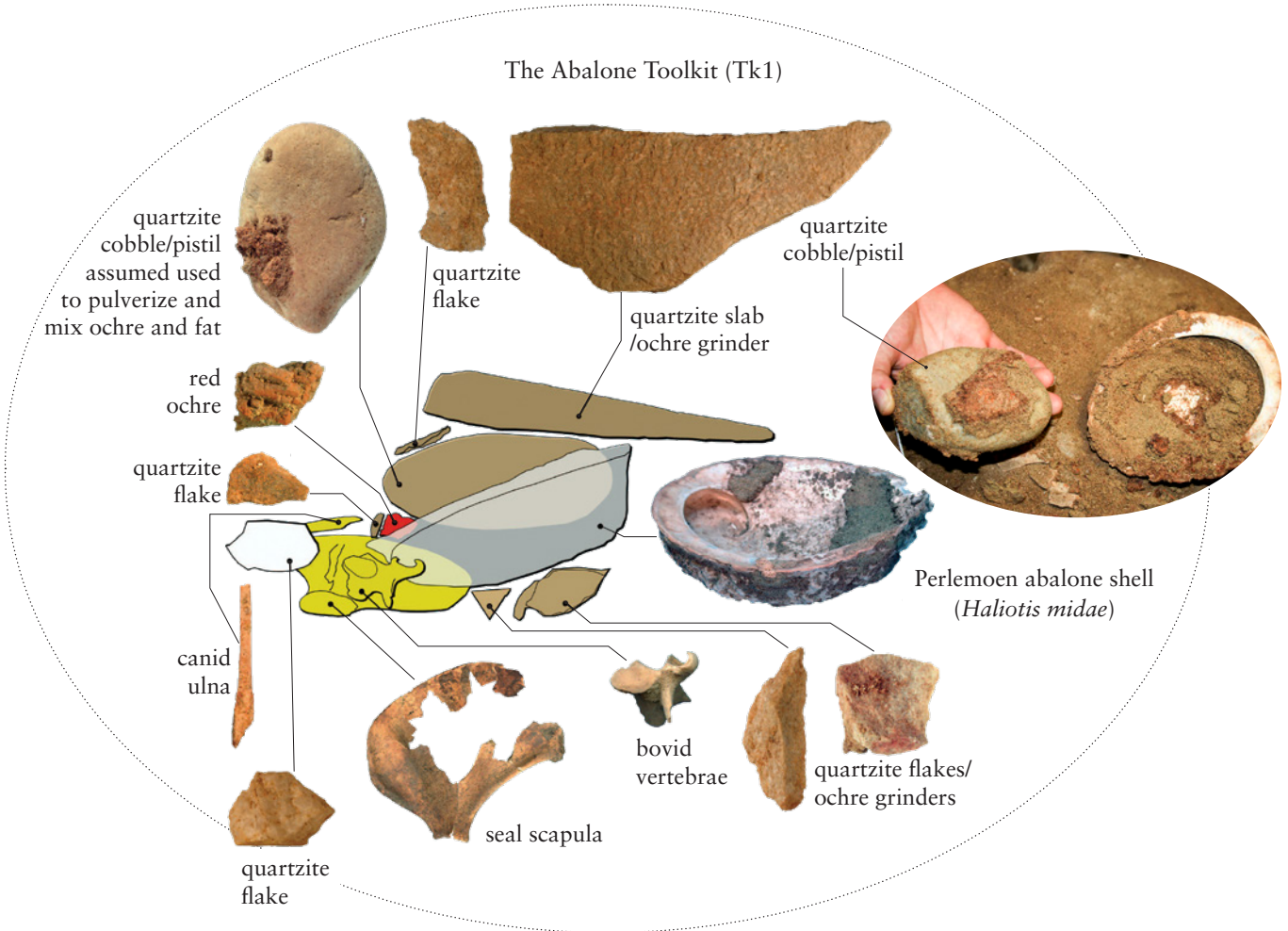


Figure 6. The artefacts associated with Toolkit-1 and their relative spatial locations. Diagram by Henshilwood & d'Errico (2011). Image of the excavated perlemoen shell courtesy of Grethe Moëll Pedersen & Christopher S. Henshilwood

Blombos Cave

The Blombos Cave is an archaeological site located on the southern Cape coastline, South Africa. The cave lies 300 km east of Cape Town and is situated in a steep wave-cut calcrete cliff, 100 m from the Indian Ocean. It contains MSA deposits from between c. 130,000 and 72,000 years ago and Later Stone Age (LSA) deposits from c. 2,000 years ago (Fig. 5). Excavations under the direction of Prof. Chris Henshilwood commenced at the site in 1992, and are still ongoing. Since the late 90s, the site has become known for discoveries that have significantly changed our vision of MSA cultures and their evolution. This includes engraving and drawing of abstract designs on ochre and stone and, to a lesser extent, bone, as well as the earliest known evidence of the manufacture of personal ornaments such as shell beads, and refined bone tools, and the heating of a lithic raw material called silcrete and its manufacture to produce bifacial stone points by pressure flaking.³⁵

At the Blombos Cave, over 8,000 individual pieces of ochre have been recovered from the MSA levels, with many showing traces and markings from human interaction.³⁶ Many of these ochres are shales, siltstones, and mudstones, which are abundant in the nearby geological formations of the Bokkeveld Group shales (Fig. 4). The inland deposits have undergone extensive chemical weathering, resulting in red and yellow ochre deposits which are still mined today for industrial pigments.³⁷

These findings from the Blombos Cave and subsequent reanalysis and excavation of other contemporary sites have resulted in a paradigm shift with regard to our understanding of the timing and location of the development of modern human behaviour. The faunal remains recovered at Blombos indicate that MSA people practiced a varied subsistence strategy. They were able to hunt large herbivores, such as eland, but also collected or trapped small animals such as tortoises, hyraxes, and dune mole rats. They were also eating seals, dolphins, and probably whale meat. Shellfish were collected and brought back to the cave, particularly during the oldest occupation of the cave, c. 100,000 years ago, when the sea was, as today, close to the cave.

The Blombos Ochre Toolkits

In 2011, Christopher S. Henshilwood and his team published a report highlighting the discovery of two large abalone shells (*Haliotis midae*) that contained residues of ochre in the form of powder and microscopic fragments (Fig. 7), along with several other artefacts, including intact ochre pieces, stone flakes, intact bones and crushed bone, charcoal, and a large quartzite cobble (Fig. 6). The two toolkits, Tk1 and Tk2 (Fig. 7), coeval and found close to each other, were interpreted as being used for the production and storage of an ochre-rich compound at the Blombos Cave. The context in which they were recovered was dated to around 100,000 years ago, using optically stimulated luminescence. The find predates other ochre toolkits by 40,000 years.³⁸ Chemical analysis of the ochre fragments present in the abalones, of the associated pieces of ochre, and the residues on the processing tools suggested the ochre was collected at different geological sources, and both red and yellow ochre were mixed in the compound. Traces of modification on the ochre pieces, the processing tools, and the morphology of the ochre fragments found in the shells indicated that ochre was either ground to produce a thin powder, or crushed, which produced a coarse, red matter. Lines of desiccation on the shell nacre demonstrate that the ochre was mixed with a liquid that dried out inside the shell.

Though the collective interpretation of the finds is that of an ochre processing toolkit, the exact application or use of the ochre compound is unknown. No resin or wax res-

35 d'Errico, et al., 2005; Henshilwood, 2007; Henshilwood et al., 2018; Henshilwood et al., 2001a

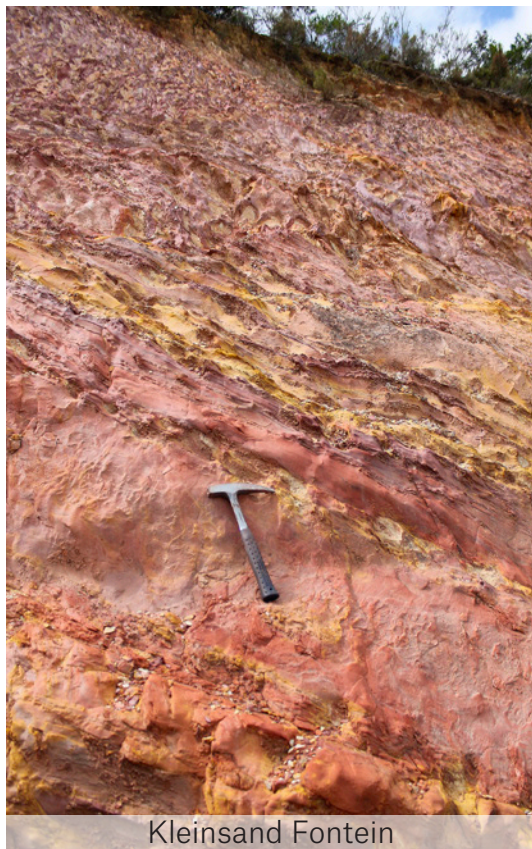
36 Henshilwood et al., 2009; Watts, 2009; Watts, 2002; Henshilwood et al., 2002; Henshilwood et al., 2001b

37 Rogers, 1988

38 Wadley, 2010; Van Peer et al., 2003; Rosso et al., 2016; Rosso et al., 2014; Wojcieszak & Wadley, 2019



Figure 7. The Ochre Toolkits from Blombos Cave, detail (A) Toolkit-1, and detail (B) Toolkit-2.
Image courtesy of Grethe Moëll Pedersen & Christopher S. Henshilwood



Kleinsand Fontein



Garcia Pass



Albertinia



Suurbraak

Figure 8. Examples of different ochres found in the Bokkeveld shales surrounding Blombos Cave. Photos by Elizabeth C. Velliky

idues were detected in the compound, which may have indicated its use as an adhesive. The evidence does suggest that some of the artefacts were reused, indicating that the production of the ochre mixture was not an isolated behaviour. Furthermore, the presence of ochre residues on the Canine Ulna bone suggests its possible use as a mixing tool and perhaps also as an applicator. However, these hypotheses have never been tested using experiments or recreated ochre toolkits.

Recreating the Toolkits

To explore the processes surrounding the creation of the toolkit and the possible uses of the ochre mixture contained within, we will recreate the toolkit setting in order to answer specific questions on the origins, creation, and use of the toolkit. These questions include:

- Was the ochre compound produced following the procedures proposed by Henshilwood and his team?³⁹
- Were the toolkits used once, or on multiple occasions?
- Was the ochre compound mixed by use of human fingers, as suggested by some striations on the nacre?
- Was the compound mixed by one person or several different people in alternation?
- Did sand enter the abalone shell when the mixture was wet or dry?
- Was the mixture suitable as a paint or for tanning hides?

Recreating the toolkit setting is an essential component of exploring the questions related to its use and creation. It is thus important to attempt to recreate the materials as closely as possible, including using actual abalone shells from South Africa, ochre collected from South Africa, and similar animal bones and stone tools that were found in association with the toolkit (Fig. 6). Our goal is to replicate the setting as closely as possible, which we hope will encourage both the active experimenters and museum visitors to consider this process in its entirety. By this, we emphasize that often the steps behind the creation of ochre mixtures can be imbued with as much significance as the uses of the final product. We hope that by visiting and experiencing the exhibition as a whole, visitors will be encouraged to reflect on these aspects and consider them when interacting with the ochre toolkits as part of the experiments.

Conclusion

Ochre has marked the lives of humans for at least 300,000 years. This interaction has accelerated and amplified over the last 100,000 years to take the form, in some cultures, of daily contact covering almost all human activities and often even marking the passage to the afterlife. From this long interaction with a material that has marked our cognitive evolution and our way of conceiving and culturalising the world around us, all that remains from the oldest time periods are small, red fragments bearing a few traces of modification or grinding stones with residues left by ochre grinding. The toolkits discovered at Blombos represent the only known example of a set of objects discovered together and intended for the production of colouring powder, the preparation of a pigmented mixture, and its conservation. It thus opens a window into a variety of behaviours of which archaeologists know only bits and pieces. These toolkits have been studied in depth, but still have secrets to reveal.

The creation of participatory workshops allowing the general public, and especially younger visitors, to familiarise themselves with the technologies of the past has become a common practice in the popularisation of archaeology. Flint knapping, fire

lighting, pottery making, ornamental objects, painting, engraving, and rock wall pitting as the “prehistoric people” used to do, now seem to be within everyone’s reach. The experience we propose is not of the same nature and does not have the same scope. It aims to establish an ideal dialogue between the visitor, who can play the role of an experimenter if he or she so wishes, the scientists, who carry out targeted research to answer complex and relevant archaeological questions, and the craftsmen who, 100,000 years ago, repeatedly used these objects and who speak to us through them and through the traces that have fossilised their gestures. We are convinced that each of these interlocutors has something to teach the other and that each has learned or will learn something from their interaction with the different materials and forms that compose the tool kits. Through previous experimentation and the study of archaeological material, the researchers have interpretative keys that the visitor lacks and that can be communicated to them. Even so, this discipline-specific knowledge is loaded with biases that will be challenged through the naive gaze of the visitors. Our hope is that the dialogue they will start will bring back to life the third interlocutor, the one who has been hiding behind these objects for 100,000 years.

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Living perlemoen (*Haliotis midae*)

I thought the
 the world was
 there for you

(The page contains dense, overlapping handwritten scribbles in black ink, obscuring most of the text.)

So well
two p

~~Wendell~~

"Gesture, Light, Memory" is composed of *Dream Drawing*
by Geir Harald Samuelsen 2021 and *Sleep Drawing*
by William Olsson/Elin T. Sørensen 2005

“Behold in the plains, and caves, and caverns of my memory, innumerable and innumerably full of innumerable kinds of things, either as images, as all bodies; or by actual presence, as the arts; or by certain notions and impressions, as the affections of the mind, which, even when the mind doth not feel, the memory retaineth, while yet whatsoever is in the memory is also in the mind—over all these do I run, I fly; I dive on this side and that, as far as I can, and there is no end.”

Augustine of Hippo 1553–1550 BP¹

WRITING HISTORY: AN IMAGINARY MNEMONIC GAME CHANGER

Maarten Vanden Eynde, 71 AP (After Present)

After Present or **AP** is the name of the era that comes after January 1, 1950, which marks the end of BP or Before Present, also known as “Before Physics.”

Alas, we forgot when we started to remember ...

The capacity to remember, to recall memories, was a clear competitive and, evolutionary speaking, preferable advantage since it augments the chances of survival significantly. Pivotal information, like what was edible and what not, when certain animals migrated and from where, geographic locations of drinking water, and knowing sun and moon cycles, was extremely valuable and needed to be remembered, communicated, and passed on to safeguard a community of early-human hunter gatherers. Exchanging knowledge in order to work together, plan ahead or express emotions depended strongly on a variety of sounds, which humans were able to produce by evolutionary altering their larynx. An expanding linguistic toolbox increased communication and demanded a “technological fix” to make up for limited internal storage capabilities.

This text is an attempt to understand the evolution of methods and tools that humans applied to augment their memory and knowledge in general by inventing language, mathematics, and graphic writing. Next to imagination and site-specific fieldwork, countless historic sources were used to trace back the oldest remnants of these inventions and connects them to potential future developments that suggest a re-internalization of

¹ Yates, 16 AP, p. 61

memory improvements after a centuries long attempt to externalize them. Rather than analyzing specific objects, places or time periods in depth, a wide variety of interlinked events, inventions, and locales are taken into account because history is not an amalgam of independent moments and momentums. It behaves rather as a rhizome or chain of interconnected activities that influence its course. Only by following the ripples that occur when a stone hits the water, going as wide as one possibly can in all directions, it is possible to come full circle, and understand evolutions in deep time. What follows is an invitation to virtually travel through time and space, and by absorbing a myriad of references along the way to create a speculative narrative that might help unearth the mysteries of human knowledge production and preservation through memory and repetition.

Externalizing Memory

The earliest known example of what one might call a “memory device,” i.e., something external to a human body that was used as aid to store information, is a small piece of ochre from around 75.000 BP or Before Present with a very distinct crosshatched drawing engraved on it that was found in the Blombos Cave in South Africa. It dates from before the so-called second migration wave “out of Africa” (between 70.000 and 50.000 BP), when anatomically modern humans, or *Homo sapiens*, colonized the whole world and replaced *Homo erectus* and *Homo neanderthalensis* who arrived in Eurasia much earlier in human history (between 230.000 and 270.000 BP).² The symbolic meaning or practical use of that particular memory device got lost along the way, but the recurring presence of similar graphic signs throughout the rest of the world invites us to assume that it was part of a graphic writing system the function of which was important and meaning of which was known to many, in different times. It is not certain whether it is a visual representation of verbal communication or a simple reminder of how to make a calendar, it does however most certainly represent a reliable form of information storage and transfer.

Before Present or BP is an alternative time scale, mainly used in archaeology and geology and increasingly in other sciences that wants to abandon the baseline denotation of a year 0 referencing a particular religious figure (AD = anno Domini, BC = Before Christ, or BCE = Before Common Era) as is used in Julian and Gregorian calendars. This new year 0 is 1950 in the BP time scale and is instigated by the artificial alteration of the proportion of carbon isotopes in the atmosphere by nuclear weapons testing, making carbon dating after that time increasingly challenging. The BP time scale will be used throughout the entire text.

Colonized is meant here as the action or process of settling amongst and establishing control over the indigenous people of an area.

The presence of considerable amounts of pebbles or shells sometimes decorated and/or perforated, in and near caves, including Blombos, that contained memory devices (both in the form of portable objects like rocks or bones and as graphic writing symbols drawn or scratched inside caves), opens the possibility to imagine that there is a correlation

2 Liu et al., 56 AP, pp. 130-137

between them. Counting, before the invention of numbers, was made possible by placing and moving pebbles or shells around and by following the resulting mathematical logic. This numerical language eventually led to writing. A grid or structure that accompanies the pebbles, either drawn on a rock surface or in sand, expands the possibilities to use and “read” the outcome. Looking at a graphic line drawing without the pebbles would be like looking at a Scrabble game board without the letters. It would not make much sense. Pythagorean philosophers for instance, also represented numbers graphically around 2490 BP by using dots, also known as psiphi (pebbles), to represent numbers in triangles, squares, rectangles, and pentagons. The famous Salamis Tablet, a precursor of countless Abacus variations that were used until way into the After Present (AP), dates from around 2250 BP and allowed for astronomical calculations, using just a few lines and a few pebbles.

The number of lines and cross points on the memory device that was found in Blombos can be turned into a solar and lunar calendar without too much effort, as the Swiss polymath Franz Gnaedinger proposed. Also, the *Lebombo bone* and the *Ishango bone* are credited as calculating or counting devices that in combination with pebbles and shells create tremendous mathematical and data storing possibilities. Similar bones and collections of pebbles that were also engraved, sometimes with graphic lines, sometimes with representations of animals, are found in Israel, Lebanon and throughout the Levant. If the bones are indeed tally-sticks, “then the use of signs to communicate factual information followed the use of symbols in ritual,” according to French-American archaeologist Denise Schmandt-Besserat,³ who contributed significantly to the understanding of tokens in the larger evolution of writing. The division of scripts, understood here as distinctive writing systems of interrelated symbols used to encode and transmit meaning, is not a strict one, as different scripts were and still are used simultaneously. “Systems of graphic inscription, such as ideograms or pictographs, coexist with written systems, are linked with spoken language and ideas, and function much as writing does: to record, archive and transmit knowledge and information.”⁴

Frans Gnaedinger was an author, linguist, and mathematician specialized in Egypt and the evolution of language and writing.

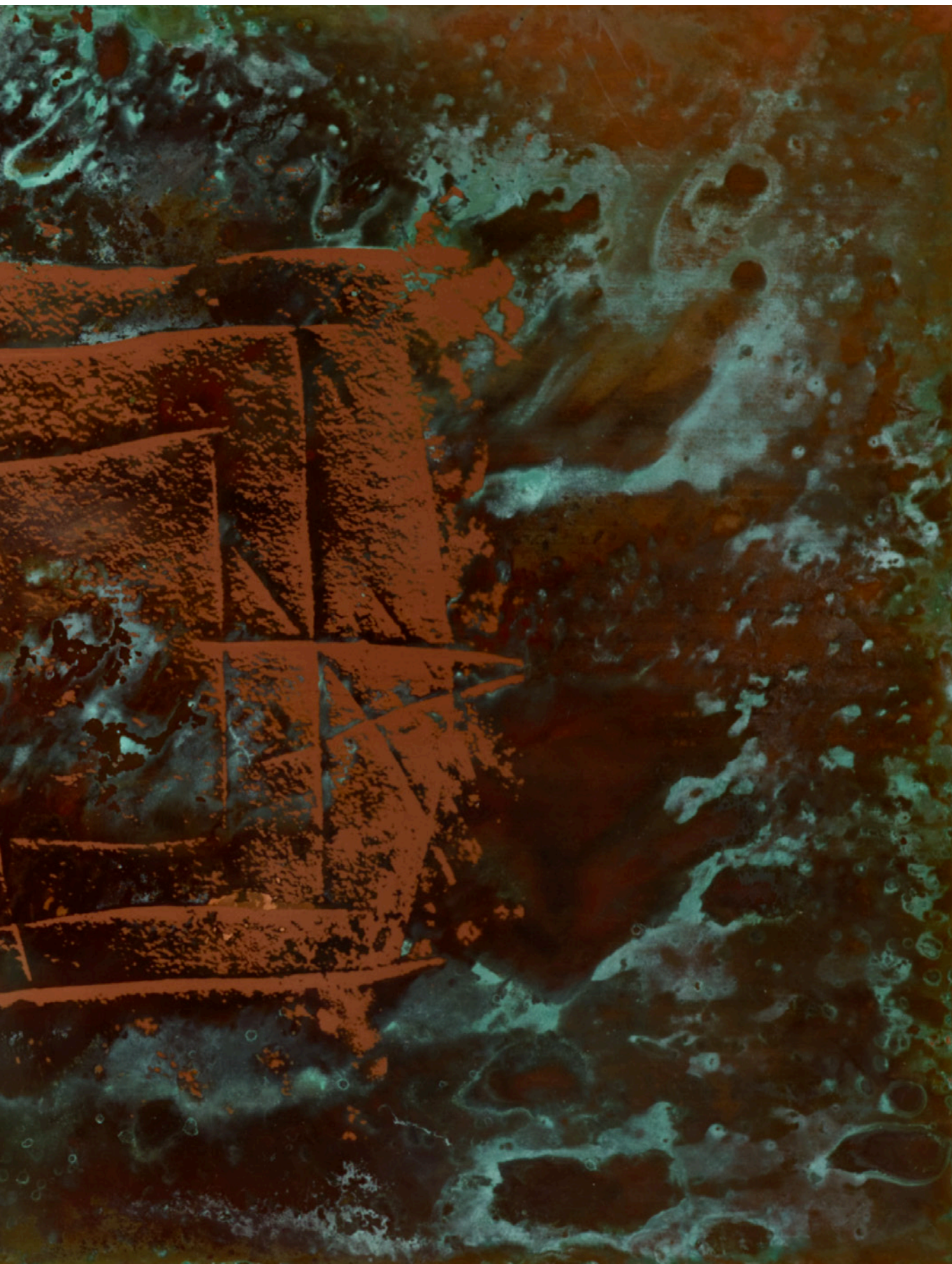
A baboon fibula from around 44,000 BP with 29 incised markings that was discovered in the Lebombo Mountains located between South Africa and Swaziland, that according to David Darling can be seen as Lunar calendar (Darling, 54 AP). A baboon fibula from around 20.000 BP with a set of mathematically sequenced incised markings that was discovered near the Semliki River in the Democratic Republic of the Congo. The amounts of incisions and the spaces in between have been interpreted both as a lunar calendar and proof of mathematical understanding of decimals and prime numbers. It includes a sharp piece of quartz affixed to one end which could be used for engravings.

Artwork on the next pages
Game Changer I
 Maarten Vanden Eynde 71 AP
 Photo by Marjolijn Dijkman

³ Schmandt-Besserat, 69 AP, p. 7

⁴ Nooter et al., 57 AP, p. 14





Still today, according to Afro-Cuban curator and art historian Barbaro Martinez-Ruiz, many of the same communication methods are in use among the descendants of the Kongo people near the old capital M'Banza Kongo (also known as São Salvador in Portuguese from 380 BP to 25 AP, currently located in the north-western Zaire Province of Angola), and similar positions in society as keepers of knowledge are found around the world. "In addition to religious figures, there are social and political counter-parts who are responsible for administering the use of graphic writing in a secular setting. One such position, which Fu-Kiau describes as a 'scribe,' someone whose role it is to archive information inside the traditional government (mbôngi). This person is called Na-Makolo or Makolo and is charged with keeping for the community records of government decisions, agreements (mandaka) with other traditional governments, such as economic contracts and political alliances, and other important events. The Makolo does this by braiding a cord and tying knots onto this rope (n'sing'a makolo) or simply by cutting marks (makènko) into a piece of wood made for the purpose. The Makolo also has the related obligation of decoding the message symbolized by each mark or knot on his ropes."⁵ The semantic roots of the verb to analyze, still includes a reference to the use of ropes: analysis = to untangle (from ana- "up, throughout" and lysis "a loosening.")

Both the cutting of marks in a piece of wood or bone and the tying and untying of knots on a rope, are fleeting snapshots of an exchange of information and due to their limited durability do not last long in the passing of time. Most material culture from both Neanderthals and humans, is organic and perishable and rarely makes it into the archaeological record. This predicament has been described by the British archaeologist Linda Hurcombe as "the missing majority."⁶ It can also be described as the dark matter of human material history, and the actions, emotions, or rituals that accompany their use, as dark energy. One can only surmise their existence by looking at the traces they leave behind in time and space.

Dark energy in analogy with the new model of the universe from 40 AP, where the amount of visible matter (the Earth, the Moon, the Sun and all the planets, stars, asteroids, comets, and gasses) is less than 5% of the universe, 68% is dark energy, and 27% is dark matter.

The use of strings for instance, to collect and safeguard perforated mollusk shells, is deduced after use-wear analysis of *Glycymeris* shells and allows us to "conclude that between 160.000 BP and 120.000 BP there was a shift from collecting complete valves to perforated ones, which reflects both the desire and the technological ability to suspend shell beads on strings to be displayed on the human body."⁷ The oldest actual fiber fragment that was part of a cord was found in Abri du Maras in France and dates from the Paleolithic Age, subsequently indicating Neanderthals' ability to manufacture cordage, and "it hints at a much larger fiber technology,"⁸ because, "the production of cordage necessitates an understanding of mathematical concepts and general numeracy. Cordage production entails context-sensitive operational memory to keep track of each operation. As the structure becomes more complex (multiple cords twisted to form a rope, ropes interlaced to form knots), it demonstrates an 'infinite use of finite means' and requires a cognitive complexity similar to that required by human language."⁹ American anthropologist Bruce L. Hardy, one of the leading researchers in the study, concludes in a newspaper article: "I can't have a sentence without words, and I can't have words without the individual sounds that carry meaning. So, I can't have a rope or a cord or a bag or

5 Fu-Kiau, 35 AP; Martinez-Ruiz, 62 AP, p. 119

6 Hurcombe, 64 AP, p. 1

7 Bar-Yosef Mayer et al., 70 AP, p. 1

8 Hardy et al., 70 AP, p. 5

9 Hardy et al., 70 AP, p. 7

a net without the other steps along the way. You can't start with the end product. It's a scaffolding process that scales up."¹⁰ Next to innumerable practical uses of cordage, this evolutionary process eventually also led to complex communication and memory systems like *Arokò*, used by the Yoruba people of the western part of Nigeria, and *Quipu*, which is used by the Inca people in the region of Andean South America.

Arokò is a messaging system combining different items like cowries and seeds on a string that each have their own meaning, depending on the combination and the order in which they are arranged.

Quipu are recording devices, both for mathematical calculations and for information storage, fashioned from strings that contain variable sequences of knots and obtain a different meaning by the changing use of colors, fiber, and twisting direction of the cord.

Song lines are part of the belief system of The First Nations people of Australia and help navigate both the physical land that was crossed by their ancestors and the complex historical events that are part of their culture. Traditional Aboriginal people regard all land as sacred, and the songs must be continually sung to keep the land, and thus the memory, "alive."

Remembering and Forgetting Rituals

The only way to avoid oblivion and disappearance into the dark matter side of history is endless repetition, recreation, and retelling, because forgetting is the destruction of memory, according to German philosopher and sociologist Theodor W. Adorno. But "since societies don't remember themselves, humans invented institutions for the transmission of knowledge. Ritual is one and it works by means of repetition. Ritual is itself remembered,"¹¹ proclaimed German anthropologist Stephan Feuchtwang. "Rituals are prescribed and are therefore a deliberately learned discipline. They can vary in intensity and degree, be more or less clearly called out as a memory, and the feelings and emotions can be induced by pain, by anticipation, relief, and release, or by pleasure. But whatever the variation, ritual performance is a corporeal experience, not just an image. Ritual creates a memory, and when it is repeated, it is reinforced."¹² That is why rhythmic music, games, chanting, and song lines are such good educational tools and excellent memory aids. They also reinforce and reaffirm physical and emotional memory, relating both to souvenirs from an exhilarating experience, and to lived or inherited trauma. Songs and visual images are stored in the frontal cortex and are as a result often the last stronghold of memory for people suffering from Alzheimer. Putting on music or specific sounds can trigger a temporary revival of Alzheimer patients who seem to be back "in the moment" and recollect the entire score or emotional sensation attached to it.

¹⁰ Roberts, 70 AP, quoting Hardy, 70 AP

¹¹ Feuchtwang, 60 AP, pp. 287–289

¹² Feuchtwang, 60 AP, pp. 283–284

In Fontainebleau more than 2000 different sites have been discovered so far, dating from the Mesolithic to the late Paleolithic era (between 10,000 and 20,000 BP) in an area of more than 1000 m².

The creation of song lines and the repetition of scratched geometric patterns on rocks and inside caves, of which Fontainebleau in France is one of the most spectacular examples because of their overabundance spread out over such a vast area, are two distinct ways to merge memory and landscape, or the lyrical and the literal.

“Histories are written into landscapes through ritual and myth,” says Feuchtwang, “but history as written from archaeological and documentary evidence functions in a quite different mode from mythical temporality, just as the landscape of events and histories of them are quite different in mode from a ritual landscape, which is cosmological or cosmogonic, that is, of a world and its origins and of humanity in it.”¹³ In order to understand the mythical and societal temporality of such ancient memory devices one should implement a “fundamentally pluridisciplinary global and comparative archaeology,” as Cameroonian archaeologist Augustin F. C. Holl would call for.

Sadly, at the beginning of the After Present, the cultural and social sciences were underdeveloped in Europe, according to the American anthropologist John M. Janzen, or, rather, they were developed in a direction opposite to that which would have allowed them to see the meaning of a cosmogeny as a set of cultural axioms.¹⁴ A centuries long effort to separate ancient animistic belief systems from western and euro-centric scientific belief systems caused a serious disconnect and rupture in the understanding of human history and evolution. Starting in ancient Greece, a purposeful extinction attempt of pagan knowledge and wisdom was set in motion. It also marked the end of the so-called *Ars Notoria*, the magical art of memory. Attributed to Apollonius or Solomon, but with clear connections all the way back to the beginning of graphic writing systems, *Ars Notoria* combined figures and diagrams with shorthand notae (the Latin word for marks) already in 2900 BP. A few hundred years later Marcus Tullius Tiro, known as the “father of stenography” introduced the Tironian notes (notae Tironianae) as an elaborate shorthand technology that contained more than 4000 characters. He was an enslaved servant and private secretary of Cicero, arguably the “father of the Roman Empire” and writer of more than three-quarters of all surviving Latin literature. By the time of the Carolingian dynasty, between 1200 and 1300 BP, the notae vocabulary reached an amount of 14,000 characters, but it quickly disappeared thereafter as it became associated with magic and witchcraft and was severely suppressed and condemned. It only resurfaced after 800 BP by the recurring efforts of Thomas Becket, archbishop of Canterbury, who rekindled interest, but it was never able to gain similar momentum as it had before. Thomas Becket was murdered in Canterbury Cathedral in 780 BP and today only a few notae survive, like *et* (∩ meaning “and”) in Ireland and Scotland.¹⁵

All this valuable knowledge of symbols, diagrams, and other memory techniques were collected, popularized, and distributed by the Italian philosopher, mathematician, cosmological theorist, and Hermetic occultist Giordano Bruno around 380 BP. He had to flee several times from the Roman Inquisition, first to Geneva and after that via France to England, during which he was protected by the royal family and King Henry III himself because of his extraordinary memory skills and knowledge. Eventually he was caught by the Inquisition, convicted for heresy, and burned on the stake upside down in 350 BP. And ever since that moment most of this historic knowledge related to memory and remembering was seen in Western Europe as occult, superstition, and part of black magic.

¹³ Feuchtwang, 60 AP, p. 289

¹⁴ Janzen, 19 AP, p. 5

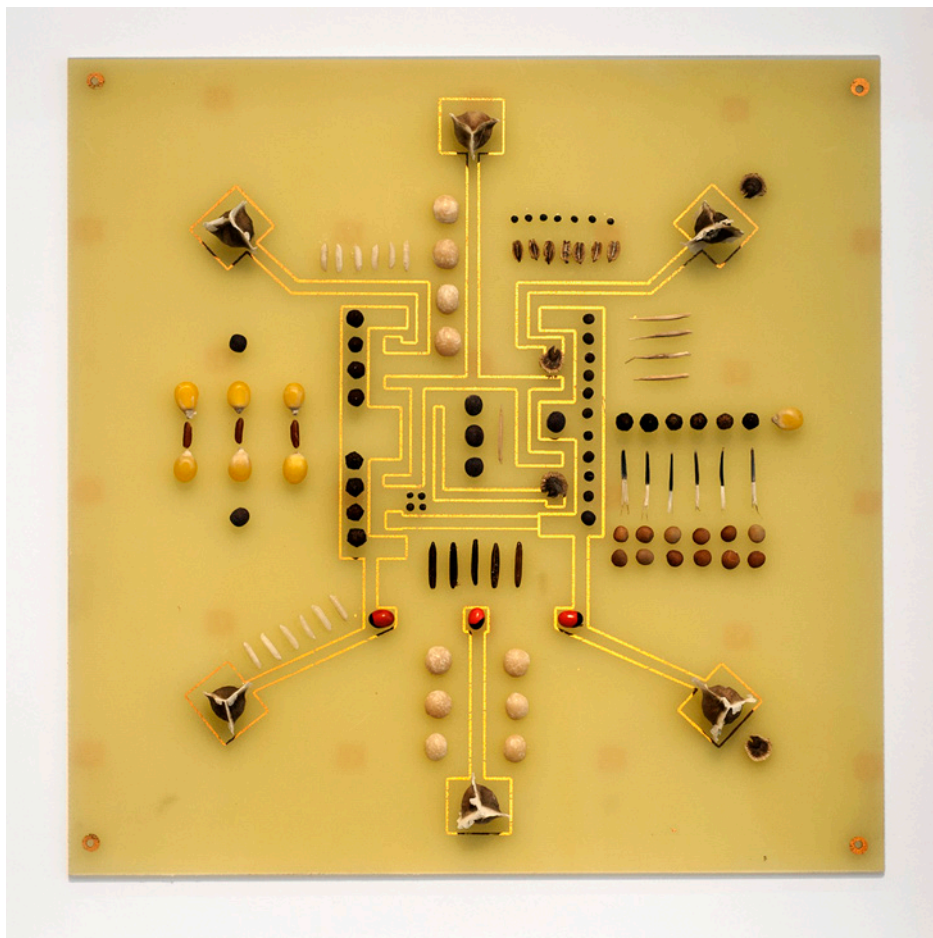
¹⁵ Yates, 16 AP, pp. 56–57

Coquibus, Milly-la-Forêt 71 AP



Abris de Prinvaux, Boigneville 71 AP
Photos by Maarten Vanden Eynde





A new wave of erasure and forceful forgetting took place around the world during the European colonization, starting at 458 BP, and together with the violent spreading of Catholicism came the destruction of vast amounts of valuable indigenous knowledge. Human history was rigorously rewritten, placing Western culture and science at the heart of human evolution. Fictional concepts like “prehistory” or “pre-literary history” were introduced during the European Age of Enlightenment (the first use of the word prehistory in English occurred in the *Foreign Quarterly Review* in 114 BP!).¹⁶ It was initially introduced by antiquarians who used the word “primitive” to describe societies that existed before “written records.” The subsequent invention of the geologic time scale for pre-human time periods and the three-age system for human “prehistory” (Stone Age, Bronze Age, Iron Age), kickstarted the further semiotic and linguistic specialization and separation of interconnected technological inventions and anthropological evolutions, resulting in a fragmented and biased understanding of human cultural heritage.

In 36 AP, the Canadian geneticist, science broadcaster, and environmental activist David Suzuki linked the success of science “limiting its field of vision to a narrow sphere” with its failure, never being able “to provide a worldview - by its very methodology, it is incapable of it. By looking at nature in bits and pieces, our understanding of it can only be fragmentary, for nature is not the sum of its isolated parts.”¹⁷ This artificial and fallacious view on human history and evolution through a western scientific

¹⁶ Matthew Daniel, 66 AP, p. 3

¹⁷ Suzuki, 36 AP, p. 11

telescope, has a lasting effect on the apprehension of deep history,¹⁸ and correcting this historical (wrong) turn has been a frustratingly slow but necessary endeavor ever since. Breaking the mirror in which one only sees oneself is instrumental for the creation of a kaleidoscopic worldview that reflects the multilayered and inherently subjective representation of the world.

Re-writing History

In the early days of the After Present, the necessary rewriting of history began to have considerable influence and slowly but surely the air was let out of the self-inflated Eurocentric air castle. “The viability of the traditional narratives of patriarchy, imperialism and colonialism were vigorously challenged and disproved by the sort of reassessment of history called for and developed by marginalized groups and societies. This sort of undermining of the truth and authority of history is exemplified by Edward Said’s landmark book *Orientalism*, which issued a clear challenge to the ways in which colonial history was constructed and biased.”¹⁹ As a result of the relentless work by countless scholars like Senegalese historian and anthropologist Cheikh Anta Diop, American philosopher Molefi Kete Asante, and Congolese linguist and historian Théophile Obenga we understand now how graphic writing systems and mathematical tools and knowledge led to the magnificent wonders of the Egyptian civilization, which in its turn instigated the further evolution of alphabetic writing and countless other technological and scientific developments throughout the rest of the world. The American linguist Konrad Tuchscherer summed it up nicely, a few decades later, when he said: “The Egyptian system drew from many highly codified African graphic systems,” including rock art, knotted cords, tallies, geometric pottery motifs, weaving designs and scarification, “which, even if not phonetic, were highly systematized and recorded as well as communicated information.”²⁰ This led the American linguist Christopher Ehret to conclude, with some acquired institutionalized surprise, that “over the long run of north-eastern African history, what emerges most strongly is the extent to which ancient Egypt’s culture grew from sub-Saharan roots.”²¹ This epic human evolution from counting to graphic writing systems resulted into Unicode, which was first proposed in 37 AP. The Unicode information technology standard for the consistent encoding, representation, and handling of text comprises at the moment of writing this text most of the world’s writing systems.

When writing about the history of writing, especially while using digital means, there is an inevitable feeling of disconnect. The manual experience (from manu = hand) feels distant and intangible when hammering away on the keyboard of a computer. At the other hand, what else is writing and the transmission of knowledge but a rhythmic repetition of signs and symbols with an agreed upon meaning? The core of any communication or counting device is based on a set of axioms that over time become theorems, from simple line drawings to binary code. Some of the oldest ideograms that can be traced back to the early days of human existence are still present today, like the iconic # or + symbols for instance, although their particular function and meaning changed over time. Graphic writing systems making use of a similar set of signs are found on all continents, as Canadian anthropologist Genevieve von Petzinger put forward, introducing a set of 32 recurring signs that can be interpreted as a rudimentary alphabet before letters were invented. Unicode now defines 143,859 characters covering 154 modern and historic scripts, as well as symbols, non-visual control and formatting codes, ideographs, hieroglyphs, sign language, emojis, and emoticons. It is a utopian attempt to preserve, at least digitally, and make available what still exists today and has not yet disappeared in the dark matter of the past.

18 Smail, 59 AP, p. 6

19 Gibbons, 57 AP, p. 4

20 Tuchscherer, 57 AP, pp. 37-51

21 Ehret, 52 AP, p. 93

But humans tend to forget, regardless of the many variations we have at our disposal to say we won't. The whole Western memory tradition, for example, is based on an unknown rhetoric teacher. Oh irony, the art of memory springs from a book by a forgotten author ... Brilliantly put forward by the English historian Frances Yates in her seminal book *The Art of Memory* (16 AP), referring to *Rhetorica ad Herennium* (from around 2030 BP). The book without a known author contains the first confirmed description of the mnemonic technique the method of loci and provides the first complete treatment of the memorization of speeches.

The German psychologist and pioneer in the experimental study of memory Hermann Ebbinghaus introduced already in 65 BP the notion of "the forgetting curve" that supports one of the most common memory failures: transience, which is the process of forgetting that occurs with the passage of time. The stronger the memory, induced on purpose or accidentally by a rememberable experience, the longer someone can recall it. Afterwards, unless a memory is kept alive through repetition, reviewing, or reciting for instance, a typical "the forgetting curve" graph shows that humans tend to halve their memory of newly learned knowledge in a matter of days or weeks.

So how do we make sure we do not forget again to remember? By bending the curve, over and over again. This can be achieved by making sure that knowledge or information is repeated inexhaustibly in the same way, like a student copying every move from a tutor. Or by allowing natural variations to take place because of personal and individual fluctuations of mood, timing, and character, like the different readings of *Lukasa memory boards* from DR Congo for instance. This last approach is more related to what Opaskwayak Cree scholar Shawn Wilson, who is specialized in indigenous research methodologies, would call "performative knowledge," or learning by doing.

Because of the striking resemblance between old petroglyphs and outlines of contemporary boardgames, could it be that they were initially used to transmit information, to learn something? And that by the constant replaying (to both play and listen again) or recounting (to both tell and count again) a continuous repetition ritual was instigated and stimulated, or, learning by playing?

Lukasa were used until recently by members of the Mbudye association in the Kingdom of Luba as an archive for the topographical and chronological mapping of political histories and a means of remembering important people, places, and mythical migration routes.

The Game is On!

Games fit all the requirements of a perfect memory device, including repetition and ritual, the process of transition towards completion and adaptability depending on specifics of time and place, and even players. That is probably why they have been around for so long and in some cases still exist today, like the Morabaraba game, also known as Merels board games, or Nine/Twelve Men's Morris. Several thousands of examples, with some variations, have been found around the world, including in Valcamonica in Italy and in the before mentioned Fontainebleau area in France, dating the game to at least the Mesolithic era. The combination of several declining squares, with cross-sections both horizontal, vertical, and sometimes diagonal, allow for a multitude of mathematical calculations, making it a remarkably successful tool in mathematics education still today. But the game does more than that. South African mathematicians and educators Mogege David Mosimege and Nkopodi Nkopodi analyzed the effects of playing the game in an educational context and put forward that next to the experience "to learn the language and vocabulary of mathematics, develop mathematical skills, develop abil-

ity with mental mathematics” it is also a tool to help “devise problem-solving strategies” and that it “also leads to discovery of patterns, decision making, and logical reasoning.”²² The fact that most Morabaraba-like patterns from the Mesolithic era are not on a flat, horizontal surface and would therefore not allow for the game to be played on site as the pebbles would fall off the board, which was the conclusion after analyzing the largest survey of similar geometric grids around the world by the French archaeologist Christian Wagneur and other affiliated researchers of GERSAR, dismisses the more logical explanation that the geometric petroglyphs themselves were not necessarily overlapping with the physical place where the game was played. They might as well have an archival function, kept secret and hidden in a safe space, but accessible to use or educate others, when need be, like a blueprint or a hard copy. The portable memory devices like rocks, bones, shells and sticks with signs and patterns engraved or drawn on them, should be interpreted in the same way: as manuals for future use instead of the actual functional pattern itself.

The rock drawings in Valcamonica

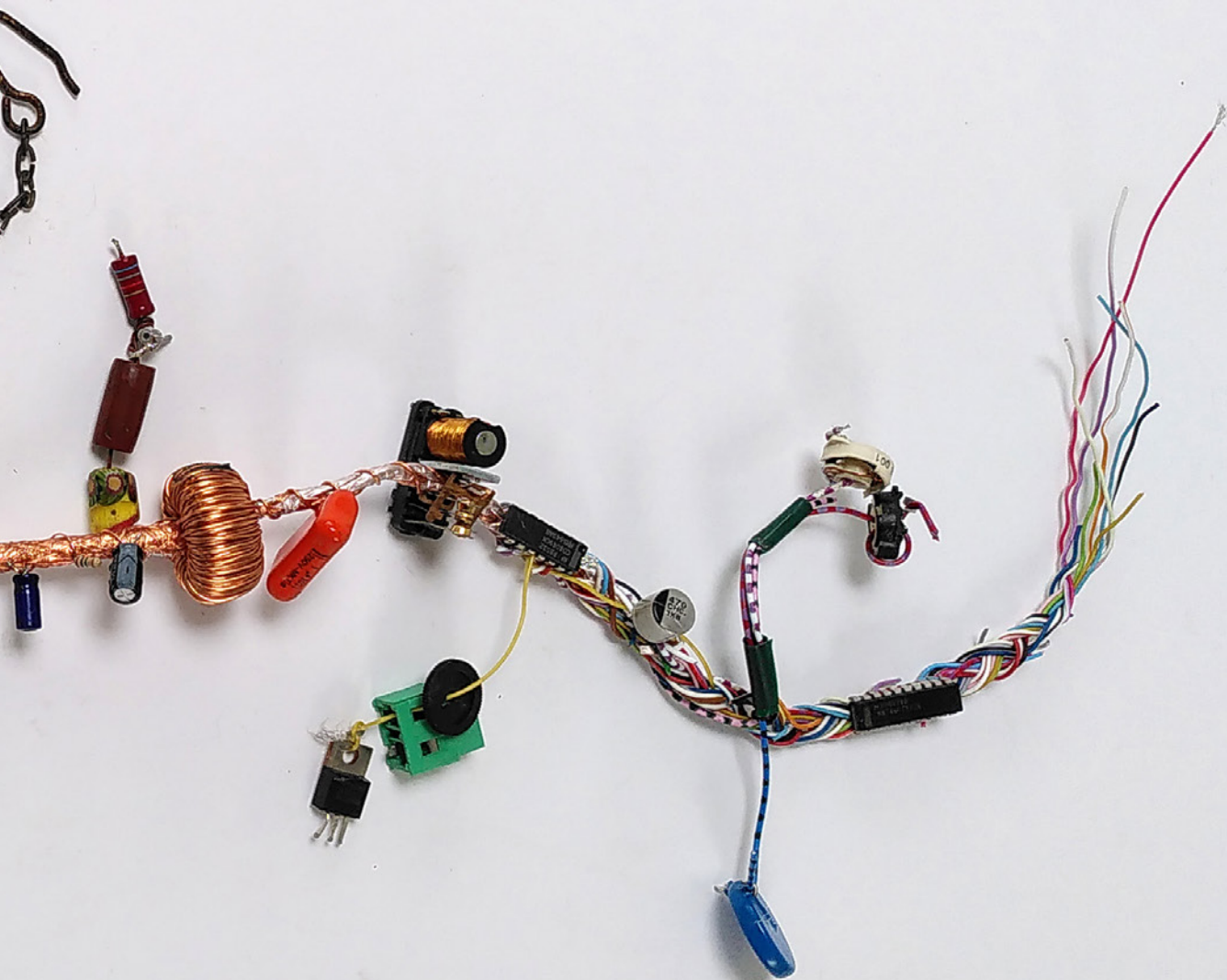
(Camonica Valley), with a staggering number of catalogued incisions, between 200,000 and 300,000, are located in the Province of Brescia, Italy, and constitute the largest collections of prehistoric petroglyphs in the world. *Group d'Etude, de Recherche et de Sauvegarde de l'Art Rupestre* (Group of Studies, Researches and Protection of Rock-Art GERSAR). Founded in 25 AP in France, the main purpose of the association is to study and make better known French rock art in general and more particularly rock art from Île-de-France, including Fontainebleau.

Sotho or **Sesotho** is a Southern Bantu language spoken primarily in Lesotho, South Africa and in Zimbabwe

The Phaistos Disc is made of fired clay and contains 241 tokens, comprising 45 distinct signs. It was found on the island of Crete and dates from the middle or late Minoan Bronze Age (between 5000 and 3000 BP), although even this is debated. Its use, meaning, and origin is one of the great unresolved mysteries in archaeological history.

Morabaraba means “to mill” or “to go round in a circle” in *Sotho*, which is similar to the game of Mehen, meaning the “coiled one,” which looks like a snake and guides the player step by step towards the end of the game. It resembles the mysterious *Phaistos disc*, which although so far impossible to read can be understood as part of a knowledge system for storing and communicating information, much like a computer or any other memory device. A similar game still exists today and is known as the Game of the Goose. Even if other and older discs that look like a Mehen game are found, this is the only one that includes signs and thus might explain what is happening along the way, or what one needs to do or remember while following all the squares towards the head or the tail of the snake.

²² Mosimege, Nkopodi, 59 AP, pp. 377–392



There are countless examples of so called Roman or Egyptian games, like Senet (meaning *passing*), Mancala (meaning *to move*), Hounds and Jackals (also known as 58 *holes*), as well as, Tab, Seega, Aseb and Latrunculi, that all use the combination of geometric grids made with lines or holes and pebbles to move around to “achieve something” or “arrive somewhere.” All of them are present throughout the sub-Saharan African continent, both in the form of petroglyphs and as contemporary games like Wari (Oh-Wah-Ree), Omweso, Bao, Gabatta, Ayo, and Kisolo.²³ It is thus safe to assume that they existed prior to the emergence of the Egyptian civilization and played an indispensable role in the development of human culture and consciousness.

Photographic Memory

Making use of images of places, or entire palaces, to store memories and allow easy access by “walking through” a landscape or “navigating” from room to room became known as the method of loci (the Latin word for place). It is still the preferred method to retain as much data as possible for most memory champions. The Greek philosopher Socrates assumed that there is “a block of wax in our souls” on which impressions can be left behind.²⁴ These impressions, however, change over time, and whenever a memory is recalled, the old image is written over by the new one, in an analogous way as photographic memories of a holiday (meant here as actual photographs) are replacing the memories of the experience itself. That is why the Greek polymath Aristotle concludes in *De Memoria Et Reminiscencia* that “memory belongs to the same part of the soul as the imagination; it is a collection of mental pictures from sense impressions but with a time element added, for the mental images of memory are not from perception of things present but of things past.”²⁵ We constantly create and recreate images of past experiences that become new and renewed experiences whenever we remember them. When forgetting (or disremembering) is such an inseparable part of remembering, can we do one without the other, or are we doomed to undergo them simultaneously all the time?

There is a difference, however, between images that function as earmarks of memories that are inspired by empirical experiences or events, and images that are imagined to remember something by. The first one is referred to as natural memory whereas the latter is called artificial or mnemonic memory. Art critic and curator Joan Gibbons concludes that “the development of artificial memory was highly dependent on techniques of visualization, such as the location of a piece of knowledge in an imagined, clearly defined locus (often a building) or the attachment of data or ideas to striking (and therefore more memorable) images. Because of this emphasis on imaging or the formation of impressions, memory became closely related to imagination.” And as a result, “the way that memory is valued, then, has shifted enormously from the idea of it being a storehouse of data which, given the right techniques, is recoverable in an ordered manner to the notion that it is a key to our emotional understanding of ourselves and the world.”²⁶

The individual functionality of different memory aids has been extensively researched and written about by the Australian anthropologist and memory champion Lynne Kelly, who tested in practice all mnemonic memory devices that were known in 66 AP. Although they are all different in nature and some seemed to work better for specific kinds of knowledge, they are all absorbed into the brain tissue of contemporary humans as fresh rain on a dried-out lake. These ways of learning and remembering are clearly an integral part of human cultural DNA and, being passed on generation after generation, could they be embedded or inscribed genetically in the human mitochondrial Genome? After the discovery a few decades ago that planaria worms could “learn” something by eating another planaria worm who “learned” something just before, the idea emanated from this observation that “memory might be encoded in a chemical structure such as

²³ Eglash, 49 AP, pp. 101-108

²⁴ Yates, 16 AP, p. 50

²⁵ Yates, 16 AP, p. 47

²⁶ Gibbons, 57 AP, p. 4

the amino acid sequence of a protein.”²⁷ Is this the next step to internalize information, on top of the existing physical and emotional memory?

The introduction of digital memory of computers, allowing to store both words and images, particularly in combination with the Internet, further declined the need to internalize memory. As long as computer hard drives are made of inorganic material, knowledge will be largely externalized and not leave lasting impressions like those “which a signet ring makes on a block of wax,” paraphrasing the Roman rhetorician Quintilian.²⁸ In the beginning of the After Present, before transistors proved to be reliable sources of data storage, humans began to experiment with the replication of biological computers through biomimicry and implicated living cells—micro-organisms—in computations for the first time.²⁹ In 52 AP, American data scientist Pak Chung Wong encoded the famous Disney song “It’s a Small World (After All)” on a DNA string and was able to retrieve it and read it completely, but only once. The encoded information became less and less accurate with every new “reading.”³⁰ The analogy with memories that are changing whenever they are called back is striking to say the least, but this glitch only caused a temporary delay. “The microorganisms that survive heavy radiation exposure, high temperatures, and other extreme conditions are among the perfect protectors for the otherwise fragile DNA strands that preserve encoded information. Finally, living organisms, including weeds and cockroaches, that have lived on Earth for hundreds of millions of years, represent excellent candidates for protecting critical information for future generations.”³¹ One gram of DNA can store 455 trillion gigabytes,³² which means that every bit of information that was ever produced would fit in a shoebox. The already existing “unkillable” eternal living bacteria *Deinococcus Radiodurens*, or *Turritopsis Dohrnii*, aka the Immortal Jellyfish, are excellent candidates to carry, pass on, and thus preserve human history for us, if asked politely of course.³³

Today, in 71 AP, the technological evolution of storing data in DNA is so advanced that it is not a question anymore if biological computers will replace conventional silicon-based computers, but *when*. This magical milestone might allow for the re-internalization of memory devices for the first time in human history, epigenetically merging with our limited brain. It would mark the end of our need for external memory devices like computers and smartphones altogether. Although, it is just a thought. Nothing is written in stone, *yet*.

27 Campenot, 66 AP, p. 352

28 Yates, 16 AP, p. 50

29 Suzuki, 36 AP, p. 36

30 Farrier, 70 AP, p. 274

31 Wong et al. 53 AP, p. 98

32 Farrier, 70 AP, p. 274

33 Farrier, 70 AP, pp. 273, 278

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HEIRLOOMS

Åsil Bøthun

Speleothems are secondary mineral deposits formed in caves by flowing, dripping, ponded, or seeping water. The shapes of speleothems are determined by a competition between the dynamics of the water and the crystal growth habits of the constituent minerals. Another more populist term of this phenomena is cave popcorn, which in the geological world also means a rocky deposit related to stalactites and stalagmites. This serves as a monument to the transformative power of water, and to the fact that caves are constantly changing.

Building on these geological anchored phenomena, the series of sculptures produced for this presentation, can at first glance be associated to speleothems, where the surface exists of small, eroded holes in the matter. The surface is thus full of minute details, like a landscape in miniature. But the surfaces of these objects are not cave popcorn, they are tracings of Persian fur, casted from my grandmother's fur coat.

Qaraqul is a breed of domestic sheep which originated in Central Asia. Some archaeological evidence suggests that Qaraqul sheep has been raised there continuously since 1400 BC. The sheep are renowned for their ability to forage and thrive under extremely harsh living conditions. They can survive severe drought conditions because of a special quality they have, storing fat in their tails. Qaraqul are currently listed as endangered. Very young or even fetal Qaraqul lambs are prized for their fur. The newborn lambs have a tight, curly pattern of hair. Fetal Qaraqul lambs are harvested through miscarriages, induced early delivery or by killing the mother sheep and removing the fetus. Rather than killing healthy female sheep, farmers will kill older sheep that have already given birth many times. The fur is used to create various clothing items, commonly known as Persian fur.



Heirloom 1
Plaster and Pigment. 45x40x20 cm. 2020



Heirloom 2
Plaster and Pigment. 30x45x40 cm. 2020



Heirloom 3
Plaster and Pigment. 30x45x30 cm. 2020. All photos by Thomas Tveter

SYNERGETIC STRATEGIES

Eamon O’Kane

From a House in the Trees to a House of the Dead

My work often takes its starting point from a very specific piece of history and then expands to a much wider context. I frequently work simultaneously on quite different projects and bodies of work. One theme I have returned to a number of times throughout my career, is that of the history of the house I grew up in. The starting point for this body of work was the fact that King James II stopped off at the house at the time of the siege of Derry in 1689.

The King was welcomed by the owner of the house and a dining table was laid under the canopy of a sycamore tree (which I played in as a child). After the siege, as the monarch’s forces retreated and laid waste around them, James spared Cavanacor House because he had enjoyed its hospitality. This passage describes the event in some detail: “On 20th of April 1689 King James passed thro’ on his way from Mongevlin Castle to Strabane, after dining under a big sycamore tree in front of the house of John Keyes esq. at Cavanacor, to whom he gave protection, which afterwards saved this gentleman’s house, when those of all the Protestant houses round him were burned. The old oak table on which the unfortunate monarch sat to dinner, and the antiquated china upon which the dinner was served are preserved as curiosities.”¹

In 2007, I created a work for a solo exhibition at the RCC Art Centre in Letterkenny. *The House And The Tree* included a reconstruction of an original part of my parents’ house that was demolished half a century ago. The reconstruction included a film of derelict vernacular architecture around the county. These ruined buildings were a result of migration of communities, and audio recordings of *Sean-fhocail* (Gaelic proverbs) augmented the film. The sycamore tree, which the King dined under, had blown down in a storm in 1999, and the cut-up fragments of the tree formed the centerpiece of the show along with a large wall drawing of the tree itself. The project developed into a touring exhibition with the works evolving and changing as they moved from venue to venue. I worked with a local carpenter in Bristol to transform the sycamore tree into a seventeenth-century style table and chairs, similar to those used by James II. I approached the installation of the exhibition at Plan 9 in Bristol in much the same way that I would approach a period of research in my studio. The intention of this was to work directly with the material and not form any preconceptions of how the show was to be installed prior to the four days of installation. I had the advantage of working with an experienced craftsman for the design of the furniture, and specifically, all “waste” material from the process was kept. I worked with these wooden fragments in the space for four days, eventually settling on laying them out over the floor. I have continued to develop this working process, having been refined and enhanced

1 M’Corkell, 1823

by my reflections on the interventions that the public has carried out in my interactive installations, as well as other installations such as my works *In All Things* and *Wood Archive*.

In 2009, using the 17th century-style furniture produced in Bristol, I directed the staging of a re-enactment (by the English Civil War Reenactment Society) of the meal James II had under the sycamore tree in Ireland. This took place at two sites in the New Forest on April 19—almost 320 years to the day of the actual event. I gave the re-enactors a brief synopsis of the background history and asked them to improvise the roles they were given. The film was shot in one take and then edited. The furniture was installed in the gallery space with the video documentation of the re-enactment. This was connected to another re-enactment, which took place on the same day, that of a hunt that James II led (being the last king to hunt in the New Forest in the late 17th Century). I was interested in connecting the two places, using the fact that King James II had visited both. Again, I intentionally took an improvised approach to how the artwork should evolve and this was also the case in my approach to directing the resulting performance.

King James II retreated from defeat at the siege of Derry, which had lasted 105 days—from April 18 to August 1, 1689. Thereafter he and his troops were involved in a number of battles and skirmishes before meeting William of Orange and his troops at the Battle of the Boyne. A museum dedicated to the history of the battle is now located in my grandmother's childhood home, Oldbridge House, Co. Meath. A few kilometers away from Oldbridge, Newgrange is a 5,200-year-old Neolithic passage tomb located in the Boyne Valley. It was originally accidentally discovered in 1699, nine years after the battle of the Boyne.

“The place was extraordinary, I remember seeing it in around 1969—all alone, just me and him. No cameras, no lights, nothing. The whole place was just illuminated. I'll never forget it ... He was the first person in about 5,000 years to see it.”² The quote is from an interview with Helen Watanabe-O'Kelly, where she describes first witnessing the winter solstice event at Newgrange alongside her father, Professor Michael J. O'Kelly after he rediscovered the winter solstice phenomenon when he unearthed the roof box at the site. In 1961, archaeologist Patrick Hartnett selected O'Kelly to be the director of excavations of the site. It was in very poor condition and had no public access. O'Kelly confirmed a local legend on December 21, 1967, that the sun rays during the midwinter sunrise go straight down the long passage to the central the tomb. The rays of sun “pass through a small ‘roof-box’ opening above the doorway to penetrate along the whole length of the passage as far as the center of the chamber.”³ He conducted extensive research during the excavation and was able to calculate that the tomb was built to align with the winter solstice. “But it was quite obvious to us that it couldn't happen at Midsummer because of the position of the sun” says O'Kelly. “So if the sun was to shine in at all, the only possibility would be in Midwinter.”⁴ He describes the moment he witnessed the light enter the roof box and illuminate the tunnel, only to fade to total darkness once again. “I expected to hear a voice, or perhaps feel a cold hand resting on my shoulder, but there was silence. And then, after a few minutes, the shaft of light narrowed as the sun appeared to pass westward across the slit, and total darkness came once more.”⁵ The feat of engineering involved in the construction of Newgrange is astonishing, not only in relation to the scale of the boulders and quantity of earth used but also with regard to the precision of the construction and its alignment with the seasonal

2 Hogan, 2007

3 Harbison, 1998

4 Welfare & Fairley, 1980

5 Welfare & Fairley, 1980

cycles. “I think that the people who built Newgrange built not just a tomb but a house of the dead, a house in which the spirits of special people were going to live for a very long time. To ensure this, the builders took special precautions to make sure the tomb stayed completely dry, as it is to this day ...”⁶

My recent stop motion animation based on the Newgrange site and entitled *Liosanna* (ringfort in Irish) is a development of *Regeneration*, another stop-motion animation from 2006, created by filming the process of making a series of paintings based on the transformation of the Blanchardstown area (outside Dublin) over a ten-year period. The process of painting echoes the construction of man-made interventions as the layers of paint chart the rapid build-up of an urban landscape. The animation loops back to before the beginnings of this development, when the area was farmland. In *Liosanna*, I use aerial views of the archeological sites in the Boyne valley. I have also made a film of the stone carvings at Newgrange using 3D animations of renderings of the various stones and carvings at the site, merged together in a series of layers: evoking the layers of time and creating illusionistic spaces perhaps akin to those hallucinogenic visions that are presumed to have inspired the patterns and symbols in the first place.

Professor John P. Miller of the Department of Cell Biology and Neuroscience, Montana State University has conducted research into recurring geometric motifs of ancient rock and their relationship to visualizations caused by specific anatomical and neurophysiological characteristics of the human visual cortex. He points out: “Ancient cave paintings and rock engravings can be found on every continent. Clearly it was a practice of great importance - not merely ‘art for art’s sake’—carried out by hunter-gatherer societies. By studying this practice on a global scale, the art reveals similarities in both style and subject. The similarities are evident even though the artists could not have been influenced by one another.”⁷ David Lewis-Williams is also fascinated by similarities of artistic expression throughout ancient civilizations and argues we must be open to layered explanations of these commonalities between prehistoric societies which were separated by time and geographic location: “Was there an underlying, not easily detected, bedrock of belief that expressed itself in contrasting ways? In geological terms, was there a subterranean chamber of molten rock that rose to the surface in different places to form batholiths, each similar to others in its origin but each shaped by the forces of erosion to display its own hills and valleys? Today, many archaeologists are reluctant to seek generalities of this kind. They prefer to see each society as possessing its own unique culture, that is, the set of beliefs and norms that individuals learn from birth and with which they creatively interact. There is, of course, truth in the concept of the uniqueness of human cultures, but it is by no means the whole story.”⁸

I have been working with the spiral form in drawings, paintings and sculptures which investigate its recurrence in natural forms such as fossils of ancient creatures and in different forms of rock art. Professor Miller specifically highlights the stone carvings at Brú na Bóinne, such as the entrance stone at Newgrange, in their use of the spiral form. One of the most common geometric motifs is the spiral, painted and carved throughout the world. And yet the symbolic meaning of the spiral in prehistoric art is speculative. Some argue it may have represented the sun, or the portal to a spirit world. Perhaps it represented life itself, or life beyond life—eternity. Or else, it may have had a more prosaic, functional purpose, that of a calendrical device, employed to deconstruct time into chapters, seasons and solstices. From the painted and engraved walls of the Upper Palaeolithic to the decorated megalithic standing stones of the Neolithic, the symbols persisted. In Europe, the megalithic art of Ireland featured the spiral intensively.

At Brú na Bóinne, a significant center of human activity for almost 6,000 years, the spiral symbol is a dominant feature. [...] passage graves of Newgrange, Knowth and Dowth, each standing on a ridge within the river bend. Each of the three main megalith sites have significant archaeoastronomical significance. It is thought that Newgrange and Dowth have winter solstice solar alignments, and Knowth has an equinox solar alignment.”⁹ Professor

6 Welfare & Fairley, 1980

7 Miller & Robinson, 2021

8 Lewis-Williams & Pearce, 2005

9 Miller & Robinson, 2021

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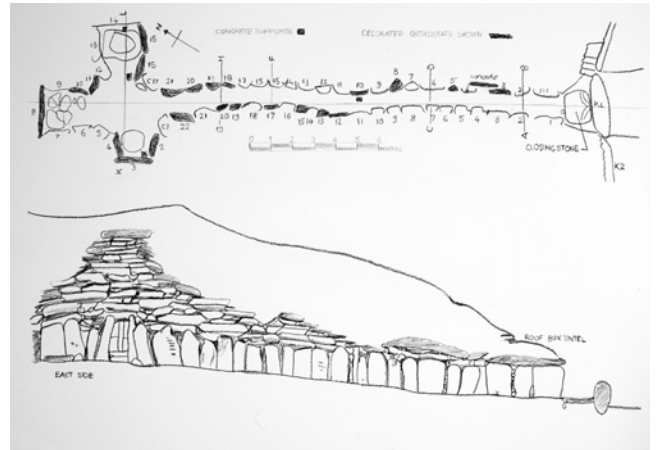
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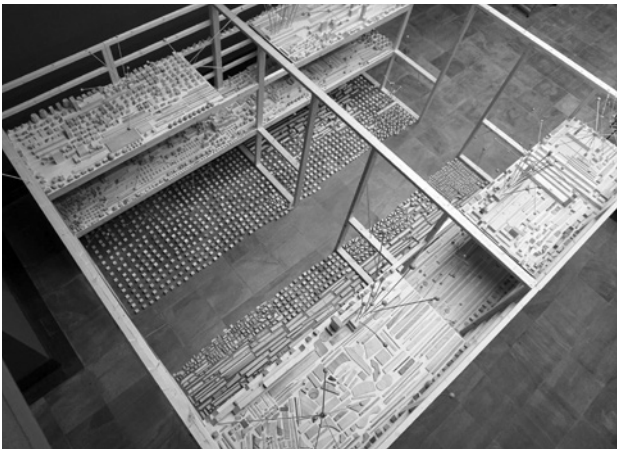
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i-ii. *20th April 1689* by Eamon O'Kane 2009
Installation views Plan 9, Bristol UK

iii. *In All Things* by Eamon O'Kane 2018
Wooden objects installation view M100, Odense Denmark

iv. *Wood Archive* by Eamon O'Kane 2018
Wooden objects and structure installation view Norwegian
Sculpture Biennial, Vigeland Museum, Oslo

v-viii. *Synergetic Strategies* by Eamon O'Kane 2021
Mixed media works on paper, installation view and details

ix. *Liosanna* by Eamon O'Kane 2021
Painted animation still from 4K-video (duration 3 mins)

All photos by the author

Miller goes on to argue that this use of the spiral could be explained by research he has carried out into their relation to the human nervous system. “The ubiquitous nature of geometric motifs, such as the spiral, clearly raises the question: What is the art saying? It also raises another question: What relationship do geometric motifs have with the human nervous system, with hallucinations, for example? We need to understand the relationship between brain, vision and interpretation. What is the cortical basis for geometrical visual hallucinations? What causes these geometric patterns [and even more complex patterns] to be generated in the cortex? The scientific literature has a host of images drawn by people during or directly after they were experiencing hallucinations induced by drugs, or direct electrical stimulation of the visual cortex of the brain. One can argue that there is a clear commonality between hallucinations and prehistoric geometric motifs, such as the kerbstones at Brú na Bóinne.”¹⁰ The similarities between these prehistoric stone carvings and the hallucinations brought on by different stimuli on the visual cortex are striking. I have done a number of drawings on paper which explore these similarities in relation to the Knowth Kerbstones and the Newgrange entrance stone. “These predicted hallucinations are very similar to the real, recorded hallucinations. Therefore a plausible hypothesis may be that prehistoric rock paintings and geometric art forms are simply an accurate record of the artist’s vision. However, was the artist who created the 18,000-year-old mammoth ivory plaque from Siberia doing so under the influence of drugs, migraines or near-death experiences, or was this simply a pleasing and meaningful pattern? Similarly, the predicted hallucination ray patterns that come out of the computer model of the visual cortex bear a striking resemblance to the prehistoric engravings on one of the Knowth kerbstones.”¹¹

Tunnels and Portals

As children growing up in the northwest of Ireland we often visited sites of archaeological significance. This was due to our father’s interest in history, and he signed the family up as members of the Donegal Historical Society as he was President of the society and then later Chairman of the Federation for Ulster Local Studies. We would often go on field trips and sometimes lectures by local historians. I remember visiting archeological digs, numerous stone circles (including Beltany stone circle a few miles from my home) and passage tombs as a child. Growing up in a historical house also surrounded us with a sense of layered time, the derelict buildings in the yard with trees growing out of them and finding pottery, flint arrowheads or antique toy soldiers when digging in the garden. From the front door of the house, you can see Croaghan hill atop of which there is a Neolithic hillfort and cairn. One can see the river Deele that St. Patrick attempted to make a crossing of. An account of St. Patrick’s visit goes as follows: “Patrick comes round the shoulder of Cruachan Lighean, preaches to the people and baptizes them at his well where Ith lies buried at the Foyd. Then he descends to the lowlands at Murlog where in attempting to cross the stream the axles of the chariot are broken again and again. ‘Be ye not amazed at this thing for yonder land from stream thither does not need that I should bless it, for a boy shall be born ... and his name will be Colmcille.’ And the Ford of The Chariot is the same ever since—Tyleford.”¹²

Trips to visit our grandfather also further nurtured this interest in the past. He was head of the National Trust in Northern Ireland and deeply engaged with conservation of historic buildings and the natural environment. In fact, he was responsible for buying up a huge stretch of the coastline on behalf of the Trust in the 1960s, thereby designating it a nature reserve and protecting it from being developed into golf courses and hotels. Later in life he became head of Christies in Northern Ireland, and visits to his house included being surrounded by auction catalogues and antiques as well as excursions to other people’s homes to conduct valuations on prized heirlooms. At that time, around his retirement, he was also in the process of restoring an old watermill, which he brought back to life and put to use in the production of flour and flax. In the 1950s he had bought another property closer to where I grew up in Donegal. That house was an old rectory set in 20 acres of

¹⁰ Miller & Robinson, 2021

¹¹ Miller & Robinson, 2021

¹² Hegarty, 1938

rugged farmland right in the middle of a valley in a place called Glencolumbkille, named after St. Columbkille, mentioned by St. Patrick in the quote above. During family holidays we would spend weeks with our cousins fishing and exploring the local area. We would visit the Court Cairns in the valley of Malinmore to the west. These are built of massive stones in a manner which was current throughout Atlantic Europe at the time. They are burial places erected with huge stones forming a space in the middle of the “court,” with chambers branching off from it. We would also visit the six *Portal Dolmens* at Malinmore, which are supposed to be the finest of their type in Ireland. These consist of a number of standing stones which are surmounted by a capstone, and I have memories of these huge rocks and feeling dwarfed by them as a child. In fact, a lot of the huge stone formations on my grandfather’s property had a completely different sense of scale than they do when I visit them today. What I remember as a cave is almost just a small indentation in a rock face. The same could be said of the sense of scale of the ringforts (*Liosanna* in Irish), which date back to the Celts and are from around 350 BCE. They normally consist of a number of circular earthworks, and there is one near Glencolumbkille at a place called Doonalt. They are about 20 metres inside and were built as defensive installations. The most dramatic one I remember from my childhood is closer to the house I grew up in. It is called *Grianan of Aileach* and sits atop the 244 metres high Greenan Mountain at Inishowen in County Donegal. It was one of then royal sites of Gaelic Ireland and the seat of the Kingdom of Ailech. The main structure is later than the Celtic ring forts and dates to about 600–700 CE, but there is also evidence of an earlier settlement. The structure comprises of three terraces, and these are linked by steps. The walls are almost 4.5 metres thick and 5 metres high and there are two long passages within them. There would have been wooden buildings inside the ringfort when it was built originally, but now it is an open arena which has a bit of a feeling of an amphitheatre. I remember thinking of this structure as being huge as a child and the short tunnels as being endless.

Another tunnel that features strongly in my childhood memories is the souterrain (underground refuge) beneath the Graveyard of Church of Ireland, also in Glencolumbkille. The refuge was probably constructed by early Christians in order to hide from Norse raiders. It used to be easily accessible but is locked and out of bounds today. My grandfather’s house used to be the rectory for this church and is situated nearby. As local legend would have it (there is a rumor that) the tunnel was connected to the rectory (which is several hundred metres away) and as children we used to search for the entrance to the tunnel and imagine it being used to escape from the Vikings or pirates.

The Flight of the Earls—Donegal to Rome

A few hundred metres from the gate of my childhood home there is a small village called Ballindrait or *Bhaile an Droichid* in Irish, which means “town of the bridge.” The bridge in the village is connected to an important moment in Irish history, *The Flight of the Earls*. “According to local tradition, Rory O’Donnell, Chief of Tirconnail, and O’Neill, Earl of Tyrone, met at the bridge at Ballindrait on their way to Rathmullan to join their extended families and other noblemen of Ulster in the Flight of the Earls on September the 14th, 1607.”¹³ The permanent exile of the Earls was a watershed event in Irish history in that it symbolized the end of the old Gaelic order. Hugh O’Neill, who was the 2nd Earl of Tyrone and Rory O’Donnell, the 1st Earl of Tyrconnell, left the small fishing town of Rathmullan in County Donegal for Spain on a small ship with about ninety followers. The chieftains of some of the leading Gaelic families of Ulster were on board this boat and they were about to seek refuge with England’s main enemy in the hope of making a new life for themselves or regrouping and gathering support to return to claim back their lands. After reaching Spain, the Earls and their entourage proceeded to Rome with many being killed along the way by English spies as well as dying from disease and hunger. “After their untimely deaths, variously from disease, exhaustion and deprivation, at least seven but possibly as many as

¹³ Anonymous, 2011

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xi



x. The grave of Hugh O'Neill, San Pietro in Montorio, Rome, Italy. Image courtesy of Fr Mícheál MacCraith 2016

xii



xi. *The History of the True Cross* (1447-1466). Excerpt from the frescoes by Piero della Francesca in Basilica San Francesco in Arezzo, Italy. Image courtesy of Augusto Corsini

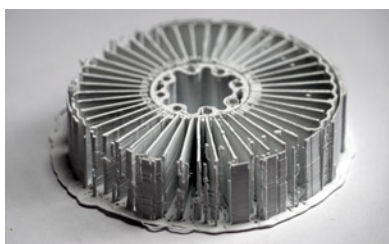
xii. *Where there are People there are Things* by Eamon O'Kane 2014. Installation view CCA, Derry, North Ireland

xiii. *Synergetic Structures* by Eamon O'Kane 2021. Objects in plaster, Jesmonite, plastic and clay

xiv. *Distillation Portals* by Eamon O'Kane 2021. Minerals on paper discs

Photos xii-xiv by the author

xiii



xiv

eleven or more members of the O'Neill and O'Donnell exiles, including the earls themselves, were buried between 1608 and 1623 in San Pietro in Montorio. The form of the burials, the surviving grave-slabs and their inscriptions, the earliest records of these and of their architectural context, together with correspondence between two successive Spanish ambassadors and the Spanish court of Philip III, hint at the circumstances of this Gaelic community's exile."¹⁴

In 2006, I had an artist residency at the British School at Rome and visited Trastevere along with my father. We managed to find the tomb of Hugh and Rory O'Donnell, located in front of the altar of San Pietro in Montorio. At the time the tomb was covered by a carpet, but we were able to pull it back to look at the inscription and it was a very moving experience to see the names engraved on the marble slab. The tomb was excavated pretty soon after our visit and it is estimated that including the earls and their servants there are about eleven members of the Irish community in exile interred at San Pietro in Montorio. During my time in Rome I also had an opportunity to visit The Vatican Necropolis, which lies 5–12 metres below Saint Peter's Basilica and under the Vatican City. The Vatican organized secret archaeological excavations during the second world war, from 1940, and until 1949, and these revealed parts of a necropolis dating back to Roman Imperial times. The work was undertaken at the request of Pope Pius XI as he wanted to be buried as close as possible to St. Peter. The excavations had to be done in secret due to the Nazis' interest in archeological artefacts, which they were collecting for Hitler's Führermuseum. Apparently, the priests and monks at the Vatican dispersed the soil and sand from the excavations from small sandbags concealed under their robes whilst they were making their daily walks in the Vatican courtyards and parks.

The necropolis was not originally one of the Catacombs of Rome, as it was an open air cemetery with tombs and mausolea, which was very common in the Roman Empire at the time. Roman law dictated that it was forbidden to bury the dead within the city walls, and this meant that burial grounds sprang up along the roads outside of the city. These graveyards were much more social spaces than we are used to contemporary graveyards being. The four walled mausolea were roofless and open to the elements and each would have been designated to a particular family, which meant that during particular festival days the family members would congregate in these outdoor rooms and spend time celebrating their deceased loved ones. The events could be seen as having much more in common with a family picnic than a somber memorial, and in this way could be seen to be more like the Mexican tradition of the day of the dead or even the Irish Wake tradition. The free-standing sarcophagi would have functioned almost as tables for the food and drink, and even included a hole through which wine, milk or honey could be poured to feed the dead and allow them to participate in the feast. The Vatican necropolis was begun as a burial ground built adjacent to the Circus of Caligula on the southern slope of the Vatican Hill. These spaces were deeply important to the Romans. This importance makes Constantine's decision to turn this particular necropolis into the foundations for a Christian Basilica all the more astonishing. My visit to the Necropolis was fascinating. I remember checking in with a Swiss Guard station near one of the entrances to the Vatican City and then entering a small doorway along with the other members of the tour group, mainly consisted of Christian pilgrims, and descending a staircase. The tour is now called *The Scavi Tour* (Scavi being Italian for excavations) and the spaces consist of a mix between an ancient pagan and Christian cemetery and burial ground from the 1st century. I remember being astonished at how clear the transition from one belief system to another was, and as we ascended the gradual incline, our tour guide pointed out frescoes of Roman life slowly becoming one with portraits of Christ depicted not as the bearded man we are familiar with but as a clean shaven Roman. One got the feeling that this transition from a pagan belief system to a Christian one must have been a huge public relations coup built on Emperor Constantine's own unswerving belief which had been cemented before and after the Battle of the Milvian Bridge, as depicted by Giulio Romano 1520–1524 in the Vatican City Apostolic Palace. The air was

warm and humid and most of the floor was dirt, sand and stone, and I was able to imagine the priests and monks making the slow and steady excavation of the spaces during the war. Some of the spaces were confining and wouldn't have suited anyone prone to claustrophobia—especially not if you think of the huge basilica above. It was hard to imagine these confined spaces in their heyday being open to the elements, with the blue skies above and probably trees and bushes interspersed around them.

During the excavations in the 1930s and 1940s the remains of a tall, thin man were found in the ruins of the necropolis. After a period of intense research, analysis and debate it was determined the remains were those of St. Peter. Pope Paul VI made the official declaration in 1968 when he declared the remains to be those of St. Peter. Pius XI had died on February 10, 1939 in the Apostolic Palace, but he still got his wish to be buried close to St. Peter and is buried in the Papal Grotto of Saint Peter's Basilica. Our guide pointed out the bones at the end of the tour. They are directly under the foundations of the altar of Saint Peter's Basilica and contained in a hermetically sealed plastic box constructed by NASA in order to preserve them.

From NASA to a Nursery

During the autumn of 2020, I had a research sabbatical supported by The Meltzer Research Fund for six months, allowing me to develop an artwork in the studio for this project. It allowed time to work on archiving, and as this excavation of past works was simultaneous to making new work in the studio, the process gave the opportunity for a particular type of critical reflection which juxtaposed my current work with my early work as an artist over 25 years ago. With the objective distance that time affords one begins to detect certain patterns in one's own artistic development—themes, formal concerns, aesthetic preferences etc.

In *Making: Anthropology, Archaeology, Art and Architecture* Tim Ingold proposes ways of thinking through making where practitioners from different fields “correspond” with one another through materials in the generation of form. On reflection I feel that this is what I have been doing through my research and practice, but it is mainly a one-way process in which I receive inspiration through histories and forms and put them in dialogue with different materials, which in turn has a transformative quality and allows me to take the artwork on journeys into other associations. Of course, Ingold is suggesting collaboration between practitioners, and this has occurred for me from time to time, but it is also important that this correspondence or collaboration primarily occurs between the artist and the work itself, as that is where the really interesting things can happen.

The title of some of my new works, *Dark Matter*, refers to the invisible form of matter thought to account for approximately 85 percent of the matter in the universe. I have been inspired by Robert McFarlane's *Underland*, where he explores Neolithic burial chambers in the Mendip Hills of Somerset, and North Yorkshire's Boulby Underground Laboratory, where physicists such as Christopher Toth investigate dark matter a kilometre below the surface. I am interested in comparing different approaches throughout the centuries, including the stone carvings on passage tombs at Newgrange, which date from 3200 BCE, and right up to images of space produced by NASA. I have also been making formal connections to the recent past through a ten-year project at a site at my home in Denmark, and I am using the archive accumulated from this research as a comparative to the distant past of sites such as Newgrange.

In August 2009, I became the owner of a property with 6000 m² of greenhouses which had been used up until the day we took them over. During the following ten years, I used the site as an experimental space where I examined the relationship between the flora and fauna and the disintegrating architectural space. My regular walks throughout the complex produced thousands of photographs and many hours of audio-visual material. These experiments involve making drawings and sculptures where I explore the micro and the macro simultaneously. A cast of a piece of machinery for distilling water becomes a model

for an architectural construction with echoes of an ancient building and so on. Throughout the ten years working with the greenhouses on the site, I have developed a variety of activities and strategies which could be seen to be connected to a type of archeology of the recent past. Now that the architectural structures are removed from the site and it is slowly becoming a forest again, I am able to excavate what is left in my archive of images and artefacts whilst having a memory of the place itself.

In January 1975, Buckminster Fuller sat down to deliver the twelve lectures that make up *Everything I Know*, all captured on video and enhanced with the most exciting bluescreen technology of the day. Props and background graphics illustrate the many concepts he visits and revisits, which according to the Buckminster Fuller Institute include “all of Fuller’s major inventions and discoveries” [...] “his own personal history in the context of the history of science and industrialization,” and no narrower a range of subjects than “architecture, design, philosophy, education, mathematics, geometry, cartography, economics, history, structure, industry, housing and engineering.” In his time, as a passenger on what he called Spaceship Earth, Fuller realized that human progress needs not separate the “natural” from the “unnatural”: “When people say something is natural,” he explains in the first lecture, “‘natural’ is the way they found it when they checked into the picture.”¹⁵ The title of this essay, *Synergetic Strategies*, is taken from a phrase by Fuller. In the mentioned lecture series, he describes the significance of the term synergy: “So, I find then that the Universe, itself, is synergetic, it is a great complex of generalized principles, each of which IS synergetic, so that we really have a Synergy of Synergy, there is an exponential synergizing of the generalized principles of Universe themselves. Now, quite clearly, then, the Universe being complex, and synergetic, if we were able then to cope with the totality, we might be able to find out about parts, and we have what I call three well-known Synergetic Strategies of obtaining important information.”¹⁶

I am taken with an observation made by Fuller during these lectures where he relates Einstein’s theory of relativity to a deeper understanding of the universe, explaining that when one looks at the night sky one is looking into a type of time machine where it is possible to see stars that have died many thousands of years ago simultaneously with stars which are being born more recently. “I’m going to use items that Einstein did not use, but you’re very familiar with the *Big Dipper* the *Big Bear*. And as we go in, the first star in the end, in the handle of the *Big Dipper*, you’re seeing a live show taking place 75 years ago. Going to the next star at the turn of the handle, you’re seeing a live show taking place one hundred years ago, and going in one more star, you’re seeing a live show taking place two hundred years ago. It’s anything but on the same blackboard, because a hundred years difference at 6 1/2 trillion miles each year, you’ve got incredible depth of observation, where the brightness makes it seem to be akin in that pattern. At any rate, then you look at *Andromeda* and you can see a few little sparkling lights of a whole galaxy there; and you’re looking at a live show taking place just one million years ago ... it takes exactly 1 million years for that light to get here. Come back again to looking at *Orion’s Belt* and the *Betelgeuse* and the other bright stars, one is a live show 1500 years go, and another 1100 years ago. So Einstein said, “The Universe is an aggregate of non-simultaneous and only partially overlapping energy events.”¹⁷ He goes on to describe this in terms of ‘scenario:’ “Now, this is a very interesting kind of a definition, because it is also the definition of what you and I would call “scenario.” In a scenario we have a man born, and then he gets to be “daddy,” and he has children, and then he gets to be a “grand daddy,” he overlaps the grandchildren, and then he dies. There is an introduction of a life, and it blooms, and a star is the same. And the star has its duration, so are the beginnings and endings of these local energy systems; but Einstein said “I think that in this non-simultaneous Universe, that the energies that are being given off by this one might be associating elsewhere.”¹⁸

In conclusion, I have been developing artworks which examine the history of humankind’s relationship to mapping the night sky and the cosmos through mark making and symbols. Through these artworks I am making connections between early indigenous belief

15 Fuller, 1975a

16 Fuller, 1975b

17 Fuller, 1975b

18 Fuller, 1975b

systems and their understanding of the unknown and more contemporary thoughts about the origins of the universe. Fossil forms from the natural world connect with ancient spiral carvings or the structure of Frank Lloyd Wright's Guggenheim Museum. I am attempting to develop a type of synergy between the artworks activating the formal, material and historical connections and hopefully allowing the viewer to do the same. Buckminster Fuller has inspired me to see the universe as a series of interrelated connections through time and space and he is able to prove this through among other things Einstein's theory of relativity. It is entirely possible that many of the early civilizations (including the one that built Newgrange) built this into their belief systems and societal structures through an intuitive reading of the world around them and maybe especially the night sky. I hope to use my own Synergetic Strategies to further investigate a variety of different histories and phenomena and to use the time machine in the sky above our heads as a reminder of how the past affects our present and points to our future.

[illegible]

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MATTER, GESTURE, AND SOUL—“SUCH STUFF THAT DREAMS ARE MADE OF”

Torill Christine Lindstrøm

“We are such stuff that dreams are made of”—says Prospero near the end of Shakespeare’s “The Tempest.”—And indeed, we are matter, body, and soul. Our minds and sciences dig into the abysses of atoms and galaxies, and transcend the time-space horizons of metaphysical realities of both matter and mind. And in the multitude of the possible and the potential, we try to grasp, capture, envision—and express our experience of reality.

Not only we. In the depth of time, as far back as archaeology can reach, “we,” our ancestors, whose genes still vibrates in our bodies, created art.—What we call “art,” that is. Their concepts and ideas may have been different, but “different” can mean anything from “totally different” to “slightly different.” Yet, as long as we, as well as the earliest hominins, are human beings, there are abilities and interests that we share. One is to create art, whether it is pictures, patterns, rituals, performances, sounds, sculptures, body-art, gestures, dances, decorations, and much, much more.

Art captures the essentials of life—and what may lie beyond.

Art stretches beyond the obvious and objective, transforms it through the subjective experience of enlightened persons, and is shared with a community, even with humanity itself, in shared collective archetypes.¹ That is why art from ancient times and distant places can touch us, move us, create emotions, motivations, and motives.—Matter, the materiality of art, creates our souls.

Creativity reduces the “otherness” of “the other.” Creativity makes us feel closer to prehistoric people as well as to people from various cultures; and makes us look at the world differently.—The difference between the ordinary and the exceptional disappears.—In art, the exceptional that lies deeply embedded in the ordinary, is extracted and exaggerated. This creative process makes us see things with new eyes, our perception is transformed.—Immediate impressions become expressions, further to be laden with symbolic meaning, and channeled into solid symbols.

Every creation has a creator. A person with a creative soul is somebody who touches others by their voice, body, movements, gestures, and material products, - or simply by pointing out the exceptional in the usual. Creative persons see and experience things differently. Natural forms of stones and stone walls in caverns may ignite and stir the creative mind into fascination, imagination, awe, perhaps even to aesthetic arrest.—Lappesteinen *sieidi* (The Lappestein sacred stone) is one (see Fig. 1).² A sculpture formed by natural forces, and transformed by mental forces to become a symbol and sacred sanctuary for Sámi populations at Hardangervidda, and a loved landmark for later populations.

But matter can be further transformed. And in the perceptive process, as well as in the material transformation, also the soul and mind of the creator is transformed. The

¹ Jung, 1943

² Lappesteinen (“the Sámi Stone”) is a *sieidi*. A *sieidi* can be of wood or stone, and is a sacred object, indicating a sacred area, and a *sieidi* is also a site for offerings, for the Sámi (Åikäs, 2011). *Sieidi* stones are usually large and stand out in the landscape. They are unshaped by humans, but have spectacular shapes that appeals to the imagination. The Norwegian main road Riksvei 7 (Rv7) now runs close to Lappesteinen. It seems that this modern road was deliberately curved around it, so that Lappesteinen is preserved for the future as one of many Sámi cultural heritage sites (Thomassen, 2009).—Personally, I feel a thrilling anticipation when approaching it, and a deep sense of awe when seeing it, and touching it.

present ordinary state of mind can turn into altered states of consciousness, even states of transcendence and trance.³

The creative mind is blessed with insights and enlightenment, but may bear the curse, or perhaps we should say, the challenge, of being exceptional and different. In the Five-Factor Theory of personality the trait “Openness to experience” encompasses personality characteristics such as: openness to new ideas and experiences, unconventionality, untraditional ideas, engagement in fantasies, rich emotional life, curiosity, creativity, and an ability for aesthetic appreciation of visual and tonal arts.⁴ This “Openness”-trait is also associated with intelligence.

What role could people who were high on this trait have in prehistory? Actually, in (what we tend to call), “primitive societies,” conformity, tradition and “business as usual” were, and still are, important adaptive survival strategies (Francesco d’Errico, personal comment). New ideas and practices could lead astray. “Astray” both in concrete and symbolic meaning. Therefore, creative persons could be met with reluctance and resistance. However, through millennia, human cultures developed. People with creative minds and souls did indeed create new shared experiences, new symbols and symbolic systems of meaning, language, new practices and customs, new artefacts (literally arte-facts) as well as new intricate art laden with symbols, information, and communication.⁵ They worked with and transformed matter, communicated with words, gestures, and sounds—and they enchanted souls.—Human culture grew out of their creativity.

Some of them were shamans. Persons with uncanny insights into the totality of being, and with existential and ecstatic visions that were transformed and transferred into dance, music, symbolic gestures, utterances, mythologies, songs, stories, symbols, and insights.⁶ Their “magic” was the sciences and arts of their times. Through millennia they transcended the human-animal division and depicted their personal transformations.⁷ A stunning example is the approximately 38.000 years old hybrid “Löwenmensch” (Lion Man).⁸—Their engravings, figurines, and paintings of dances and rituals were the art of their times. In these ways their impressions were expressed. Their visionary souls touched the souls of others.—They still touch us today.

Souls and matter met and united in the embodied experience of material engagement and visionary creative ideas, in shamans and other persons alike. They created the acts and processes of creativity.

We tend to think of technology and art as belonging to different realms, but archaeologically and historically, they are entwined. The ancient Greek word for “art”, *techné* (*techne*) and *techni* (*τέχνη*) seems to us to point more to technology and objects meant for matter, materials, and practical use, than to artistic creativity meant for the mind and soul. Yet *techné* meant crafts as well as to be skillful at doing or performing something, almost anything, from navigation to medical curing. *Techné* encompassed creating, shaping—artefacts and arts alike.⁹ In this ancient Greek concept, material and symbolic culture are united, interconnected, interlaced, and entwined. There is no difference. And indeed, neurologically, in our brains, the same areas and connections are activated in the creative processes.—Matter and mind are one.

We are both.—In us, matter is animated.

The Norwegian word for “animated” is “*besjelet*,” literally: “given soul.”

Matter creates our souls.—Our souls re-create matter.

In gestures, our souls are expressed through matter.

In this unity we create – and are created.

Matter, gesture and soul—“Such stuff that dreams are made of”...

3 Fischer, 1971; Gisiger, Dehaene & Changeux, 2000

4 McCrae & Costa, 1999

5 Lindstrøm & Kristoffersen, 2001

6 Clottes & Lewis-Williams, 1996; Price, 2001

7 Lindstrøm, 2012

8 Lumley, 2009

9 Østergaard, 2001



Figure 1. The Lappesteinen siedi. A large stone, sacred as a landmark and offering site for the Sámi populations at Hardangervidda, Norway.
Photo by Torill Christine Lindstrøm

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