

Ca (Temperatures)

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1
Walking on a windy shore in early spring near the premises of the Maaretta Jaukkuri Foundation, my attention got caught by white dots on the ground. Coming near to them, I found dried seaweed rooted on those blobs, which I first thought were pieces of styro-foam or some other kind of plastic. Who knows how long they might have been drifted? But they were actually eroded pieces of coral reef from the ocean at Lofoten, above the Arctic Circle.

I collected them along with many other things which were once alive and brought them back to where I was staying. While observing them at home, I explored the micro ecologies of Lofoten.

As permitted by weather and tidal movement, I was able to forage plants from both land and sea. I found an internet site for surfers (surf-forecast.com) which was most useful for me, helping me to determine whether or not to stay home and when is a good time to look for seaweed. Eating the wild foods, tasting their flavours while looking at the view of wild scenery gave me strong impressions every time.

One afternoon, I heard a loud but dull sound from outside. I looked out at the balcony and saw a pair of small birds next to each other, dead in front of a glass shield.

2
I learned how to make a Korean oxtail soup (*gomtang*), highly

praised soul food. It takes at least two days because it requires a slow process of not only simmering, but also of clarifying its stock thoroughly. It is worthwhile waiting for the essence of the bones, cartilage and meat to come together in a magical way. Its semi-transparent milky whiteness is the goal and the sign of excellent nutrition; the soup is packed with organic substances such as collagen and inorganic minerals such as calcium. Somehow comparable to chicken soup in the US, its culinary heritage has been passed down the generations, assuring warmth and health during winters and often healing those who are weakened.

itadakimasu (I will humbly accept it) ...
jal moke get sum nida (I will eat very well) ...

Prayers are given before the meal.

3
Recently I learned that the otolith, an ear bone, in salmon grows as a tree trunk does. It actually records its outwardly expanding growth log daily. According to natural scientists who read its micro patterns, this biomineralization of calcium carbonate is sensitive to how fishes experience their worlds and other factors, such as the salinity of water, food and the location of their habitat, which has different mineral contents depending on the types of rocks on different riverbeds.

The data of an otolith is stored, archived and compared to other otoliths so that scientists can learn about the health condition of the species and the sea. And by comparing them with fossilised otoliths, scientists can look into long-term environmental changes, for example.

4
OK11 gallery has a front space covered with black and white tiles in a checked pattern. I heard that this tiling style indicates that the premises was once a dairy shop, a *maitokauppa* – perhaps lots of people were coming in and out for the various milk products that are excellent sources of calcium.

Milk is white because the water, fat and other chemical contents together form small particles in the liquid which evenly reflect, rather than absorb, every visible light wave, so the milk appears white to human eyes. It is understandable that we tend to associate the whiteness of milk with calcium; because of its high calcium content, we used to be (and still are) told to drink milk as calcium is known to be important for the promotion of the healthy

growth of strong bones.

My 7-year-old son likes all kinds of dairy products. He gets excited about eating yogurt with frozen mixed berries as a desert in the evening (this became a family custom as we learned that the evening intake of yogurt is more beneficial).

My son came to the gallery in March and gave me great help in making this work. I wanted to make a painting out of its sections, so I asked for his contribution to my work. We knelt down and searched for the parts that tiles are poorly aligned.

Some of these gaps are quite big, which comes from the fact that the white tiles are slightly smaller than the black tiles – something that is not noticeable unless one measures them. I thought about those gaps as wormholes or a source of possibility.

While holding the paper directly on the floor, he rubbed a solid graphite stick against the paper until the lines of tile edges were traced. He seemed to have enjoyed completing the task.

I brought the papers to my studio and transferred those marks onto the surface of wooden boards. I then painted them with 4–5 layers of milk paint (containing casein and lime), finished with a thin coat of beeswax and linseed oil for protection.

5
Lime, the chalky substance in the milk paint, is also used for the bases of fresco paintings, and its source, limestone, is used for lithograph and building blocks. Lime is vital in the productions of common building materials like bricks, tiles, plaster, concrete and glass. Lime works as pH buffering agent against acid rain.

Limestone is a type of carbonate sedimentary rock which takes the crystallisation of calcium (calcite) over a course of geological time. It also takes the process of sedimentation; thus it contains the fossils of various life forms (as seen on the floor in Ateneum Museum, for example) which allows us – contemporary humans – to look into the records of the evolution of life on, and the environmental changes of, Earth.

Limestone is durable but not permanent. It gets eroded by weathering, falling from cliffs, tumbling down through rivers, being broken down into pieces in fields and washed down into the oceans. The movement of water is also the movement of calcium, so to say.

In the oceans polyps use the water-dissolved calcium compounds to build their stony coral – the protective skeleton. Fascinatingly, this micro mineralisation is also a geological process, changing the shorelines and the shape of islands.

While researching coral and calcium, I learned that there are calcium supplements made of coral reef. Coral Calcium ‘Supreme’ by Bob Barefoot seems to be the popular one, getting 5/5 stars on Amazon, though I was able to find warnings and the news of lawsuits for their ‘false’ claim of health benefits including ‘curing’ cancer. Its label features a colourful photographic image of underwater ecology – tropical fishes around coral reefs – and states that the product is ‘From Okinawa, Japan’. I also read concerns about the higher content of lead and mercury in their product due to the polluted sea. A 2003 article from Time magazine said, ‘It may be one of the more successful scams of our age’.

6
Calcium exists in our system and bones, but we need to constantly take it in in order to replace the old and depleting calcium which the body uses for bone formation and resorption.

We intake calcium, sometimes from supplements and sometimes from our diet, by taking the lives of other animals and plants. Calcium is one of the essential nutrients that all living organisms need. Kale and broccoli are the among of green vegetables with higher calcium contents. So-called weeds in a field are often nutrient-rich edible plants, so free-range animals absorb more calcium – the milk from grass-fed cows has a much higher calcium content than the milk from corn-fed cows. And those plants get their nutrients from other decaying life forms, which might be from the same area or might have migrated from somewhere.

Humans can intervene both positively and negatively in this natural process by adding fertilizers, but, among other essential nutrients (nitrogen, phosphorous, potassium, magnesium and sulphur), calcium not only circulates *within* the bodies of organisms but also *among* the bodies of organisms, it keeps circulating in the biosphere and in multiple, different durations of life cycles. Calcium never disappears – it keeps transplanting and upcycling within this planet.

7
‘Different types of compounds will take on different temperatures when exposed to the same amount of sunlight.’

I found this line in an explanation of what the Thermal Emission Spectrometer (TES) is (it is a thermal data collection instrument that NASA sent to Mars). TES’s successor, the Hyperspectral Thermal Emission Spectrometer (HyTES), has more powerful meters and cameras. It looks at and measures the surface of Earth from the sky and can generate infrared images to expose mineral compositions; its thermal infrared sensor is reactive with the radiation of the electromagnetic spectrum, the amount of which increases with temperature, so it maps out the zones of different temperatures.

These HyTES-depicted images can be combined with other imaging materials to synthesise a more refined mineralisation map (such as the maps produced using MTMF method), showing different minerals in different colours correlating to the terrain characteristics.

This is fascinating, but it is complex to fully understand its technicality. But I now know that calcite and dolomite have slightly different ways of retaining solar energy and different temperatures.

8
‘Got Calcium?’

Perhaps this is a parody of a famous 1990s ad campaign for the California Milk Processor Board, ‘Got milk?’ I found this as the headline in one of the educational webpages on NASA’s webpage ‘Imagine the Universe’. It explains about how abundantly calcium exist in space – figuring out the equivalent number of the gallons of milk for the amount of calcium produced by the explosion of Cassiopeia A that took place about 320 years ago.

Along with the heavy metals like gold and platinum, calcium is produced in stars and released into space when the death of a star results in a massive explosion.

I encountered recent news confirming this idea from a discovery based on the observations made by 70 scientists from around the globe on SN 2019ehk, a rare calcium-rich supernova. Half of the calcium in space is thought to come from stars. This suggests that the calcium on Earth, including our teeth and bones, may be made out of the remnants of exploded stars.

9
In relation to the ‘natural’ movements of the mineral (by the migration of flora and fauna, and the disintegration of limestones), I started to think about the anthropological movement of calcium-rich rocks. How do technical, social, economical, aesthetical and

even political implications affect the course of such movements? So much material is ceaselessly moving from one place to another. Material is cut into shapes and often fits into the right spaces, and equally, it is quite often broken into pieces and dumped.

For this new work, I searched for photographs from my last visit to Rome, in 2010. After a few weeks of pondering, I decided to use the one photograph I took at the Appian Way, an ancient Roman road. It depicts fragments of calcium-rich materials repurposed for the composition of the wall of a building by the road. Histories of mineral movement may have been fused into the surface of the wall. Living with this, Roman people must have had a special sense of temporality.

I still get mesmerized by looking at the image – had human hands moved those materials or was the calcium moving? – Am I part of such a process?

10
The temperature dropped.

I said good-bye and laid those dead birds together on a rock exposed by the low tide.