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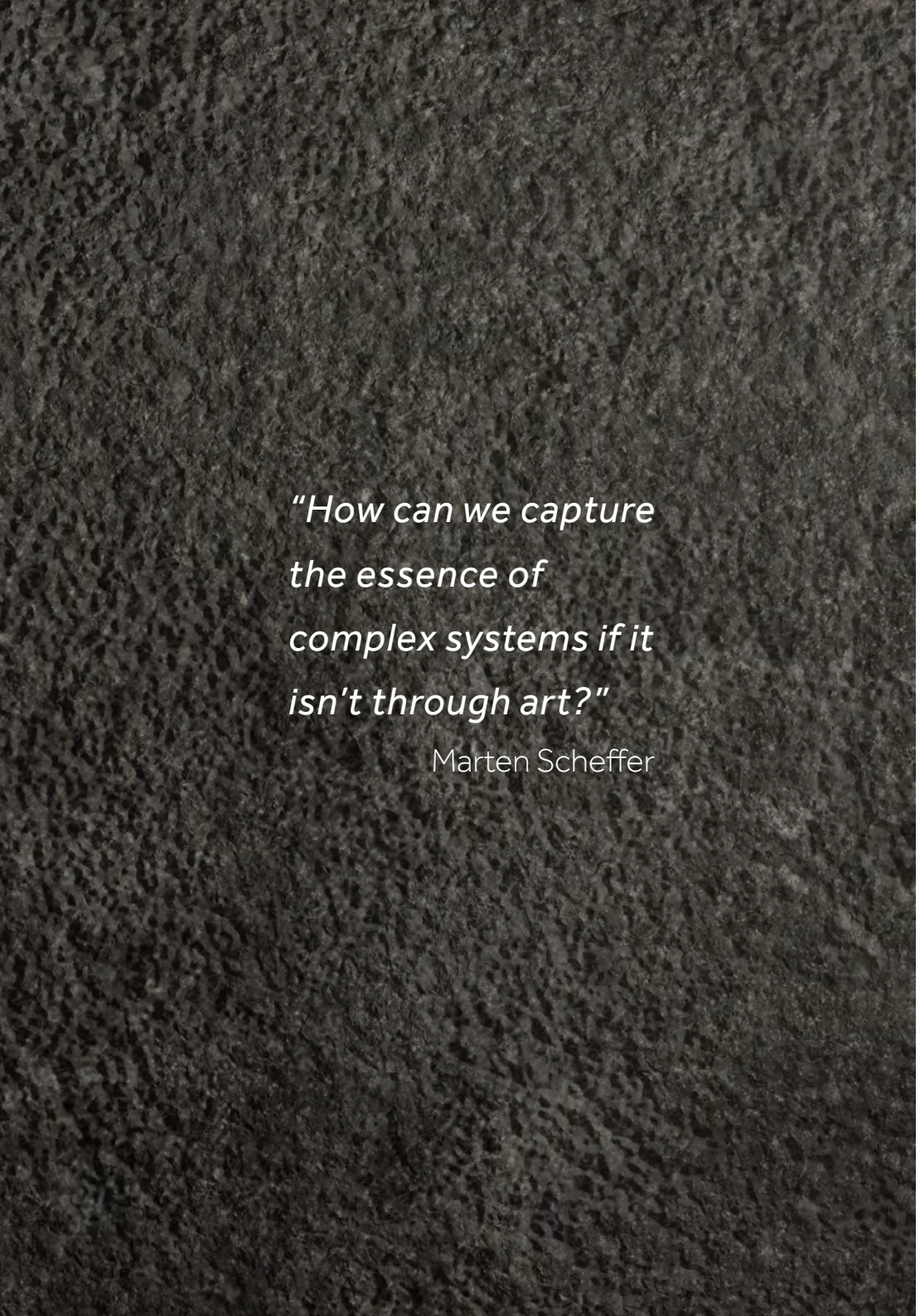
Art + Science

Chile 2023



"How can we capture the essence of complex systems if it isn't through art?"

Marten Scheffer

Art + Science

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Francisco Gazitua

Introduction

We invited our beloved Andes Mountains of Chile, a 500km long geography between the rivers Maipo and Teno. We invited scientists and artists to share our immense stone vessel, where until today we dream and work, where our work matured.

We were artists who selected the guests with the following criteria:

Scientists or artists, aware that our stay on earth, takes place in a space of time delimited by two great miracles, life and death, the place is this great workshop: The universe...

> *"In fact, a living being endowed with soul and intelligence [...] a unique and tangible entity that contains, in turn, all the living beings of the universe, which by their own nature are all interconnected"*
> - Plato's Timaeus

More poet than philosopher, conceives the universe as a great workshop, where we all, galaxies, protozoa, human beings, get up every day, with strength, innocence, in order to perform, each one in his own way, his work, to deliver his necessary contribution in the workshop of 'Anima Mundi'.

This awareness makes us an animal species, whose fur we instinctively recognize.

Travellers, accomplices, naturalists, friends for many years, together, from far or near in Europe or America, we witnessed our battles to remain and expand the limits of science and art.

In that trace we knew the nobility of the generous heart of each one of you.

Scientists and artists, during the meeting we rolled like a single stone.

A single stone of the Claro river, navigates in peace, centred in the silent coherence of its crystals and its mathematical formulas, quartz, feldspar, navigates, until it becomes sand.

We invite our illuminated temple, The Andes, staying inside those stones, which exist only to show its *Beauty* in each of its turns.

Beauty: our ancestral field from where we should never have left, scientists or artists, being ours, to see and not to see.

We invite Scientists, seekers of the *Good and the Truth*, to know up close and fall in love again with the most forgotten of the three Aristotelian attributes of *Being: Beauty*.

It became everyone's property again, not only the property of the arts.

Apacheta

Nature, by force of her tyrannical *Beauty*, by only showing us "her honest face" returned us to our "old home" from where we were always together, from where we should never have left.

The golden stone, which Roel left on our table in Pirque and which Isabel transformed into the cover of this book, waited centuries to show us a single truth:

Arts and sciences were born and walked together since the beginning of ages.

The arts and sciences, today artificially separated by a puerile rationalism, will continue to walk together!

Henrik Österblom

What are we doing here?

Possibly we are trying to internalize the mystery of the world. The sounds horses make when climbing in steep terrain. The sensation of muscles moving below me, strong against my thighs. The ways my hips roll as we go deeper in to the mountain, as I understand the rhythm.

Eating together in the shade. A man dropping ice on the ground – *"Kill him!"* – the master says, and laughs. People at peace, like children, playing in the wind and marveling at her beauty. Allowing themselves to be free. Exploring and discovering. Admiring the power of the elements, how wind moves from gentle and caressing, to raging. *"Don't try to hold me, silly, you are no match to me"*. To be humble in the elements.

Entering a secret forest, asking for permission, finding things I have never seen before. Crossing water on its floor, to exit on the other side and find a perfect home, where the puma roam. Walking back in to the green to take a deep breath and lie down on my back for a while. Watch the trees reach for the skies as my old and new friends talk about the challenge of stewarding the land in ways that are good for plants, make animals happy and people content. How to solve these problems?

The trees don't think about problems, they stretch towards the light, their roots feeling towards water and nutrients.

Exiting this green, we descend to the river and parrots – green, yellow, blue, red, white. Crossing the river, facing the water rushing towards me, pushing me as I push back. Burning feet on the sand underneath the birds on the cliff above. This is where the 'Tricahues' (Burrowing Parrots - *Cyanoliseus patagonus*) live.

Back again to play with the wind – this time in the water. She snaps a rainbow out of blue. We sail together in the river, exploring the balance of power and beauty. Then back on the horse, smiling and singing to him, but only for his ears. I am wondering if we are all secretly speaking and singing to our horses? We move forward, covered in dust, but filled with mountains, wind, lush green and sweet water.

Nothofagus obliqua

Ángela Leible - Prologue

The Map of 1 to 1 or On Rigor in Science

Linnaeus Ash

Reflecting on the way our thinking process have changed, particularly in relation to our surroundings, my focus is on the effect of our globalised materialism on our existence. Our current way of life seems to have forced us to shrink our 'brain maps', so that we synthesise too rapidly our incomplete thoughts without giving them the opportunity to fully mature, reducing our thinking to 'event machines'.

I reflect upon the ancient discipline of map making where it seems to me that thinking was allowed to mature in real time and space.

Jorge Luis Borges talks about the empty Cordillera where in the stone houses there still exist remains of the *"one mile to one mile"* maps of that time.

> *"In that Empire, the Art of Cartography achieved such perfection that the map of a single Province occupied an entire City, and the map of the Empire, an entire Province".*

As times changed these extensive truly meaningful maps no longer suited the master Cartographers, being the size of Empires themselves.

> *"These 'scale maps' were no longer of use to the following generations who found them too inconvenient, prone as they were to inclemencies of the sun and the winters. Remnants remain in the deserts of the West now viewed only by animals and passers by; the only relics of this great Geographical Discipline"* -Suarez Miranda, Viajes de Varones Prudentes, Libro Cuarto, Cap. XLV, Lérida, 1658.

An opportunity to rediscover this thinking process of the ancients, occurred when Henrik Österblom invited Francisco and I to Stora Karlsö Island, an art and science meeting initiative, where we studied this nature reserve in the Baltic Sea. Known for its wealth of birdlife, this island measures 2.5km^2 with limestone cliffs, junipers and a huge ash tree at its centre. Inhabited since the stone age, it was a marble quarry for the construction of churches on Gotland. In 1741 the Swedish naturalist Carl von Linnaeus visited the island, Linnaeus developed the binomial nomenclature to classify and organise animals and plants. He named the tree 'The Linnaeus Ash" already 400-year-old, a 6 metre tall and multi-trunked ash tree.

The ash tree in Norse mythology is a Yggdrasil, described as a huge evergreen tree that cradles the nine realms of Viking myth in its roots and branches, connecting and nurturing all things. It is the tree of life, linking the realms of the heavens, the realms of living things and the underworld. It seemed clear to me how such a living thing could indeed unite the realms of the underworld, the Viking burials; the world of living things with the animals and plants and the heavenly world with the birds.

We walked around the island every day without a plan, neither ours nor anyone else's. We concentrated on our thoughts. We concentrated on what caught our attention, the ash tree and the meaning of the ash tree.

We were thinking in the old map making way!

In making a map of that Empire, the size of this Empire. Recreating it in our minds with the ash at its centre.

My understanding is that the artist offers a service. The service is to provide for people a conduit of our spirit directly to the things around us, and make that connection available to others. The heart speaking to the spirit and the spirit resonating of itself and to humanity.

How to bring back into light these precious

Yggdrasil tree of life

Ángela Leible

When we left, the Ash dismissed us like this.

discarded shadows, the ways of connection to living things and their ecosystems, in our own time, with sciences at our side, its systematic methodologies and complementary ways of working together, to rediscover and develop a new contemporary map that plots the new, old way of the ancients. With this work we aim for a renewed acceptance of nature, animated with a light that guides knowledge and seeks meaningful communication with the soul of our world a mutually enriching relationships between ourselves and our earth.

Isabel H Langtry

Emotional Complexity

'Emotional Complexity I'

In collaboration, there is potential to connect. As a group of international artists and scientists practicing in diverse areas, perhaps we are able to explore blind spots in our methodologies, find solutions together and explore reconnecting with our environment. In a society so obsessed with consumerism our problems are perhaps reflected in our ease with consumption. Such an ease with consumption deprives us of emotional challenge, keeping us always a step away from the realities of our earth.

Our lives are collapsing down. Why do we allow our cultures to continue depleting our very selves? In dislocating from our surroundings, the diversity of the earth's resources, we lose the real wealth, not economic growth, but the thriving mycelium growth in all its possible meanings and manifestations, these beautiful complex fractal tree-like colonies, which connect us metaphorically to each other and all living things.

When Angela Leible offered us the longest sheets of fine fabric imaginable with which to describe the indescribable, or *"make visible the invisible"* as Leible says, she gave us the opportunity to create shapes that I have never seen before.

Produce feelings that I have never felt before.

Together we embraced physical and theoretical experiences as a micro community. Symbiotically reconfiguring moments in time offered by the elements.

Our relationship to the natural world expanded. The result in my mind was the experience of deep emotion. Connecting emotions and observing its impacts on each other.

In this meeting of theory and actions we embraced the mountains and the elements, possibly re-enacting ancestral rituals, all of us driven to observe and express.

A great deal of creativity is required to make significant breakthroughs, and art is often an expression of scientific understandings. When Maria Sibylla Merian studied the metamorphosis of insects, *Metamorphosis Insectorum Surinamensium 1705*, it opened a bridge of understanding for artists and scientists alike. The Da Vinci-Broen bridge in Norway pioneered by Norwegian artist Vebjørn Sand - ridiculed at the time Leonardo designed it, was successfully built 500 years later. Marianne North (born 1830), whose brilliantly coloured paintings brought species to life in their natural habitats shining a light then on symbiotic ecosystems.

Today Francisca Nneka Okeke studies the electrojet which traverses the globe eastward around the world, fascinating and inspiring. All well established knowledge, alarm bells echoing through time. How different our world would be if invading forces had listened to the people of their lands and how they worked with it, instead of seeking to dominate, impose and grow fat.

Time for our cultures to realign meaningfully with nature, let's create a different kind of navigation...

‘Emotional Complexity II’

Valle del Yeso

Artists + Scientists

Glaciar Juancal

Patrick Bermingham

Voyage of Discovery

This was a voyage of discovery. Like Darwin before us we did not set out to prove a theory or confirm a hypothesis. We went to explore, to taste the sky, to observe the wind to see what we might discover first hand. We were armed with mathematicians, sculptors, painters, scientists and legions of photographers to observe, to record and to discover what was within our grasp.

We had local guides and foreign knowledge. We travelled on foot and on horseback. We criss-crossed over subjects that ranged from micro to macro. We were a team of artists and scientists with very little to distinguish between our fields in the Mountains. Optimistic, curious and adventurous we did not go looking for metals or resources. We were looking to make connections rather than trying to prove something. We talked about how many molecules are in a square metre of rock and we compared it to the number of litres of water in the Pacific Ocean (both very similar at $2X10^{27}$).

We tried to imagine how much time it would take for a fracture to propagate across a sea of granite molecules inside a granite boulder. We listened to the stones tumbling in a glacial stream as it crossed an alluvial field. Slowly working their way from high places to new lower ones in the Canjon de Yesso.

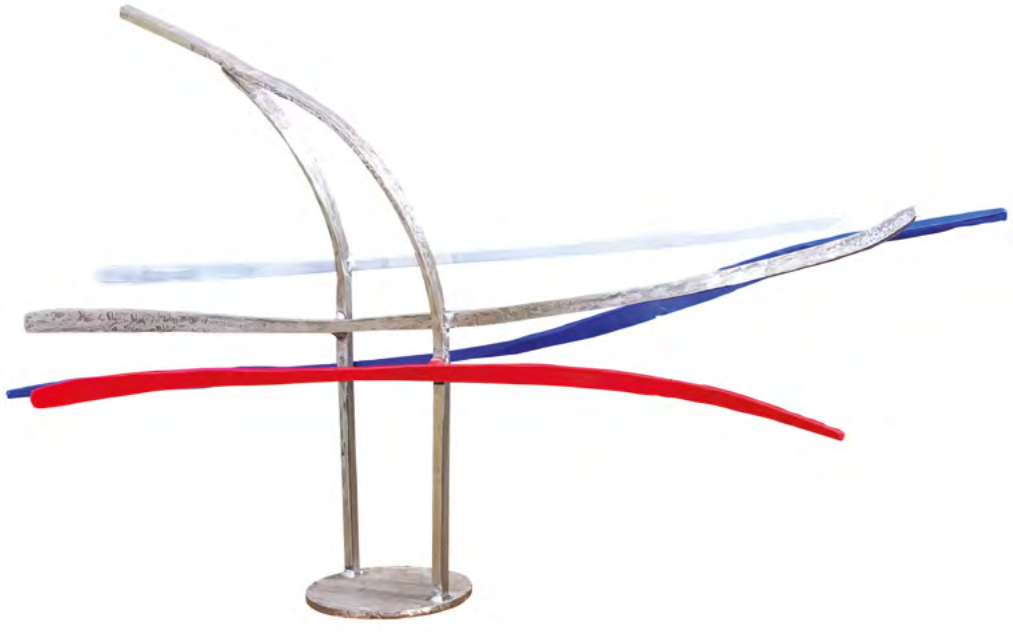
We observed the Sun and the Moon the birds and our horses as we travelled into the mountains. Every experience was a chance to learn and observe. We were like a multi-headed insect with many very sensitive antennae. We saw the obvious and the not so obvious. We were all exploring with our own skills and bias.

Each one of us having a different background we formed a ship of explorers determined to discover perhaps a greater connection between science and art?

Patrick (left) .

Participants working to support poles with bolts of cloth flying in the wind

Henrik Österblom anchors one end of a long bolt of red fabric



'The Winds of the Andes' by Patrick Bermingham.

We worked as a team to make the invisible wind visible. In the image overleaf we can see three bolts of fabric white red and transparent. Each with a team of participants working together to raise a pole with a 30 to 40 metre piece of fabric attached. The wind was strong and difficult to predict. We all tried slightly different approaches to holding and supporting the wooden poles with our hands and ropes. We quickly learned from each other's "mistakes" and soon each team had a bolt of fabric flying in the wind. The fabric illustrated the direction, the strength, and the character of the wind. Like any physics experiment there was an action and reaction as each team tried their best to counter the strength of the wind. If we look to the participants, they were a study in themselves. All working to maintain a constant steady state configuration for as long as possible. Yet the wind was not constant. It blew hard and then stopped, it started without warning and it knocked us down. It bent the poles and broke them. It pulled the ropes out from our hands and we struggled to keep control of a force that we could not see. It was very difficult to imagine how strong or from what direction it was coming. Maybe this was the experiment? To watch and observe how humans attempt to try to control nature? The wind played with us!

We listened to the stories of others and learned how they were having a positive impact on the world. How they were changing the practice of industry and all of the very positive changes that could be made. We made sculptures both temporal and permanent. A gold stone, a steel parrot feather, a forged gust of wind.

We left with a profound sense of optimism about the world and the positive impact that people can have on its future. Some of us took home a sketch, an idea, a conversation, but the real findings of the trip may not be known for years. In the meantime, we left with a promise to continue to explore further.

Juan Luis Dörr

Mountain Life

'Escultura I'

Growing up as a child in the town of Los Queñes, in the Andes Mountains, in the Maule region of Chile, has had a profound influence on my way of seeing the world, of living and on my work as a sculptor.

The mountain range life brought me closer to the inhabitants of this geography, both human and animal, allowing me to observe the world from a human-animal perspective where there is a long history of symbiosis between different beings but with a common origin and destiny.

The deep knowledge of a specific environment

'Escultura II'

Drawing by Begoña Cornejo.

allows a real connection and the possibility to observe from the macro to the micro, from the evident to the intuitive and to be able to feel it as a coherent whole.

The stimulus of the environment with all its signals passes through the knowledgeable person, therefore conscious, con-substantiating and becoming one.

Then art is born from within. As a result of this fusion of the yearnings of man and the stimuli of nature through a creative process, arises the unique. Personal and universal work at the same time, that contains symbols and eternal answers that cannot be defined but that humanise nature and make the human being reflect in it.

One of the missions of art is then fulfilled, to preserve the sacred codes that allow humanity not to separate itself from nature. Abstract codes that are hidden in our genetic memory, in our atoms and in our dreams.

Jorge Carey

The Power of Observation

Manantiales

The present dilemma that a traditional media organization faces is that it does not have time to reflect. A recurring observation made by insiders is that the chase of what is deemed urgent, such as ratings, reach, clicks, fans and likes, repeatedly trumps over what is important. This endless pursuit of an elusive audience is often to the detriment of reflection, deep observation, context and other important activities that are crucial to the healthy development of a society. The invitation to join the Art & Science Symposium Andes allowed me to witness the wonders and beauty of creation upon the intersection of science and art. The vigorous yet calming flow of the river and the wind, the omnipresence of the Condor, the testimony of endurance given by the Andean Cypress, true sentinels of an exceptional ecosystem, and the sheer magnificence of the Andes, were our companions in the pursuit of wisdom and truth. Douglas Tompkins, an environmental philanthropist responsible for the donation to Chile of vast territories that comprise the Chilean National Parks that have been created in the Patagonia region over the past 20 years, often shared that he had come to understand that a beautiful landscape was inevitably a reflection of its equilibrium, hence of its well-being. In this sense, I was able to witness the collective effort of scientists and artists to create beauty and in that observational process realised the true power of their collaboration in our modern world: the quest for resilience, understood as the capacity of the human soul to restore its equilibrium to become an agent for the well-being of our planetary ecosystem. As a media leader in Chile, the opportunity to observe the unfolding of the human spirit in the creation of beauty - the intersection of art and science- has been a humbling experience, and a way to understand that the true role of a communicator is to observe attentively the pursuit of greatness with the objective of sharing it with the rest of the world.

Isabel H Langtry

Breath of the Andes

This new sculptural work 'Breath of the Andes', has been made as a response to the art and science project working together to explore the elements and new ways to respond to them.

Plato describes platonic solids or natural objects as,

> *"...beautiful not in relation to something else but naturally and permanently beautiful in and of themselves".*

In a similar spirit, this is the way I felt about the power of Los Andes. The physicality of the mountains themselves generating *object* like forces amalgamating the natural organic - rich, witty, and playful. Stimulating in me this biomorphic response, this captured spirit in a sculptural work, abstractly evoking living forms and forces.

This sculpture is an agglomerated component of the essences which I found there, with all its architectural and spiritual allusion.

The economic use of materials is out of respect for the material itself, a respect which amongst everything else is a recognition of our breathing, living earth, distilled into our very essence, the primitive virginity which we must not suffocate. These are my axis of reference.

Abstract language allows the opportunity to explore an abstract aesthetic with energy and innovation and the chance to create and therefore react to new emotions. In Los Andes, stars become heads and mountains profiles. If we can read ourselves into these landscapes, it is because they mean so much to us.

Isabel H Langtry

Liquid Dynamics

Leonardo's movement of water.

Lynn Chadwick's maquette III, Moon of Alabama.

Isabel H Langtry in the Rio Clara.

Amongst the vast range of phenomena that Leonardo explored and depicted through his drawings was the behaviour of liquids. Comparing it with the movement of blood in the human body. Here in the tributaries of the Chilean Andes the motions of water impact, transform and inspire. Born from crystal clear lakes that make their way between volcanoes and native Chilean oak forests in this benign climate of high peaks, the water is cold and delicious. An ideal place to be in contact with nature. In this project we observed, considered and were inspired by its dynamics. The flowing water in motion, in its various forms of *vene d'aqua* or veins of water, the movement of air, the sound of birds. Driven by the need to increase our sensitivity in order that our observations can better create artworks that connect and engage far-away viewers, using our experiences to tell powerful stories about the essence of our rapidly changing world. We expressed our discoveries in motion, making emotionally striking aesthetics, playfully, to invite audiences to reflect on the relationship between this physical nature, the intimate, the global and our relationship with complex human social habits.

My own immersion in the flowing waters of the Rio Clara descending as it does from the high mountains, aimed to illustrate physically, creatively and psychologically these powerful forces to sculptural effect. In holding the weight of drenched fabric aloft to better capture the wind, the fabric and wind-flow formed my materials, and with these I created new shapes, new emotions, against my body, a direct in-person experience with the dynamics of physicality.

Together with the scientist Henrik Österblom we held this great weight into the air and became '*a sculpture*'. Reminiscent of the sculptural concerns of Lynn Chadwick whose aim to suspend weight and form in space we graphically illustrated. Forming even the tripod with our legs, bone and muscle with which to sustain the form, working with the powerful wind and its collusion with gravity and water currents, to create forms that Chadwick described as,

> *"images of flight, of ragged claws scuttling across the floors of silent seas".*

In the world of Plato, a form is aspatial - transcendent to space, and atemporal - transcendent to time. In this timeless landscape uninterrupted by human existence these words resonated with our work. Los Andes mountains inspired new explorations into other ways of creating forms and new emotions, sometimes a song or a poem also came, illustrating the emotional significance of this series of multisensory encounters, Each work seeking to attune us to the material traces of life at scales ranging from the intimate to the universal, sharing the common aspiration to deepen our understanding of our beautiful world and how we can work with it.

Turbulence

Leonardo's interest in the movement of vortices which he describes in many personal drawings, is compelling. My own interest in the forces of nature is certainly influenced by this work. Here in Los Andes, the forces are dramatically and physically real. The Art and Science research group came here to explore and respond together and individually, as artists, as scientists, from around the globe, to explore visually, physically and theoretically, the forces that surround us, the possible and the experimental, to deepen our understanding of our beautiful world and how we can work with it and how I take inspiration from here to my studio in London and continue the exploration there.

As a group we worked to experience the forces. Using fabrics in strategic ways to feel it's power and respond to the turbulence. By introducing my body as a support to the fabric I was able to experience the force of the wind through the fabric and my body, working with the wind to create kinetic shapes. Leonardo parallel's human blood with his thinking on flow, and I experienced this through the emotion and physical interaction which created a series of temporary sculptures which exist in photographic records only. Using myself as the interactive object, heart pounding, blood flowing, against the wind, feeling the force physically and through the fabric extensions, thrown to the wind and held fast working with the extraordinary power of our earth.

I observed in the movement of the fabric as we set it in the wind, how the shapes created seemed to mirror the silhouette of the Andes, the feel of the wind as it was channelled across the valleys and terrain, a visual echo chamber!

In creatively responding to the surrounding forces we establish connections, agreed ways forward to further projects. I felt an echo in the Andes, a physical and visual thing, so that the mounds of vegetation seemed as miniature hill formations, even the stones seemed magnetised into mounds. The horizon line appeared to me as a heart monitor, delineated up with human profiles so meaningful to the work of the Chilean poet Gabriela Mistral.

Emotions can motivate us to take action. They played an important role in the way I thought, and behaved in this situation of such available interactive proximity, with an extraordinary natural environment.

Pablo A Marquet

Picturing the world through art and science

The issue of inventing and representing is a cornerstone of the art science reflection, as both disciplines represent nature, although in different ways and through different supports. While art and science represent and invent, it may be said that science provides a kind of knowledge that explains in a reproducible and cumulative way.

Before delving in to these issues let's exemplify what we have said above with a concrete example; the phenomenon of turbulence. When seeing the long and wonderful fabrics brought by Angela to the Andes, we realize that when moved by the wind they were making apparent the inner complexity of air, the very fact it is a fluid, a flow. Flows, that is matter in movement have fascinated artists, scientists and *artiscientist or scientartist* (those that do both) as well as philosophers and of course polymaths, that are interested in pretty much anything.

Two philosophers are important on this point. One of them is Alexander Spirkin, in his book Dialectical Materialisms, he asks,

> *"What is a picture of the world? It is a picture of how matter moves and how in the shape of the human being it feels, thinks and poses goals.*
>
> *The creation of a general picture of the world is the task of all fields of knowledge, including philosophy."*

Art is the exploration of the infinite possibilities, of the sheer number of pictures of the world, it is the exploration of the possible. Science on the other hand is the systematic exploration and cumulative construction of a selected picture of the world, that needs to fit the empirical reality we experience, as an objective representation of it, through a method that needs to be reproducible, that is, any one that follows the same rules should get the same results. Further, it needs a language to minimize ambiguity so that the communication of science, and the cumulative nature of knowledge is realised with minimal distortion; this way we can keep progressing, adding pieces to the puzzle of nature. If art studies the possible and science the study of one realisation of it, then it follows that science is contained within art and it should overlap, such that art can converge and work a picture of the world that is aligned with science and the other way around. The other philosopher I would like to call in is Heidegger. As he mentions in his essay Modern Science Metaphysics and Mathematics,

> *"The mathematical is that evident aspect of things within which we are always already moving and according to which we experience them as things at all, and as such things. The mathematical is this fundamental position we take towards things by which we take up things as already given to us, and as they must and should be given. Therefore, the mathematical is the fundamental presupposition of the knowledge of things."*

For Heidegger, the mathematical was a distinctive feature of modern science a way of knowing things in the world as we already know them to be in advance. Mathematics in this context is a way to unveil the world we know, a sort of mirror of what we already know in advance. A representation of world we already know. In this context, art is the same, a representation of a world we know. And sometimes this world can be mysterious.

Turbulence, from the Latin *turbulentia*, meaning perturbation, trouble, describes the flowing of fluids (liquids but also gases), which under certain conditions become disordered and thus troublesome. The study of turbulence

is an important field of scientific research in atmospheric and fluid dynamics sciences. It was an artist, Leonardo da Vinci, who is credited with making the first scientific note on turbulence. Leonardo made extensive studies and experiments on the movement of water. One famous drawing by him shows a water jet impacting a water pool, and has been widely used by fluid dynamicists as an example of a turbulent flow, probably the first of its kind (Fig.1) among several others da Vinci drew on water movement.

Reality seems richer than it looks. Art brings us that richness, unveils the many worlds around us, making apparent their mystery as science does. All I can say is this:

Among the granodiorites and the basalts
we discovered a river of blood
Running through the Cypress and the Nothofagus,
Unveiled by the soul of art and science
United in the ancestral rite of seeing the turbulent flow of the wind
I saw the wind
I saw the wind
Unwinding me to become myself.

Fig. 1.Leonardo da Vinci's studies of water (c.1510-12). The fall of a stream of water from a sluice into a pool.
This drawing depicts turbulence as composed of several eddies or vortices of different size, a quintessential feature of turbulence that several centuries later was formalized by the great mathematician Alexander Kolmogorov in what is now known as the cascade model of turbulence. But this was not the only attempt to represent this phenomenon mathematically. Later came the Navier-Stokes equation that models the dynamics of a fluid. This equation is essential to model the weather, blood flows, and the flying of airplanes, and yet it remains a mystery, as it has not been proved that it has a solution nor that this is unique, but it works!

Henrik Österblom

A great workshop

As a sustainability scientist, I am used to workshops where scientists from different disciplines meet and discuss common problems, challenge each other, and share ideas or questions. The aim is often to create a synthesis of different strands of knowledge. I am also used to co-design sustainability approaches with corporations. Exploring solutions through a carefully designed process results in an improvement of systems, at least at some level.

Meeting in the Andes would be different. There were no specific problems to address and we were not looking for solutions. When arriving to Chile, the instructions were: *"Try not to think too much. In fact, don't think at all"*. I don't mind operating in a different mode than what I am used to, and I don't mind when there are no plans. We had horses, we were going to explore the wind, and I trusted the organizers.

Meeting the other participants, I realized this was the common denominator. We all have faith in Francisco and Angela, admire them for their knowledge, skills, passion, humility, sense of humour and their connection to, and care for, the Andes. Regardless of results, this would be fun and we would make new friends.

For two days, we explored the mountains. We played with the wind (or did she play with us?). We found dead trees alive with silver, entered a secret forest, admired the bright colours of parrots, ate, drank and had conversations that generated new ideas and possible futures. We learnt about the Andes, its geography, how water flows, how wind runs through the air, how birds fly and how horses move. We realized what happens when surrounded by beauty, how senses are opened in mountains, and the many ways to appreciate the world, using tools from our respective training – as ecologists, mathematicians, sculptors or painters. So much to say about this, but then, there was also another workshop.

Forge at the Pirque's workshop

The workshop after the workshop was located in Pirque, with masters of sculpture and painting. This workshop had a forge, hammers, anvil, water, sunshine through leaves. It had lazy dogs resting on the floor, casually moving to the side as lightning sparks from grinders hit the best resting spots. Here I learnt about how steel behaves, how it can be shaped and moulded in to beauty, through force, coercion, and caress.

"Think of the hammer as your thumb,
.. think about two pieces of steel as

paragraphs with text, join the sections together, just as when you are writing, ...look at the scrap metal as a thesaurus, .. think about what you want to produce and why".

Spending time in this workshop, admiring the curves, shapes and movement taking form was the best way to understand how ideas about wind, geography and birds can be translated to matter.

This time in the Andes did not only expand my knowledge of the mountains, appreciation for horses, network of friends, and excitement from being alive, it fundamentally developed my appreciation for, and understanding of some of the basic principles of life. Scientists are increasingly happy (and often embarrassed) to speak of the Gaia hypothesis, developed by microbiologist Lynn Margulis and chemist David Lovelock in the 1970s, stating that life on this planet is operating as an integrated whole. Initially perceived as a flaky theory, science is increasingly understanding the important biological, physical and chemical connections across the planet and between people and the biosphere – of which humans are part.

What I learnt is that the Gaia hypothesis has deeper roots. Plato already spoke about 'Anima mundi' – the world soul, and how everything is connected. Our conversations revolved around how the universe is looking at us, this obsessed little species, refusing to do what we are supposed to do. When will we do what we came here to do? When will we improve our relationship with this beautiful planet? There in the Andes, we learnt why we need to start, and how. We learnt it by admiring the mountains, wind and animals. We realized it by appreciating each other and the knowledge we each brought, and what we could do by combining it together. We worked without hierarchies, appreciating complementarities, driven by curiosity and a willingness to learn. We have taken important steps towards who we need to be and what we need to do, in the great workshop of this world.

Roel Teeuwen

Artis natura magistra - Nature is the teacher

Austrocedrus chilensis

From a small-scale landscape located just below sea level, impressed by the grandeur of the Andes, by the palpable powers of our earth, the steep planes of the mountain ridge, the crater wall and the roaring rivers.

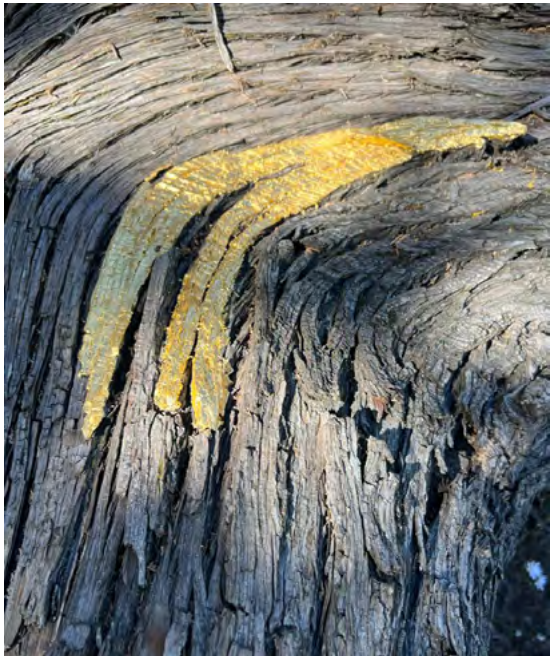
But at the same time as a human being, as a sculptor, overwhelmed by the visual beauty of the detail from the shape of the skin and without understanding it essentially, your eyes and your hands feel this little world of nature the trees and tree remains, the roots and fungi, wet, dry and also moist. And then when you close your eyes, and let your fingers look, even in these little things, you feel the power of the rugged nature.

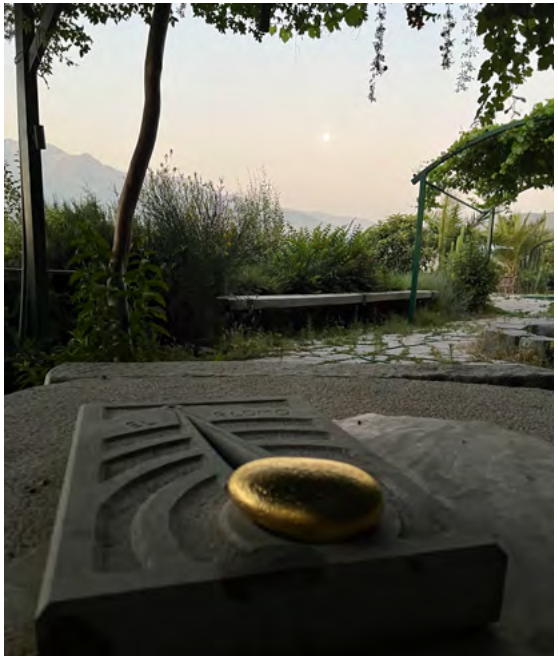
The tree trunk has not become wood, but a raging wind.

And then when you lift that random large round stone, a large pebble out of the Rio Grande, one of hundreds of thousands, then you feel the time, that incomprehensible endless time, which turns an angular and amorphous piece of stone into a *'soft'* sphere, then you feel you're being human, your insignificance, then feel that art and science are one, it is the earth, the matter that binds us, connects us. We draw from the same source.

It makes us thirsty....

About science - I think that scientists approach their surrounding world from the *'what'.* They ask the world, of *what* are you composed, world *what* is your reaction to, *what* are the possibilities of getting to know you. *What* can we contribute from our research to better understand the world? How can we use that knowledge to realise change/improvement? I suspect that the essence of the scientific message is less dependent on the personal opinion of the viewer. Their statements are unequivocal within their field. But ...it applies to both, science and art, there is no doubt that creativity is the most important human resource of all. Without creativity, there would be no progress, and we would be forever repeating the same patterns.

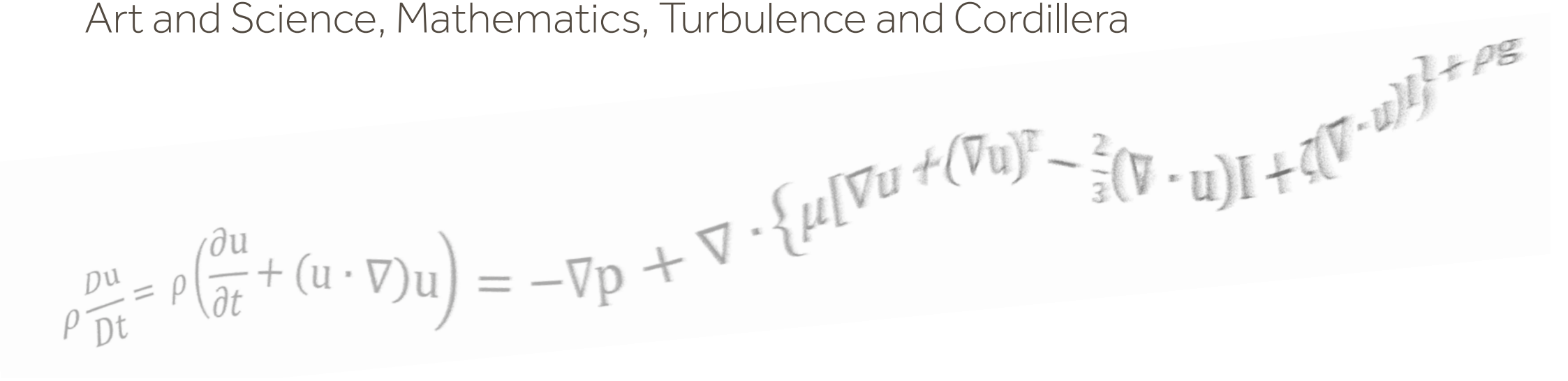




Centre: 'Omphalos' (belly button of the world), Delphy, polished bronze, 1975
Lower right: Sculpture '2345' (which delineates changing shadows through time)

Alejandro Jofré

Art and Science, Mathematics, Turbulence and Cordillera



$$\rho\frac{Du}{Dt} = \rho\left(\frac{\partial u}{\partial t} + (u\cdot\nabla)u\right) = -\nabla p + \nabla\cdot\left\{\mu\left[\nabla u + (\nabla u)^T - \frac{2}{3}(\nabla\cdot u)I\right] + \zeta(\nabla\cdot u)I\right\} + \rho g$$

There we were, high in the Andes Mountains, some observing and others in full action, keeping the colourful tulles moving violently and unpredictably, trying to follow and subtly show us the majestic winds that intertwine with huge mountains and embrace stones of all sizes and colours.

Finding myself among the observers of the tulles, led me at first to that exhibition of Man Ray et les équations shakespeariennes, at the Institut Henri Poincaré in Paris, 2019. An institute where we met mathematician colleagues to share the movements of the frontier of mathematics. Those surfaces that Man Ray captured well and then were the subject of more formal studies, were transcribed from the tulles in a static look, however, this is where came the second moment of observation, in conversation with my colleague Pablo Marquet, the natural convergence towards turbulent flows, which are created in those interactions between winds and rocks, where there was a moment when the coloured tulles almost approached the turbulence, but then dissipated their energy to leave aside that task close to the impossible.

We know that turbulence behaviour is an open problem in mathematics and physics! To fully understand the behavior of the solutions of the Navier-Stokes equations, posed in the 19th century, is one of those crucial problems in mathematics and physics, which model from a breeze in Africa to unreachable winds in our beloved Andes Mountains. One of the versions of this equation, which we began to write with charcoal on one of those huge stones up there, is the one written above. All this was going on, while the horses watched us gently congregate in that collective thought about turbulence...

The scale and boundary conditions in these equations matters, it is not the same to observe the tulles from a metre than from a kilometre. This is one of the difficulties of the turbulence phenomenon. We conducted an experiment on fluid and chaotic movement in the Atacama Desert three years ago, from observations of the Camanchaca cloud banks, organized together with colleagues from the PRISMA* collective, Valentina Serrati and Jazmín Alder.

Returning to Man Ray, he often repeated that he loved mysteries and not solutions. The Navier-Stokes equations are a good example of a mystery whose solutions will require much collective effort to unravel. In this, the Andes Mountains are an example of patience, capable of waiting for the wind to sculpt incredible geometries, using turbulence as an unpredictable and incomprehensible guide, and yet beautiful.

**PRISMA. Jazmín Alder (UNTREF), Alejandro Jofré (UChile), Claudia Müller (PUC), Valentina Serrati (PUC). https://www.instagram.com/prisma_arte_ciencia/?hl=en*

Manuel Dörr Bulnes

Los Andes

Manuel Dörr Bulnes. Architect and MA in History, raised between the Maulina mountain range and Santiago, from early on in his training as an architect at the University of Chile he became interested in heritage. This interest took him to Mexico in 2007, where he began his research into vernacular architecture. After Mexico, he travelled to Chiloé Island, where he worked on the conservation of its churches and the dissemination of its heritage carpentry.

Since 2013 he has been based in the Precordillera Maulina, dedicated to the research of local vernacular architecture and the 'arriero' (muleteer) culture, its development and validity, conducting several seminars and surveys on the subject, achieving publications in national and international media.

Stone house at Curicó

Rio Rosín

Snow makes the habitation of the Andes of central Chile seasonal, this seasonality generates, since time immemorial, the transhumance and this transhumance as a consequence - the footprints of the people. In a transversal sense to the Andes and also in a longitudinal sense once they have been inhabited.

These tracks in their nodules generate, in turn, the stalls, the stone houses, the ancient pirca (Incan dry wall) corrals.

These shelters and traces are the scars left by human habitation in these central Andes.

They impose their conditions: vertigo, solitude, and the stones.

This mountain range, which rises as the central axis of South America, generates not only a landscape, but it also generates a limit, and this limit, an encounter. This encounter is through these traces that form routes, in these posts called nodules . Or in these nodules called posts.

In these encounters is generated the transculturation that moulded the culture in conversations, to the smoke of the fire and to the sweet taste of bitter maté.

Milena Holmgren

We came to the centre of this Andean star to think about our future. The birth of the Andes redirected winds and stopped rains. It isolated life letting it evolve in fascinating new ways. But it also offered shelter when ice sheets advanced or retreated keeping pockets of life that could expand again. The mountains shaped also how people moved and lived. Our culture. It feels natural therefore to think about resilience here. Now that Earth is changing fast, these mountains offer shelter to reflect about our options. Artists and scientists, brothered in admiration. Humbled. Nurturing love feels as the only true way out of the crisis we face. Yet we are running out of time. As in the past, these mountains will determine our options and witness the changes we can only imagine.

Milena

This culture generates a circular economy, born of transhumance, which is also circular, so that the muleteer and his livestock go up the trail, sheltered from the wind and loneliness, inside the poncho spun and woven from the wool of the sheep that went up earlier, so that later, others are spun with the wool from the shearing of the livestock that comes down, before going up again.

The Andes also divides, as the central axis of a star, the desert from the forest, divides the barren pampa from the cold jungle of the south of the world, and also divides what differs from all the humidity of the Amazon to the dryness of the driest desert in the world.

As the centre of this star we have the central Andes, where they will decant, like an hourglass, delivering all their contents to one point, to pass to the other side, diagonally, passing from the desert of the north to the arid pampa of the south and passing in the opposite direction, the green of the Amazon and the Chaco Boreal, to the rainy, diverse and lively south.

Manantiales

Francisco Gazitua

My Art My Science

In 1966, I handed in my thesis 'Art as knowledge', after four years of exclusive dedication to a science: Philosophy.

Fifty seven years later, for this meeting in Los Andes, I unearthed my thesis. In it I found this sentence *"In the aesthetic relationship, we face reality, with the totality of our human richness"*.

Reality: that complex entity where according to Heidegger *"We were thrown"*.

I understood at that time that it was not enough only with the analysis of reality and in a second act of throwing, this time by my own will, I threw *"the totality of my human wealth",* my whole life, to art.

I took back my tools, my workbench, installed in these mountains that my father taught me to climb and my mother to cultivate, I made a pact with sculpture that I have never failed...

I did not find philosophy here, because when the empires of the Andes, oral civilizations, were overthrown they did not leave written literature to form the basis of a great literary or philosophical tradition, for the cultural future of humanity, as with the Greeks. The Andes are as silent as Greece would have been without Homer or Plato.

Here I learned that the Andes did not generate a mute civilization, because sculpture being a language, it speaks with the formidable stone gesture of the monuments it generates.

The Andes, creators of the best sculpture, translating into traditions available to all, like a great house with its door open to whoever enters with respect, as did thousands of stonemasons, sculptors and blacksmiths before me. The art came with me to the planet, but the craft and the secrets of its consubstantial matter I had to learn.

I contemplate in peace from these hills the immense lake of the mystery of the existence of sculpture and all its beauty without asking anything, without drawing conclusions...

Because in the Andes one does not draw conclusions.

In my work I learned the deceleration of time, that slowness in the process, a consequence of the sculpture's capacity to stop time, given that the very support of the message (the stone) is placed behind the walls of human time.

Borges writes in 'Stones and Chile':

> *" They are already part of that docile clay, my past, that erases time or manages art and that no augur has deciphered.... "*

If the mineral life of the planet originates on its surface - the biosphere - if our life is born in the shell of an expanding being, 99% made of stone, then the life of the stones is the most important, and on that expansion, depends the ephemeral scenario of our lives.

If everything disappears, we, art and science, our culture, music, written language, sculptural language, others will come again, they will search again and learn everything, as we did at the beginning: from the stones.

El Espiral de la vida , granite

Marten Scheffer

Can We Capture the Essence of our complex World in Math ?

Marten points out the saddle point on a collaborative hand-drawn map of the Andes

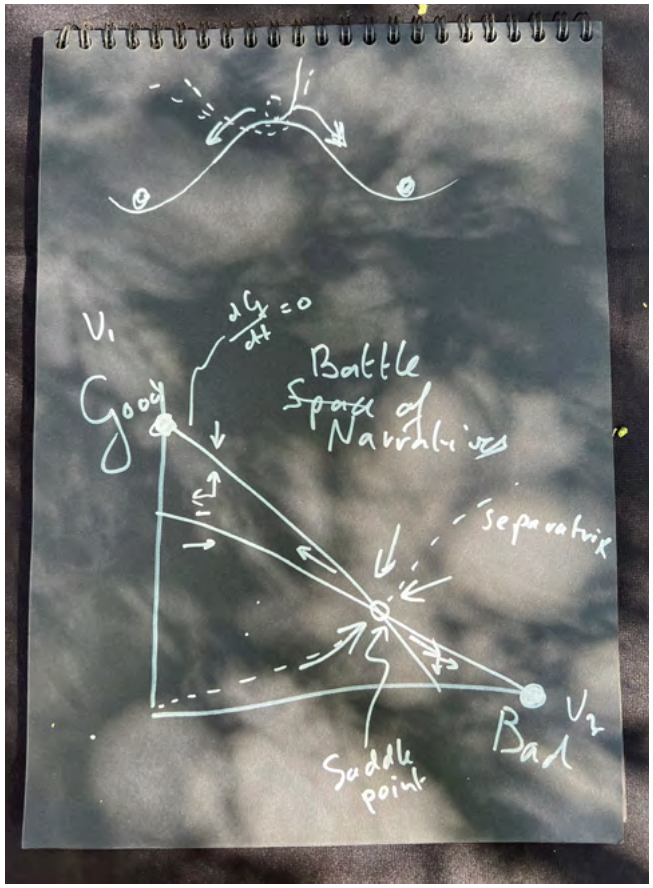
As far back as we can trace, human beings have tried to explain and control their overwhelmingly complex and threatening environment with tales, beliefs, and rituals. Art played a key role long before we knew the word. Capturing the essence of things. Essence that can be so hard to express otherwise. The development of science is just recent. It is a systematic approach that is somehow different from anything we did before, and so successful in solving problems that many people have gained a deep faith in our ability to *"carve the future."* Not everyone, however, feels equally confident in this extrapolation of scientific victory. Most of the success comes from branches of science that study only some elements of the complex world, like molecules or gravity. Disciplines that attempt to study larger chunks, such as ecosystems, human societies or the climate seem to make much less progress. Yet the fate of such complex systems really matter to us in the long run. There is a pattern: we understand small parts of the world increasingly well, but lost track of the whole. We focus on well definable problems, but miss out on the big picture. How can we capture the essence of complex systems if it isn't through art?

A surprising answer may be mathematics. For instance, the simple Navier-Stokes equations (See page24, Art and Science, Mathematics, Turbulence and Cordillera, by Alejandro Jofré) invented about two centuries ago capture the essence of how air and water flows surprisingly well. This includes the dazzlingly complex and ultimately unpredictable patterns we saw in the wind we felt and the river we drank. Indeed, in my scientific struggle to grasp the complexity of ecosystems, climate and societies, my main tool has been similar equations, and the amazingly universal principles of their behaviour: the theory of dynamical systems. This turns out to be valid for what happens in brains, financial markets, the climate, and anything else that changes over time. Rather than referring to any particular part of the world, this theory addresses what seems to be another world: a mathematical world of 'strange attractors', 'catastrophe folds', and 'metastable states' where 'torus destruction' and 'homoclinic bifurcations' may happen. So disparate is the language and notation in this discipline that it is hard to imagine that it has anything to do with reality as we know it. But what it does is create a kind of mirror world. And surprisingly, underlying structures of the real world show up in this mirror world with a beautiful clarity that is hard to observe in reality. Isn't that just what art does? Helping you see?

In the illustration we see a sketch of one such underlying structure: the 'saddle point'. Think of the horse saddles we used so much on our workshop. If you look where a marble will role starting from any point, you will find that there is one point from which it can remain without rolling away. The only tiny horizontal part. Of course if you give it just a tiny push it will roll

to the left or the right side of the horse. The saddle point is a repellor. At the same time the marble will roll towards this point if you start from the front or the back of the horse. In those directions the saddle point is an attractor. Close to the place of our workshop the Andes mountain range has an important pass. The centre of that pass is a saddle point, and it is a crucial one in the topography of South America, as illustrated in the hand-drawn map opposite. It is where green ecosystems and deserts flip between the East and the West of the mountains.

On a more abstract level, a saddle point is also the centre of a so-called separatrix. The border between watersheds, but in the math of dynamical systems it may equally describe the critical border between *life or death*, *war or peace*, *a dystopic future or a good Anthropocene* allowing countless future generations of humans and other species to thrive.



The saddle point attracts from two directions but repels in two other directions. It is a crucial point on the separatrix, marking the border between alternative basins of attraction.

Ángela Leible

Voyage to the South

The most important event in the history of the Americas is a journey of 40 thousand kilometres. It began in Mongolia, passing south through the Bering straight and ended in Tierra del Fuego, Patagonia. This was a journey of 800 metres a year.

In this journey were men, women, children and the elderly. The voyage of Ulysses was a voyage of men alone. This journey was undertaken by families, by generations, by entire societies. The end of this sojourn was Tierra del Fuego, the land of fire, beyond which lies only the ocean, and then an inhospitable Antarctica.

They did not undertake this voyage to flee or escape any impending threat like the barbarians of central Europe in their march upon Rome. They walked the Americas in peace, without

SelknamTierra del fuego

Gauchito Gil Cordillera de los Andes

enemies. They walked through the prairies of the North in silence. They breathed in the air of the Andes and exhaled it in Patagonia.

To walk through the Americas is, in a way, a search for beauty. Beauty that magnifies from place to place. This journey can be eternal.

They stopped in the south, at the end of what can be called the south - Cape Horn.

A Mongolian is similar to an Ona, a Hopi, an Inuit. The aboriginal peoples stretching from Mongolia to Patagonia have much in common, many similarities in their faces, their lives. With the Mapuche peoples of the South the similarities are not just morphological, such as the double-fold eyelid, the callana (a small birthmark on the lower back, also known as the Mongolian mark) but importantly, symbolically, it is the colour blue of their Gods that binds them together.

They say that the first Mapuche spirit arrived to the Earth thrown from the Blue – not just any blue (such as the sky) but specifically the Blue of the East. The Mapuche claim to have come from far in the East. Their god Kalfu is always represented by this colour. On the other side of the world the god of the Mongols is Tenggeli who, in their tongue, means both Blue and God.

Families, carrying their small and sacred bundles walked the prairies of the Americas, moving themselves always to the south. What was in the bales they carried? Whose order were they following? The secret would reveal itself night after night, in dream after dream, every evening of this massive journey. They would travel from place to place, from faith to faith. Of what was the Bering bridge made? Ice, or the longing of man?

We are accustomed to understand history through the lens of war. The story of this journey can only be understood through dreams. If they did not dream, they would not have carried on.

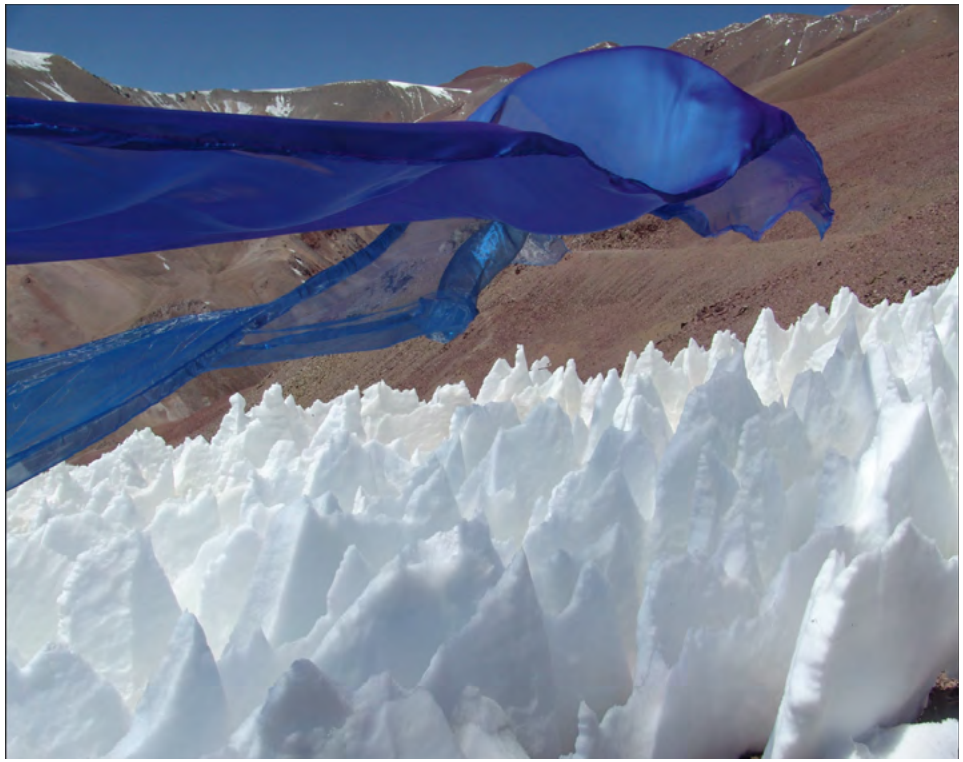
No book tells the story of this voyage. This nameless journey through the Americas is only written in fingerprints.

Their bible was written in the ground by the feet of the first founding families. These families were the greatest travellers in history. The prints are still there. Each step, each footprint from Mongolia to Patagonia is a word in the near-endless saga of this journey, written with footprints, written in fingerprints.

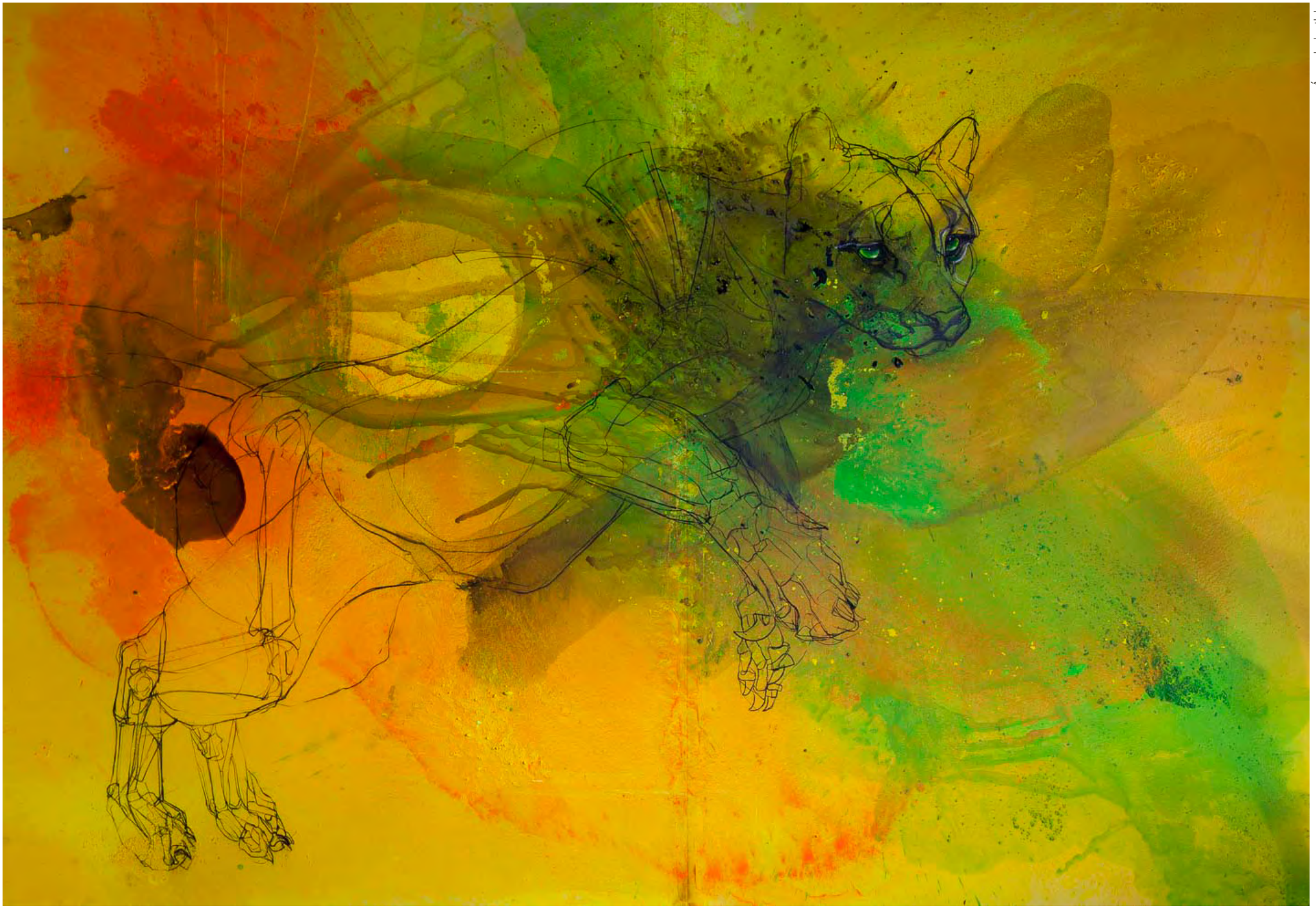
The men and women whose portraits I paint, I paint with the same techniques used 150 years ago, are the last descendants of these tireless journeymen.

I have travelled extensively through the Andes, its ravines and heritage trails from the Rockies, Mexico, Colombia, Ecuador, Bolivia, the Atacama Desert, the southern Andes on the east and west side, the central Cordillera (in it a piece of 1,000km from Choapa to Maule, on foot or mule), then from the centre, where I have my workshop and home, the volcanoes of the south, to the Cordillera of Darwin and the Austral Constellations, Magellanic Clouds.

Ischigualasto Cordillera de Los Andes



Rio Olivares Cordillera de Los Andes



Ángela Leible

Kay Pacha.The Puma inhabits from the mountains of Yukon, Canada to Patagonia.

Valle del Olivares

Communal Project




In-process

Francisco Gazitua

My sculpture called 'Crossing the Andes' started many years ago, inspired during several horse riding voyages with Angela trough the ancestral trails from Chile to Argentina and back, using Paso Vergara, Paso Carrizales, the origin of Rio Claro where we have our Symposium. In these trips we realised that the mountain ranges, the "wall of the Andes", went down in height an average of 1,500 metres in relation to The Andes of the north from Bolivia Lat 16 to Lat 34 Curico Chile.This geographical feature creates a climatic interchange.

So impressed by such a powerful, gigantic subject, I took upon myself to make a tri-dimensional model, a sculpture, from the drawing and ideas of an architect and a scientist based on a key phenomenon for South American life, especially in the mountains where we were working, a stone gorge, or a mountain bridge for clouds, storms and winds in the area around Volcanoes Planchón-Peteroa.

I start by making and coordinating the 4 main elements in forged steel in my studio ...

1) Sky

2) Amazonia and Chilean Rain Forest

3) Andes

4) Desert and Patagonia

... I must confess that I have never made a sculpture from subjects that were not visible, in front of my eyes. Compared with the human body, animals, fountains and bridges ...this was a really abstract subject.

This change of scale and way of thinking was a challenge, this time coming from my scientist colleagues.

I include the skies because during the symposium, the planet Mars was in conjunction with the Moon, both guardians of our night conversations on our terrace of Pirque, trying to draw conclusions, with a musical background of crickets and the waters of Rio Maipo.

This unexpected sculpture might be the main lesson of this Andes Art and Science for me as an artist moved this time from a science perspective.

Thanks Amigos

'Cross the Andes'

Henrik Österblom

Manuel is starting to speak about the place where we are. He is from here, and clearly excited – he has learnt something new about his home and immediately gets the attention of people in his proximity. We all want to hear from him and understand more about where we are, what we are experiencing here, and also, perhaps, why we are here specifically, in relation to another place where we could have been, where the original plan was for us to be. Manuel describes how this place represents an intersection of geographies, a place where things change – where mountains feed the rivers with water of different colours, because the soils are different. North of here they are black, south of here, the rivers are white, he says. This is where tropical rain forests from the North East Amazon basin in Brazil transition into temperate rain forest in the South West of Chile, the Pacific side of the Andes. Where deserts in the North West of Peru and Chile give way to the Patagonian dry steppes. We are at the point where it changes, we are at the X, we are where the treasure lies.

I listen carefully to his story and it surprises me, the level of detail and the exactness of the intersecting geographies – that it is here where we are. When I was young, I travelled in the deep forests and on the Andean altiplano of Bolivia and Peru. Later, I moved through Brazil and the forests of Paraguay and Uruguay. I have seen the foggy desert coast near Lima and Arica, and with my family, have driven between Santiago and San Pedro de Atacama – and back. I have watched penguins in the sand south of Peninsula Valdez and then hitchhiked from the Atlantic coast in Argentina to the Chilean border, through the Patagonian steppe with a man who had lost his wife in a car crash. I have walked, camped, taken buses and ridden in the back of a pick-up truck through the wet forests of Aisen. I could hear Manuel and understand how the large scale geography of this great continent found a point of incredible tension right here – exactly where we were having lunch. Maybe I also felt that I was at a point in my life where things were intersecting, where I had reached a point where I could see details more clearly, as part of a larger picture. In any case, we started drawing – first I sketched the outline of the continent, shoulder to shoulder with Manuel, who outlined the Andes, where the great spine

Collaborative, hand-drawn map.

divides in two across Bolivia and merges in one again. We found colours to illustrate the forests, the desserts, the changing colours of the rivers, the different kinds of ocean on each side of the Southern cone. Someone added a profile of the mountains, an hour glass. We had a sketch, we were starting to make sense of what we had just heard. We were starting to understand where we were.

Embalse del Yeso

Poems

Nature

All nature looks at man.
Just as after a day's work industries stop.
The machines stand silently watching man.
Waiting for him.
Looking at a human being who has not yet arrived.
I think of a factory of light, creator of trees and mountains.
Species that live in peace.
All this industry stops and catches a glimpse of an obsessed man.
He focuses on it and looks at it in its rare growth, as he has done with many species before.
Knowing in the background that life is death, evolution and life.
The universe knows how to overcome its crisis.
And it does so because it carries written in its molecules the formula of life, that same life that is the admirable destiny of matter.

Ángela Leible

I fell asleep by Rio Claro

Its waters hot out of the Andes
The eagles woke me as the burrowing parrots leapt to escape them
I had forgotten where I was
It could have been hell but I found it was heaven
The river flowed tight round a bend accelerating, roaring its presence

I heard that a child had drowned here when the white talons of roar had washed them away for ever into the ether that surround's us
Making it difficult to reconcile beauty and pain
The river continues washing anyway

Isabel H Langtry

El Toyo

Who Has Seen the Wind?

Who has seen the wind?
Neither I nor you:
But when the leaves hang trembling
The wind is passing thro'.

Who has seen the wind?
Neither you nor I:
But when the trees bow down their heads
The wind is passing by.

Christina Rossetti 1872

La Raza Cósmica

La Cordillera se yergue como muralla,
Como fortaleza contra los elementos.
El Ánimo se nos agranda,
se identifica con los volúmenes gigantescos.
Se adivina un reto de la quietud hecha perennidad,
A la inquietud del agua y del viento.
Una realidad imperecedera,
inmóvil delante de todo lo que es fluido, móvil, cambiante,
Heráclito vencido,
Súbitamente petrificada la entraña de su perpetuo devenir.

José Vasconcelos

The Art Of Poetry

To gaze at a river made of time and water
and remember Time is another river.
To know we stray like a river
and our faces vanish like water.

To feel that waking is another dream
that dreams of not dreaming and that the death
we fear in our bones is the death
that every night we call a dream.

To see in every day and year a symbol
of all the days of man and his years,
and convert the outrage of the years
into a music, a sound, and a symbol.

To see in death a dream, in the sunset
a golden sadness, such is poetry,
humble and immortal, poetry,
returning, like dawn and the sunset.

Sometimes at evening there's a face
that sees us from the deeps of a mirror.
Art must be that sort of mirror,
disclosing to each of us his face.

They say Ulysses, wearied of wonders,
wept with love on seeing Ithaca,
humble and green. Art is that Ithaca,
a green eternity, not wonders.

Art is endless like a river flowing,
passing, yet remaining, a mirror to the same
inconstant Heraclitus, who is the same
and yet another, like the river flowing.

Jorge Luis Borges

Seeing the Wind

Among the granodiorites and the basalts
We discovered a river of blood
Running through the Cypress and the Nothofagus,
Unveiled by the soul of art and science
United in the ancestral rite of seeing the wind
I saw the wind
I saw the wind
Unwinding me to become myself.

Pablo A. Marquet

River Birds

In the green
Where the diagonal lines meet
The flow of colour
The movement of birds
The green of the tricahue
Burrowing by the river

Henrik Österblom

Painting of a Tricahue (burrowing parrot) by Edward Lear 1812-1888.

Cuando los artistas invitan.
The artists' open invitation.

Reflections

It is important to note that this meeting in Los Andes was an invitation of artists, a pioneering initiative that has its first origin in the art and science congresses organized for more than 10 years by scientists in Uruguay SARAS - South American Institute for Resilience and Sustainability Studies and in which many of us had participated as artists, showing images of our work.

For years we had talked with many of the participants about the urgent need to create the basis for a new relationship between the two disciplines in future congresses.

This time, we organized the artists, leaving the conference rooms and going directly into nature to share with scientists the management and creative process of our art work.

Chile by its geographic situation, last in the periphery, at the Pacific end and the Southern Andes.

Could be a field where to lose at times our pre-designed identities in the academic world.

That was the spirit of this invitation.

I honestly think it worked out for us!

It was the opposite of previous congresses where scientists asked us to be illustrators of their theories.

As we artists showed the beauty of wind turbulence on transparent canvases, the scientists instinctively presented us with the mathematical formulas inherent in these moving shapes and colors.

For a few days we joined our destinies, sharing a fruitful silence, where we recognized each other as simple and autonomous human beings.

Alejandro Jofré: *"Closer to the mystery than to the solutions".*

It was the winds, also the rivers of the Andes who cleaned our minds and then showed their thousand faces in two hundred and eighty metres of transparent fabrics...

A thousand thanks to all of you and welcome to the next ART AND SCIENCE!

Angela Leible

Isabel Langtry

Francisco Gazitua

Biographies

Ángela Leible

Institute SARAS Uruguay art and science, Stockholm art and science 2017.

Private Collections

New York, Miami, Italia, Canada and Chile
Directora del grupo de reconocimiento del territorio de los Andes
"Cruz Del Sur"2000-20018
"Cruce de Los Andes" 2004-2005
"El niño del Plomo" 2004-2018
"Nacimiento de las aguas de los Andes" 2004-2018
" Arte y Ciencia" 2023

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Exhibiciones

2022 Mayo "Anima Mundi" Hampstead School of Art - London
2018 Octubre – 2019 Febrero "La Raza Cósmica" Insituto cultural Cabañas- Guadalajara, México
2018 Marzo "La Raza Cósmica" Galería Artespacio
2017 Resilience 2017, Stockholm, Frontiers for Global Sustainability
2017 "El Niño del Plomo" " The Frozen Prince"- capac cocha. Centro cultural El Tranque- Chile
2017 "La Divina Comedia desde el Sur". Galería Enlace - Lima, Perú.
2015- "Puna , La Otra Orilla Del Pacífico"
Galería Artespacio , Santiago, Chile 2015
2012- "Las Iniciales De La Tierra"
Museo Nacional de Bellas Artes Santiago -Chile
Museo de Arte Contemporáneo MAC Valdivia
2010 - "Viaje al fin del mundo".
Galería Artespacio, Santiago- Chile
2009 "Caballos de Fuerza" mural, ACHS- Los Angeles, Chile.
2009- "La Divina Comedia desde el Sur".
Universidad de Talca, Bodegón de Los Vilos, Chile.
2008- " La Divina Comedia desde el Sur ".
Galería Artespacio, Santiago, Chile.
2007 - "Tierra De Caballos".
Galería Artespacio, Santiago, Chile.
2004 "Caballos En La Huella" , Galería Artespacio, Santiago, Chile.
2003- "El Espiral De La Vida"., Fundación Telefónica of Santiago, Chile
1998 "Se Que Ahí Estuve Alguna Vez", Museo de la Revolución en La Habana- Cuba

Estudios

1993-1986
Geología Universidad de Concepción, Chile.
Geología Universidad Autónoma,Barcelona, España.
Licenciatura en Artes, Universidad de Concepción, Chile.
Licenciatura en Pintura, Universidad Católica, Santiago Chile.

Arte Público

Mural "Four Horses"., City Place Concord Adex, Toronto, Canada
Mural "El Paso De Los Andes"., Asociación Chilena de Seguridad, Santiago, Chile
Mural "Caballos De Fuerza", Asociación Chilena de Seguridad, Los Angeles, Chile
Mural "Horses Power", McMaster University Library, Toronto, Canada

Francisco Gazitua

Born Chile 1944. Lives and works in his workshop quarry, in San Juan de Pirque, at the foot of the Central Andes of Chile.
He shares life, children, house and workshop with the great visual artist Ángela Leible. Together they have explored on foot or on horseback more than 1000 kilometres in the Andes of Chile.
1963-1967: Philosophy and Fine Arts University of Chile.
1978-1985: Lecturer in the Department of Sculpture at St. Martin's School of Art, London.
1980-2023: Founding Professor of Kornaria, Kroacia, school of marble sculpture.
1981-2023: Organises and participates in 23 symposiums and congresses specialis ing in sculpture, art and science.
1994: Sculpture on an ice floe Antarctica
1968-2023: About 100 monumental sculptures in steel or stone in Chile and abroad.
2007: Associate Member, Academie Royale des Sciences, des Lettres et des Beaux Art de Belgique, replacing British sculptor Lynn Chadwick.
2017: Appointed Patron of Hampstead School of Art U.K. whose first Patron and founder was Henry Moore, in 1944.
2014-2017: Reconstruction of Apachetas, Olivares Valley, Central Andes Mountains, Chile involving Angela Leible, Patrick Bermingham and Henrick Österblom and Isabel Langtry.
2018: Honorary Fellow of The South American Institute for Resilience and Sustainability Studies (SARAS)
2019 : Fellow of the Royal Society of British Sculptors
2021: National Award Republic of Chile Mention in Plastic Arts
1980 -2023: Publications
Author or co-author of numerous books or catalogues on the subject of sculpture.
www.franciscogazitua.com

Juan Luis Dörr

Born in Santiago de Chile in 1970. He took sculpture courses at the Pontificia Universidad Católica de Chile and the Universidad Finis Terrae.
He completed his studies working in workshops of prestigious Chilean and foreign artists.
He has participated in exhibitions, seminars and national and international symposiums.
During his career he has won prizes in public competitions making public sculptures in Chile and abroad.
Dörr's work is strongly influenced by Chilean and Latin American art and culture, where he has placed his source of research and inspiration.

Patrick Donald Bermingham, BFA, Sculpture

Bermingham started studying sculpture as an apprentice to Elizabeth Bradford Holbrook OCAD, RCA, at the age of 14. He went on to study at Queen's University in Canada and then transferred to St. Martin's School of Art, in the UK, where his instructors included Tim Scott, Phillip King and Francisco Gazitua. While in London he worked as an assistant to both Sir Anthony Caro and Tim Scott. He was invited to represent Canada in the first International Sculpture Symposium in Marusici, Yugoslavia. Following his return to Canada, Bermingham worked for a time on various research projects with Engineers at McMaster University, The National Research council of Canada and TNO in the Netherlands. He also collaborated on research projects with several universities in Japan and the United States. His ability to visualize and his creativity were recognized by the Americal society of engineers when he was the first non engineer to win the Martin Kapp Award for Innovation. Today he works in his sylvan studio in Dundas Ontario and travels to Puente Alto, Chile to work alongside his friend, the noted sculptor Francisco Gazitua. He was recently elected into the Sculptors Society of Canada in 2020. And won the silver medal at the XIII Florence Biennale, Sculpture. Currently, he is working on a life size horse for the City of Pickering, ON, Canada, 'One Horsepower'.

Manuel Dörr Bulnes

Architect and Master in History, raised between the Maulina mountain range and Santiago, since early in his training as an architect at the University of Chile he is interested in heritage. This interest took him to Mexico in 2007, where he began his research in vernacular architecture. After Mexico, he traveled to Chiloé, where he worked on the conservation of its churches and the dissemination of its heritage carpentry.
Since 2013, he has lived in the Maulina foothills, dedicated to the investigation of local vernacular architecture and the arriero culture, its development and validity, conducting several seminars and surveys on the subject, achieving publications in national and international media.

Roel Teeuwen

Sculptor, Alblasserdam Holland. Born 1944 Gouda. Active as a sculptor after his training at the Willem de Kooning Academy of visual arts in Rotterdam, 1965-1969.

The formal language of Roel Teeuwen is derived from nature. From this wealth of forms, the greatest possible simplification is sought which leads to archetypes. Archaeological forms that are timeless, not bound to place and of all cultures. Primal principles of organic design that carry meanings and in which both the visual and the tactile elements are important. In the work, these evaluate to images that are only one step away from a branch or a fossil, a step that brings about the metamorphosis from object to work of art.

For Teeuwen, nature is not a romantic idea, but a *life and death* struggle, only absolute clarity and precision give chances of survival.

Isabel H Langtry

Isabel H Langtry is the Principal of Hampstead School of Art, a historic community art education charity. Isabel works closely with Patrons Sir Frank Bowling, Alan Gouk, Francisco Gazitua, Lady Rachel Scott Bowling, Angela Leible and Dolorosa Sinaga. Community is everything to her and inspiring creativity, inspires her.

A graduate of Central St Martins, London, MA in Pure Sculpture. Born in Lagos, Nigeria, a Spanish/English bi-lingual. As an international monumental sculptor Isabel has created work for scientists, architects, public bodies and private collectors developing mainly sculptural artworks that are often interactive, performative and thought provoking, using materials that make strong associations with people and places, exploring the language of sculpture.

Langtry's exhibition at the Whitechapel Art Gallery, London, explored a reinvention of forms as do her series of sculptures in public spaces permanently sited in Saudi Arabia, Chile, China, Spain, Slovenia and London.

Smaller pieces and maquettes are in collections all over the world. Isabel lectures extensively, including at Tate Gallery, and writes about art.

Biographies

Henrik Österblom

Professor at the Anthropocene Laboratory, the Royal Swedish Academy of Sciences and Professor of Environmental Sciences at the Stockholm Resilience Centre, Stockholm University. Henrik studies human cooperation and works with leading seafood corporations to investigate if such actors with disproportionate powers can provide sustainability leadership for ocean stewardship. He has been scientific advisor to the SARAS institute and worked for the Swedish government as policy advisor. Henrik has a degree in Behavioural Ecology from Uppsala University and a PhD in Marine Ecology from Stockholm University. He has worked at the University of British Columbia, University of Tasmania and Tokyo University.

Pablo A. Marquet

Pablo A. Marquet is Full Professor in the Department of Ecology at the Pontificia Universidad Católica de Chile, External Professor at the Santa Fe Institute, and member of the UC Center for Global Change. Originally trained as an ecologist, his career has been marked by transdisciplinary collaborations with physicists, mathematicians and social scientists, to tackle questions in different systems, from ecological to social ones.
He has devoted most of his research to the search for the general principles that underlie the structure and dynamics of ecological systems using different theoretical approaches and models. More recently he has turned his interest to the integration of theories in ecology, climate change, and the emergence of social complexity and innovations in simple human groups. He is member of the Chilean Academy of Sciences, International member of the National Academy of Sciences (USA), The American Academy of Arts and Sciences (AmAcad) and The World Academy of Science. He is the author of more than 250 scientific publications.

Marten Scheffer

Marten Scheffer is a theoretical biologist recognized for his work on the stability of complex systems. He has worked on the ecology of lakes but is known particularly for his work on tipping points in complex systems ranging from the brain to ecosystems, the climate system and societies. Scheffer was born in Amsterdam, and grew up in the Netherlands. He graduated from Utrecht University with a degree in biology. Working at the national water research institute RIZA he obtained his PhD at Utrecht University. He went on to become a professor of Water Quality at Wageningen University, where he has broadened his field of study since. He is a member of the Royal Dutch Academy of Sciences as well as a foreign associate of the National Academy of Sciences in the US.

Marten Scheffer is interested in unravelling the mechanisms that determine the stability and resilience of complex systems. Although much of his work has focused on ecosystems, he also worked with a range of scientists from other disciplines to address issues of stability and shifts in natural and social systems. Examples include the feedback between atmospheric carbon and the earth temperature, the collapse of ancient societies, inertia and shifts in public opinion, evolutionary emergence of patterns of species similarity, the effect of climatic extremes on forest dynamics and the balance of facilitation and competition in plant communities.

Milena Holmgren

Milena Holmgren is a field and experimental ecologist. She was born in Chile and lived in several countries of the Americas before settling in The Netherlands. She conducted her PhD training at the University of Tennessee, USA before joining Wageningen University where she currently works as an Associate Professor.

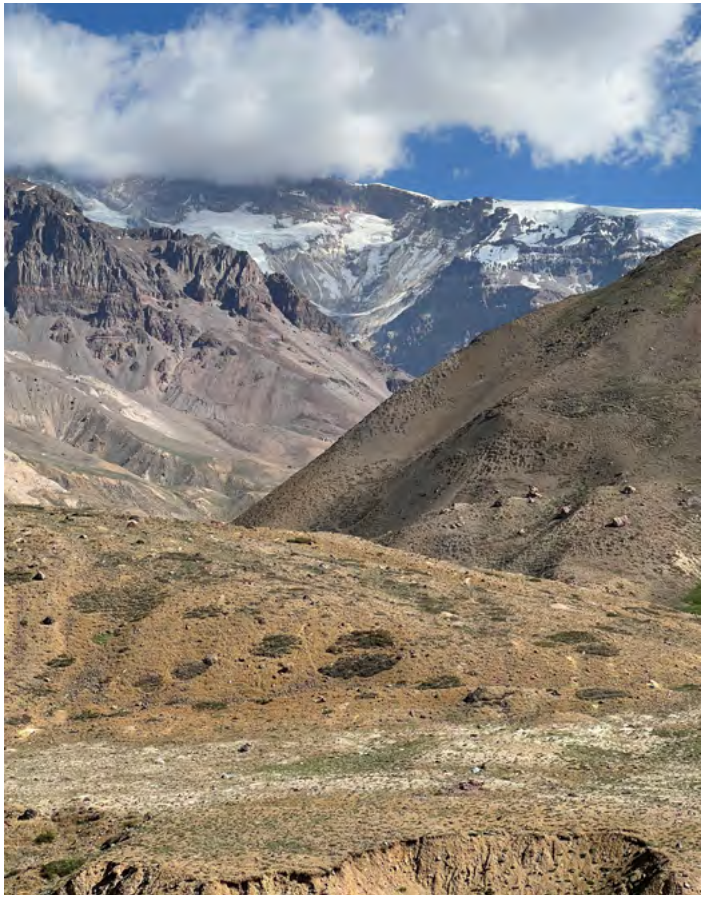
Milena studies the mechanisms that explain the resilience of terrestrial ecosystems to climate variability and human disturbances and the implications for ecosystem functioning. She is interested in how ecological and social dynamics interact and how ecological knowledge can be used by decision-makers to foster biodiversity conservation and ecological restoration. Her work uses a variety of methodological approaches and has covered a wide range of ecosystems including drylands, tropical forests and boreal forests.

Alejandro Jofré

He is currently Researcher at the Centre for Mathematical Modeling (CMM) and the Department of Mathematical Engineering, University of Chile. Alejandro was Vice President (*Prorrector*) of Universidad de Chile until last June. He obtained a PhD in Applied Mathematics in France in the 90's and a Post-Doctorate at University of California. He has been professor at the Universities of Paris 1-Sorbonne and University of California Davis. He has a recognized research career in the areas of stochastic optimisation, game theory and economic equilibrium. He has been working on industrial projects such as system optimization, big data and analytics, planning in mining, power system behavior and energy markets, risk analysis, telecommunications and water pricing, sustainable copper production and forestry. He has also advised a dozen PhD theses. Alejandro is associate editor of several mathematics and engineering journals and book series. Prof. Jofré is also one of the founders of PRISMA initiative in Art-Science-Technology, a project promoting research actions connecting Art and Science.

Jorge Carey

Extensive trajectory in the television and telecommunications industry. He currently serves as Executive President of CNN Chile, the leading News Media Organization in Chile. Previously, CEO of Turner Chile, premier Broadcasting and Sports Entertainment holding in Chile, where he led the open air channel Chilevision and CDF, Canal del Fútbol. He holds a Law Degree from Pontificia Universidad Católica de Chile and a Masters Degree from Duke University School of Law.



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Don Juan Carlos Dorr Zegers

To Don Juan Carlos Dorr Zegers, who for half a century has been preserving, on his own initiative and assuming enormous costs, 24,000 hectares of flora and fauna, native forest, rivers of crystalline waters, mountains in the region of Los Queñes and Los Manantiales Curicó Chile, the place where we held the symposium.

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Oscar Ardiles - Andes Solution Ltda.

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Rosa Plaza and Angela Sanchez for all their help cooking in Pirque.

'Spiral of Life'.Forged steel medals made in collaboration with Francisco Gazitua in his studio in Pirque by the participants and shared to all as a symbol - a chain linking art and science moving into the future.