TREES OF LIFE – KNOWLEDGE IN MATERIAL

This ongoing inquiry began with an interest in traditional social and cultural practices closely tied to natural habitats, as well as how communities have lived in close relationship to their environment, and over centuries perfected sustainable cultivation systems, applying ingenuity in craft and technique. This ongoing inquiry explores the knowledge of biological forms within their geopolitical and historical contexts. The focus is on four plants deeply rooted in Asia: **indigo** (*Indigofera tinctoria*), **lacquer** (*Toxicodendron vernicifluum*), **rattan** (Calamoideae), and **mulberry** (*Morus alba*).

Featured in this presentation are works by **Liang Shaoji**, **Manish Nai**, **Phi Phi Oanh**, **Sopheap Pich**, and **Vivian Xu**, each of whom has established an ongoing practice around materials derived from these plants. The artists' installations are outcomes of long-term experimentations with the material properties of each plant and their natural ecosystem. They serve as a starting point to discover more about the materials, looking into their natural and cultural DNA, which allows further exploration of biological processes intrinsic to these plants and the diverse usages at their locale.

Alongside the artworks, selected documents introduce the complex histories and circulation routes of these natural resources, expanding into the different cultural representations of the chosen plants, underlining both their ecological and economical significance. This undertaking is guided by questions such as: What are the various uses and applications of these plants? What is their place in the current agro-ecosystem? What traditional crafts are still practiced and can industrial and technological advancements support an economic future for the communities that depend on them? How has globalisation changed the perception and reception of these natural produces, and therefore impacted these traditions?

Topical seminars, dedicated to each of the four botanic materials, further unpack the characteristics, cultural references, and their expanded ecology, including techno-logical advancements and innovative applications. Lectures, panels, and workshops featuring the participating artists, as well as craftsmen, designers, scientists, ethnobotanists, and anthropologists, allow for a rich diversity of perspectives.

Trees of Life – Knowledge in Material contributes to the Centre's long-term research cluster CLIMATES. HABITATS. ENVIRONMENTS., highlighting precarious conditions of habitats and the consequences of human intervention combined with climate change for local conditions.

This project is led by **Ute Meta Bauer**, Founding Director, NTU CCA Singapore and Professor, NTU School of Art, Design and Media (ADM); **Laura Miotto**, Associate Professor, NTU ADM; and **Khim Ong**, Deputy Director, Curatorial Programmes, NTU CCA Singapore.

Dragon's blood, rattan or rotang, *Daemonorops draco* (*Calamus draco*).
Chromolithograph after a botanical illustration from Hermann Adolph
Koehler's *Medicinal Plants*, edited by Gustav Pabst, Koehler,
Germany, 1887.

RATTAN

This naturally renewable palm is a strong and robust climber, liana-like vine, native to the tropical regions of Africa, Asia, and Australasia. Growing in primary and secondary forests and lowland swamps, rattans are old world palms part of the Arecales or Palmea family, belonging to the subfamily Calamoideae. There are 13 different genera of rattans that include in all some 600 species. Some of them do not climb, being shrubby palms of the forest undergrowth, but most need structural support and have spines to aid climbing. The long, thorny stems may reach well over 100 m, maintaining the same diameter throughout the length, varying from 2-3 mm to 10 cm. Species of different diameters are used for different purposes. The word rattan comes from the Malay word *rotan*, the local name for climbing palms. It is also known as *manila* or *malacca*, named after the ports of shipment in Southeast Asia and as *manau*, the trade name for *Calamus manan* canes. In Iban language, it is known as *wi* and nicknamed *nganti mimit* or "wait a moment," for its clawed thorns—once they get hold of someone walking in the forest, are extremely reluctant to let go.

Cultivation and Harvesting

Today the main areas for rattan production are in the tropical regions of South and Southeast Asia, where it is generally collected in the wild, with only a very small portion coming from cultivated sources. Rattan is mainly harvested in Indonesia, in the area of Kalimantan, Sulawesi, and Sumatra. It is a fast-growing tropical plant, typically taking around five to seven years to restore its growth before it is ready to be harvested again, which makes it a sustainable option. When properly harvested, it can provide an alternative to logging timber and it has been associated with the preservation of the rainforest. Rattan continues to play a major part in supporting the economies of rural communities and has been an invaluable part of local livelihoods.

Village communities in Indonesia, Cambodia, Laos, Vietnam, and the Philippines rely heavily on the rattan trade. Sales can account for up to 50% of the cash income in some villages, making rattan a major contributor to poverty alleviation in rural areas. Despite the importance of rattan, it has not been sustainably harvested and its prevalence is declining. The main threats are over-harvesting and deforestation due to land conversion and frequent forest fires, which affect both the livelihoods of forest dwellers and biodiversity.

The furniture and design industry, which regard rattan as an ideal material, create a constant demand on the global market, yet prices paid to harvesters in Indonesia are low. As a result, many smallholders are turning away from rattan production to less sustainable alternatives. The Katingan district in central Kalimantan started producing rattan certified by the Forest Stewardship Council in an area denominated High Conservation Value Forest. The P2RK-cooperative uses this certification to command higher prices from the high-value markets. The project started in 2011, involved the WWF, the community, and the local authorities to map land ownership and to determine the volume of rattan that can be sustainably cut each year.

Rattan palms, Thailand.

Rattan as Material

Because of its strength, pliability, but also rigidity, resistance to wear, durability, length, the possibility to be finely split, and its lightness when dry, rattan has locally been used for centuries for furniture, basketry, construction materials, as well as food and traditional medicine. According to recent research in the medical field, rattan is also suited as bone replacement.

The cane is collected in the forest, dragged from the trees where it hangs. After getting rid of the outer spines, the cane is cut into sections or coiled for transportation and left to dry in the sun. From a strand of rattan, the skin is peeled off, to be used as weaving material, with the "core" applied for various purposes in furniture making. Canes with small diameters are cured using sulfur fumes, while large canes are boiled in oil to make them dry and to protect them from insects. Rattan can be further processed into peel for weaving, cut into radial or flat sections, or used as material for binding and craft products.

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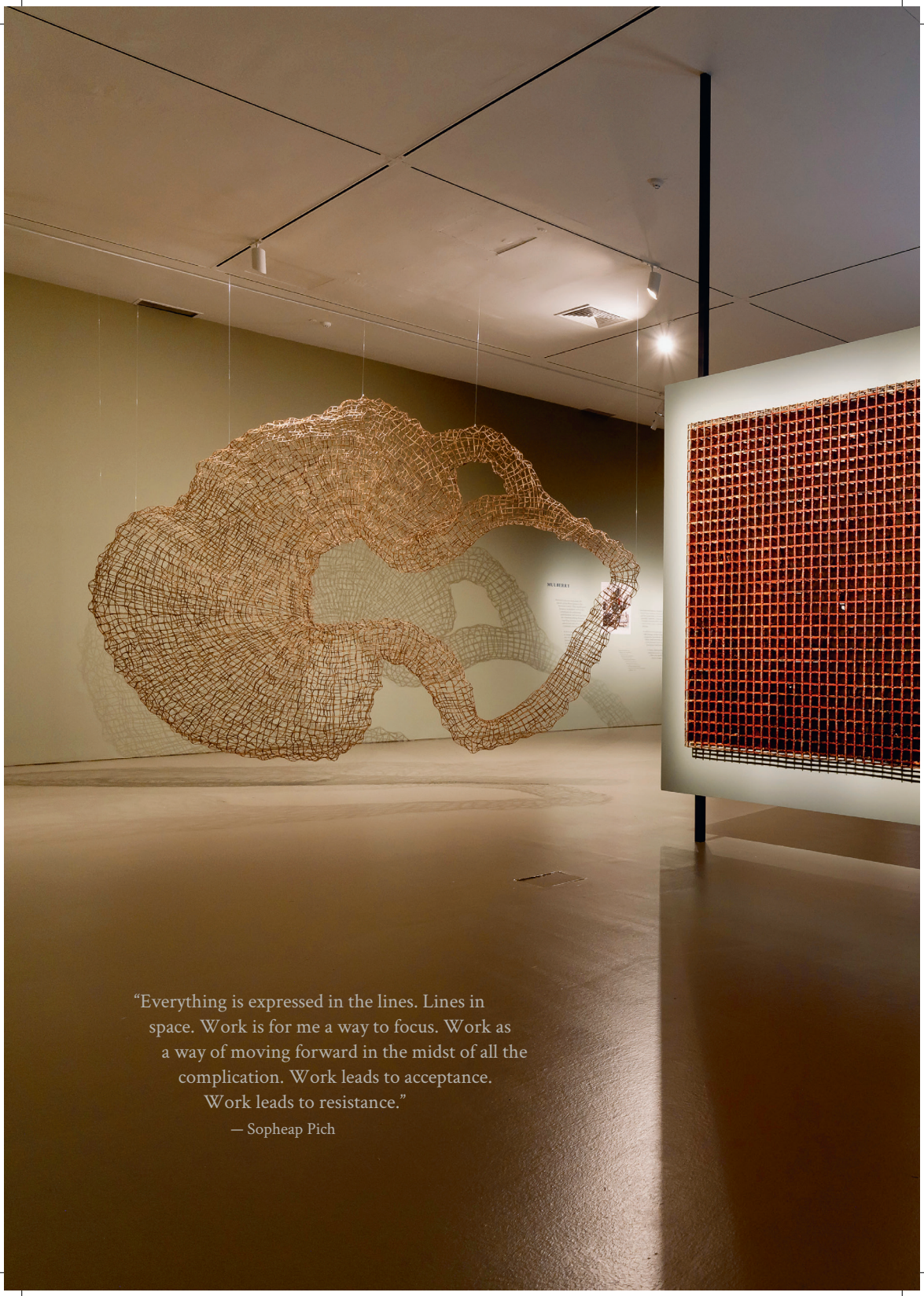
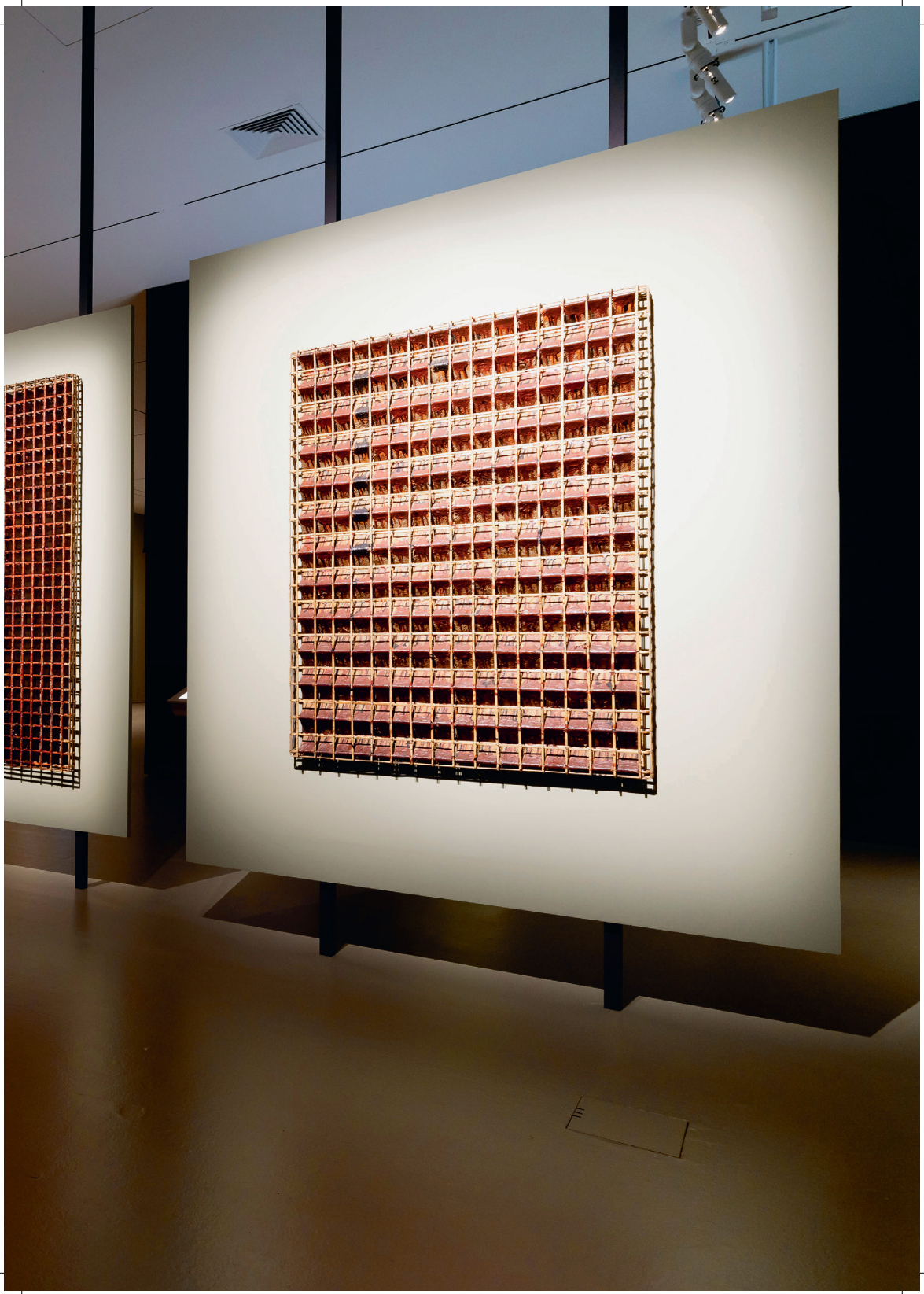


"Everything is expressed in the lines. Lines in space. Work is for me a way to focus. Work as a way of moving forward in the midst of all the complication. Work leads to acceptance. Work leads to resistance."

— Sopheap Pich



Sopheap Pich started as a painter, working now almost exclusively with sculpture. He uses natural and inexpensive materials from Cambodia, such as rattan, bamboo, and burlap, imbuing these objects with a renewed value. Pich left the country as a refugee at the end of the Khmer Rouge's reign in the late 1970s. His childhood memories of war, poverty, and hunger, as well as his experience of several refugee camps in Cambodia, Thailand, and the Philippines before finally settling in the United States in 1984, have left a profound impression in the artist, who impulsively made the decision of returning to Cambodia in 2002. He then became interested in craft, technique, and the creation of something from beginning to end.

Pich's sculptures are inspired by his political and social perspective on Cambodia, but also reflect his desire to recover the joy of working with materials. After *Silence* (2004), his first rattan sculpture, he created structures resembling human organs such as the liver, lungs, or stomach, in the attempt to understand what else these forms could suggest. Recurring threads are poverty, lightness and strength, fragility versus monumentality, which are reflected in his use of simple means and everyday materials. His abstract and geometric works are nevertheless playful even if dealing with trauma and healing, and full of Cambodia's life and culture.

Sopheap Pich (b. 1971, Cambodia) holds a BFA from the University of Massachusetts at Amherst, and an MFA from the School of the Art Institute of Chicago. In 2013, the Metropolitan Museum of Art, New York, presented *Cambodian Rattan: The Sculptures of Sopheap Pich*. Group exhibitions include the 57th Venice Biennale (2017); the Moscow Biennale (2013); dOCUMENTA (13), Kassel (2012); the Singapore Biennale (2011); the Asian Art Biennial, Taichung (2011); the Fukuoka Asian Art Triennale (2009); and the Asia-Pacific Triennial of Contemporary Art, Brisbane (2009). His works are in major collections such as the Metropolitan Museum of Art, New York; Solomon R. Guggenheim Museum, New York; San Francisco Museum of Modern Art; Centre Georges Pompidou, Paris; M+, Hong Kong; and Singapore Art Museum.

Valley Drip (Maroon Top), 2012
160 x 120 x 8 cm.
Bamboo, rattan, burlap, and beeswax with natural pigment.

Red Grid, 2015
200 x 200 x 8 cm.
Bamboo, rattan, burlap, and beeswax with natural pigment.

Both courtesy Private Collection, Singapore.

Noticing that all his sculptures used the grid as a structure, Pich decided to make these in different sizes, initially as a base for something else. He began the relief series in 2010, turning these grid structures into works in their own right. The colours are made of grinded pebbles collected by the artist during journeys, mixed with beeswax and tree resin, applied onto the burlap used in farms or markets.

With an arbitrary rectangular shape, his "grids" had no particular meaning, giving the artist a certain freedom from his own authority. For Pich, this represents a more passive, receptive position, similar to an absorbing sponge. The grid, regarded as an expression of modernity, creates a contrasting shape to his organic or figurative sculptures. However, their flexibility allows them to carry specific meanings, as is the case with *Valley Drip (Maroon Top)*:

"My first trip to Ratanakiri Province in northern Cambodia was the inspiration for making this group of works […] Ratanakiri wasn't what I had expected to see from what people had described of it some five, six years ago: a beautiful mountainous province with villagers living off the land and speaking their own languages. What I saw was a region being taken for its resources by greed and villagers living in desperation. I made *Fields of Ratanakiri* and the *Valley Drip* to reflect the emotions I felt from that trip."
— Sopheap Pich

Delta, 2007
Rattan and wire, 341 x 478 x 70 cm.
Courtesy The MaGMA Collection.

Delta is one of the early sculptures using rattan, while the artist was still becoming familiar with the material. The hanging organ-shaped form is a grid made of hand-cut rattan, linked with wire, with its title alluding to the importance of the rivers in Phnom Penh.

Men collecting varnish from the Chinese lacquer tree, *Toxicodendron vernicifluum*, using bamboo pipes. Hand-coloured copperplate engraving by Andrea Freschi, after Antoine Cardon. Henri-Leonard-Jean-Baptiste Bertin and Jean Baptiste Joseph Breton, *China, Its Costumes, Arts, Manufactures, etc.* London: Howlett and Brimmer, 1824.

There are about 600 species of trees belonging to the Anacardiaceae (cashew or sumac) family found all over the world. Among these, the lacquer producing species include *Toxicodendron vernicifluum* (*Rhus vernicifluum* or *vernicifera*) in China, Japan, and Korea; *Toxicodendron succedaneum* (*Rhus succedanea*) in Taiwan and Vietnam, and *Melanorrhoea usitata* which grows in Cambodia, Myanmar, and Thailand. Lacquer-producing Anacardiaceae trees are small, flowering, wooded trees which can grow to a height of up to 20 metres with large leaves, each containing 7 to 19 leaflets. Its sap is a complex, water-in-oil emulsion of catechols, phenols, carbohydrates, glycoproteins, and laccase enzymes. The high level of urushiol content (in the East Asian species) makes it caustic and toxic.

Different countries have referred to the lacquer sap and trees with various terms:
China: *Qi*
Japan: *Urushi*
Korea: *Hwangmichil* for raw sap; *jeongjechil* for refined sap
Cambodia: *Chor mreak* or *mreak* for lacquer, extracted from the *dam kroeul* (*Melanorrhea luccifera*) tree
Myanmar: *Thitsi* for lacquer; *sitsepin* for the tree
Thailand: *Rak* for lacquer; *rak luang* for the tree
Vietnam: *Sơn sống* for raw lacquer and *Sơn cánh gián* for processed lacquer (colloquially known as "cockroach wing")

Cultivation and Harvesting

Lacquer tree sap is a high-quality natural preservative capable of resisting acid and alkali, heat, and moisture. Harvesting is done when the tree is five to eight years old by tapping incisions into the trunk, collecting the sap that flows out (similar to rubber tapping). It is then filtered, heat-treated, or coloured before use. Curing the sap requires a "drying" process of between one to two days in a warm, humid chamber.

Studies have argued that lacquer (or resin-producing) agroforests deliver environmental benefits—they enrich the soil and improve the biophysical conditions for growing food crops. The Lemo, a branch of the Bai ethnic group in Northeast Yunnan Province, China, have developed such systems. Due to the harsh biophysical conditions of their habitat (high altitude, steep slopes, and poor soil), the Lemo grow lacquer trees

and alder together with food crops. A similar system is found in West Lampung Pesisir area south of Sumatra, Indonesia, where the introduction of damar trees (another resin-producing species) into upland swidden rice fields helps to preserve the plant species itself, maintaining a high level of biodiversity and benefiting a range of forest-resourced economic products.

Lacquer/resin harvest represents the main source of cash income in these regions, as well as in other communities in Southeast Asia. Today, they face challenges in securing their livelihood due to changes in land-use policies (abolished traditional tenurial land systems and increasing state and corporatised land ownership), destruction of the forest, and decrease in demand and prices of lacquer. Ironically, lacquer sap fetches increasingly low prices, its use in various industries being replaced by synthetic chemicals.

Lacquer as Material

For its high resistance to chemicals, heat, flame, water, wood rot, salt, and electricity, lacquer is used especially as varnish and polish for daily wares, walls, and buildings, and as adhesive. It has even been applied as coat for paper and for silk in high-quality kimonos. As lacquer sap includes a natural disinfectant, lacquer-coats are also chosen for their insect repellent properties. Seeds of the lacquer tree are oil-bearing and can be used for industrial purposes, and its timber is used in constructing special furniture. For its durability and water-resistance, the wood is used as float. The roots, leaves, and bark of this species are also used in medicine.

Treating and applying lacquer is laborious and time-consuming, as the lacquer base alone requires up to 30 coats before the actual lacquer for crafting is applied. Some of the finest objects have more than 100 layers, each needing to dry thoroughly for two to four days before the next can be applied. Its lustre and richness of colour makes it one of the most valued materials in the field of fine and decorative arts. It is the painstaking process of working with the material and scarcity of lacquer that makes its products precious.

Vietnamese Lacquer Painting

The use of lacquer for fine art paintings is unique to Vietnam and was developed during the early 20th century. There are two different methods: *sơn khắc* in Vietnamese (literally translated as "colour engraving") and, more commonly, *sơn mài* (which can be translated as "rubbed/polished colour"). Many layers have to be applied and subsequently sanded to reveal the composition beneath. This complex layering gives these lacquer paintings incredible depth and variety of colour, which are unsurpassed by any other painting medium.

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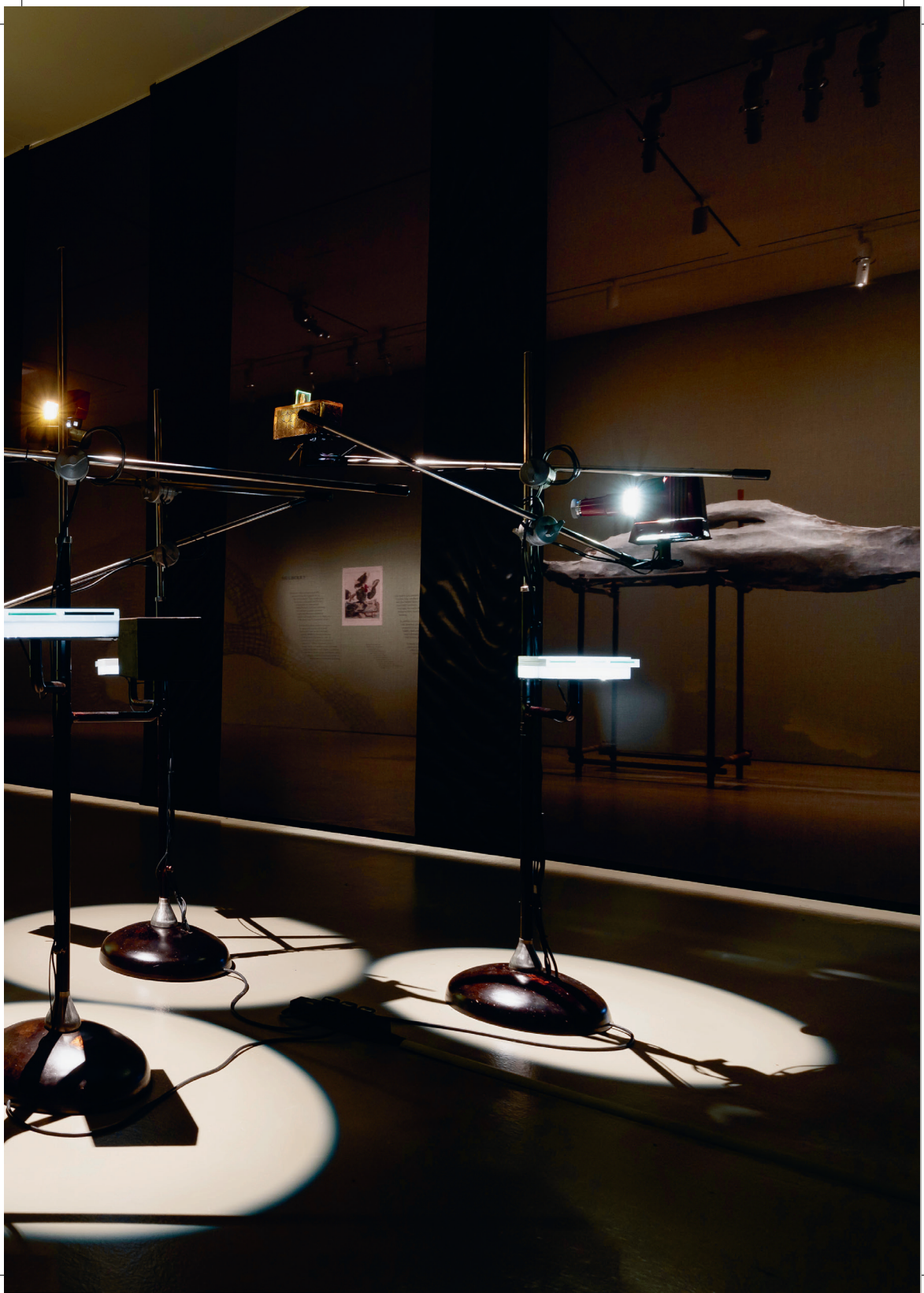
"The material qualities of this medium, the deep colours and ever-changing light on a lacquer image demands a different kind of attention and offers a heightened visual experience."

— Phi Phi Oanh



Phi Phi Oanh has been working with Vietnamese *sơn ta* lacquer for over a decade. With a background in painting, she is interested in exploring alternative strategies for working with *sơn ta* from the perspective of contemporary art and cultural theory. Extracted from the *Rhus succedanea* tree native to North Vietnam, this lacquer has an ancient history, being used to cover utilitarian wooden objects and the interior of temples for protection from termites and humidity. In the 1930s, Vietnamese lacquer was introduced as a painting medium at the École Supérieure des Beaux Arts de l'Indochine established by the French colonial government, through which a hybrid between ancient craft techniques and Western art emerged: the modern *tranh sơn mài* (Vietnamese lacquer painting).

Oanh is interested in expanding this process of acculturation by combining *sơn mài* with new materials and display devices in order to reflect not only on the medium itself, but also on cross-cultural histories. The artist, herself brought up in between cultures, constructs installations that reconfigure the specificities of both the medium and its cultural context. With little written material accessible on Vietnamese lacquer painting, Oanh looked for metaphors in the medium itself, starting with fossilisation and memory. In the same way that lacquer painting requires multiple applications of resin on wood, as well as a repeated cycle of sanding and polishing, memory is formed through an accumulative process of adding and subtracting, or as the artist puts it, "sanding away of time and perception." For Oanh, this focus on memory has served to see *sơn ta* as a cultural medium, a witness and marker of the changes in Vietnamese society, as it also serves as a political tool for the creation of national identity.

Phi Phi Oanh (b. 1979, United States/Vietnam) graduated with a Bachelor of Fine Arts from the Parsons School of Design, and a Masters in Art and Research from the Complutense University of Madrid. In 2004, she was awarded a Fulbright Scholarship to study traditional *tranh sơn mài* (Vietnamese lacquer painting) in Hanoi, which has since become a key medium in her practice and research. Recent solo exhibitions include L'Espace, Alliance Française, Hanoi; Artcore, Los Angeles; Art League, Houston; El Palacio Nacional de la Cultura, Managua; and Fost Gallery, Singapore. She participated in *A Woman's View* (2014), a group show at the Goethe Institute, Hanoi, and the Singapore Biennale (2013).

"In the era of globalisation and virtual reality, the use of *sơn ta* is my own way of negotiating between the extremes of global homogenisation and territorial localism."

— Phi Phi Oanh

Palimpsest, 2013–18
Installation, dimensions variable.
Courtesy the artist.

This installation is an attempt at the total dematerialisation of the medium of lacquer painting. While presenting a shift from the traditional application of lacquer as surface, the artist rescales the medium, rendering small paintings in large formats, seen through lenses, reminiscent of a microscope or a telescope. The images are projections of the multicoloured lacquer, presented through "Lacquerscopes," machines adapted from old slide projectors and retrofitted with LED lights, that reveal details usually not noticeable by the bare eye. According to Oanh, the way in which these apparatuses use principles of light situate the Vietnamese *sơn ta* between painting and photography. This play between light and shadow, scale and perspective, allows a new take on how we view Vietnamese *sơn mài*.

Silk moth and silkworm, *Bombyx mori*, on mulberry leaves, *Morus alba*.
Hand-coloured copperplate engraving drawn and etched by Jacob l'Admiral in *Naauwkeurige Waarneemingen omtrent de veranderingen van veele Insekten* (Accurate Descriptions of the Metamorphoses of Insects).
Amsterdam: J. Sluyter, 1774.

MULBERRY

Mulberry refers to more than 100 species of the *Morus* genus in the Moraceae family. This classification however is disputed (and further complicated by widespread hybridisation) and there has been no consensus among botanists regarding the exact number of species, with only 10 to 16 of them being commonly accepted. A flowering plant, mulberries grow in temperate regions all around the world, both in the wild and cultivated. A closely related genus is the *Broussonetia* commonly known as paper mulberry, a fibre crop significant in the history of paper.

Cultivation – Mulberry to Silk

Mulberry stands at the top of the production chain for silk, its leaves being the only food source for silkworms. While these feed on many species of mulberry, the preferred stock is the *Morus alba* (white mulberry) native to China, Korea, and Japan. It has been widely cultivated and naturalised in other parts of the world, including the Indian subcontinent, Middle East, Central Asia, Southern Europe, Mexico, and United States.

In sericulture, the chain of agricultural activity involving mulberry and silkworm farming, silkworms are fed fresh leaves daily. The silkworm cocoons yield silk fibres that are then made into threads and used to weave textiles. Sericulture is traditionally a cottage (and seasonal) industry with the tasks organised within the domestic sphere, mainly the work of women. With the increase in the demand for silk since the 10th century, these small-scale household productions shifted into workshops and eventually developed into a major industry. Also less dependent on seasons where in the past sericulture represented additional income, in some places and with certain mulberry species that leaf all year round, this activity is continuous.

Winding silk from the cocoon, ca. 1914–18, Japan. A.Davey, CC BY 2.0
https://www.flickr.com/photos/adavey/4864375822/sizes/o/

The production of silk depends on the skill and resourcefulness of its producers to not only maintain the ideal environment for mulberry and silkworms to grow, but also in how well they nurture the plants and insects.

The nature of the insect-cultivator relationship has influenced the quantity and quality of the filament that forms the cocoon. The filament is far from raw material; rather it is fashioned and nurtured through the interactions of cultivator and silkworm. It is both grown and made, such that design and technology are integral to it.

Mulberry and Silk as Materials

Silk stands as a unique fibre amidst all other natural fibres used for textile due to its strength, lightness, smoothness, and sheen. Silk is also the only filament that can stretch continuously for up to more than 1,000 m. Evidence of the use of silk has been discovered to date back to more than 5,000 years in China where it was a sign of nobility and wealth. Silk was also not only used in clothing but also to make paper—silk paper was then a luxury but also more practical than bamboo slips, often used for important official documents such as treatises. Silk was then also a form of currency used as pay-outs, diplomatic gifts, tributes, or rewards.

Other than its importance for silk industry, mulberry leaves are also prepared as tea in Korea; its fruits are edible, made into wine, as well as used as food colourant. Various parts of the plant (leaf extract, bark) have medicinal uses. Recent studies have explored the cultivation of mulberry as cattle fodder for its rich nutritional value, high leaf yield, and widespread naturalisation all over the world, making it an ideal alternative to traditional forage.

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"In China, the silkworm
represents generosity,
warmth, life, and endurance. And
because silk threads are so very long—a
single silkworm may give out from its mouth
a thread of up to a kilometre length—the thread of
the silkworm represents human life and history."
— Liang Shaoji

For three decades, **Liang Shaoji** has been breeding silkworms, integrating their silk and lifecycle into his practice. Through this interaction, he explores bioecology from an artistic perspective, especially the inherent relationship between humans and nature. Liang, who lives in Tiantai, a small town in Zhejiang Province, ideal for sericulture, works with sculpture, installation, painting, photography, video, and performance. Meditation, the practice of emptying one's mind to experience peace, is an important element of Liang's life and art, connected to Zen and Buddhist philosophies.

Liang observes the silkworms closely in the way they live, breed, and transform, investigating their response to a myriad of different materials and surfaces. Silkworms try to cover everything with silk. The artist describes the life cycle of silkworms as the infinitely fine line of life. For Liang, silk, a soft but strong fibre, represents a celebration of life's vigour, through its inherent sense of stillness, emptiness, and blurriness.

The artist incorporates rusted iron and other industrial waste in his sculptural work, often using metal as a symbol of industrialisation and violence. His subjects are inspired by the socio-economic context of today's China and its collective psychological experiences. He also draws from traditional Chinese architecture, especially temples and spaces conducive to introspection and quietness. Other elements are chosen for their metaphorical connotation in Chinese culture, such as bamboo, candles, and clouds, that are symbols of integrity, fleeting life, suffering, and generosity. Silkworms spew silk until they die in the same way candles consume themselves while providing light and warmth.

Liang Shaoji (b. 1945, China) graduated from the Zhejiang Academy of Fine Arts (today China Academy of Art), where he studied at the Varbanov Institute of Tapestry. Solo exhibitions include *Cloud Above Cloud*, Museum of China Academy of Art, Hangzhou (2016); *Liang Shaoji: Back to Origin*, ShanghART Gallery, Shanghai (2014); *Liang Shaoji: An Infinitely Fine Line*, Zendai MOMA, Shanghai (2009). He participated in the 5th Biennale d'Art Contemporain de Lyon (2005); the 6th International Istanbul Biennial (1999); and the 48th Venice Biennale (1999). He was awarded the Prince Claus Award in 2009 and the Chinese Contemporary Art Award (CCAA) in 2002.

Lonely Cloud, 2016
Installation: wood, silk, cocoons, and steel pipes, 245 x 428 x 114 cm.
Courtesy the artist and ShanghART Gallery.

In Tiantai, the home of Liang and of Tiantai Buddhism, camphorwood is regarded as sacred. For *Lonely Cloud*, Liang used this wood, usually employed for the carving of Buddha figures, as a ground for his silkworms, who covered it in silk. The large and heavy piece of wood is hold up by a rusted scaffolding that the artist found at a construction site. The trunk's form, wrapped in the transparent white fabric, and its raised position are reminiscent of a cloud. Also regarded as sacred in Tiantai for their nobility and strength, clouds symbolise the spiritual in nature.

Moon Garden, 2015
Single-channel video, 7 min 41 sec.
Courtesy the artist and ShanghART Gallery.

Liang Shaoji filmed the process of silkworms spinning on various materials such as acrylic sheet, mirrors, and metal, while he himself lied on the ground like a silkworm. As if looking through a microscope, *Moon Garden* captures the silkworms' motions, the sound they make while eating mulberry leaves, and the raw silk they spin.

Broken Landscape, 2016
Installation: silk and cocoons, 520 x 145 cm.
Courtesy the artist and ShanghART Gallery.

The title refers to the destruction of the Chinese landscapes due to human activities, natural disasters, as well as the loss of traditional culture. A long and delicate piece of raw silk hangs from the ceiling like a waterfall. The vestiges of the silkworms' spinning and lifecycle are imprinted on the fabric: cocoons, excrement, and urine punctuate the scroll.

"Silkworm or silk, cocoon, moth or egg, they are all production of nature. And caterpillar producing silk is the natural weaving in the most primal form. The oval shape of cocoon suggests the ultimate body of life and the essential configuration of universe."
— Liang Shaoji

"The goal was not to create technology that modified the organism, but to create technology that was in tune with the organism."

—Vivian Xu

Vivian Xu explores the intersection of organic and artificial systems, her interest lying in the intrinsic relationship of electricity and life, as well as the specificity of materialities. Her research revolves around how to transfer information from technological mediums to life organisms, and how the reverse can be made possible. Xu sets up experiments to observe how lower-level organisms, such as bacteria, respond to electric stimulation patterns, which in this way could be categorised as bio art. Her aim is not to optimise these organisms, but to find "points of negotiation […] and the variations of this negotiation become the artwork itself" (Vivian Xu).

Influenced by philosophy and bioethics, Xu wants to find hybrid systems and create new forms of machine logic. Philosopher Manuel DeLanda's theories of material fluctuation and expressivity, post-human theories of fluidity, complexity, and the cyborg, as well as physician Luigi Galvani's experiments in the late 18th century where he animated frogs' legs with electric charge are part of Xu's artistic lineage. Through her work, she questions the role of the artist, but also designer, versus that of the scientist and technologist within the advanced sciences, technology, and life.

Vivian Xu (b. 1985, China), based in Shanghai, holds an MFA in Design and Technology from Parsons the New School for Design, New York. She was a Research Fellow at the Interactive Media Arts Program, New York University Shanghai, and has taught at various universities including Parsons the New School for Design and Chinese University of Hong Kong, Shenzhen. She is the co-founder of Dogma Labs. Exhibitions and lectures include the National Art Museum of China, Beijing; Central Academy of China, Beijing; Chronus Art Center, Shanghai; New York Hall of Science; Rockbund Art Museum, Shanghai; Art Laboratory Berlin; SymbioticA, the University of Western Australia; and China Academy of Art, Hangzhou.

29 ***Silkworm Project***, 2013–ongoing
Multimedia installation, dimensions variable. Courtesy the artist.

Vivian Xu was drawn to silkworms due to her familiarity with them and because of the aesthetic qualities of works using silk by Chinese artists Xu Bing and Liang Shaoji. She wanted to incorporate poetics into the concept of the machine. *Silkworm Project* is a series of bio machines that generate self-organised silk structures. Electronic and digital systems house the silk-worms creating a closed feedback loop as an autonomous ecosystem. The combination of an ancient material with the new medium of data poses questions of production and consumption.

Flat Spinning Machine, 2013–14
Teak wood, electronics, 42 x 27 x 22 cm.

This machine includes a grid where each position can be activated via electrodes, with the worms being placed on a silk screen over that matrix. Positioned on a flat plane, silkworms are unable to create three-dimensional structures and the outcome is a flat sheet of silk. In 2014, Xu began to experiment with natural coloured silk to be able to differentiate between the silk spun by two or more worms. The first attempts, through changing the worms' diet, failed. She then discovered that genetically engineered silkworms from Japan are able to spin coloured, glow-in-the-dark silk.

Spatial Spinning Machine, 2017
Teak wood, glass, electronics, 30 x 43 x 11.5 cm.

Based on the silkworms' behaviour within a circular environment, this machine traces how the worms spin spiral-like structures and cell-like concaves of silk. The silk-worms steer the machines via cameras that capture their movements. Xu is interested in how these interactions can be scaled to larger networks through magnets and Hall effect sensors, generating chaotic and complex behaviour in the worms' weaving patterns.

Pink-flowered true indigo plant, *Indigofera tinctoria*. Hand-coloured copperplate engraving of a botanical illustration by J. Schaly from G. T. Wilhelm's *Unterhaltungen aus der Naturgeschichte* (Encyclopedia of Natural History), Vienna, 1817.

The indigo colour can be obtained from around 150 varieties of plants in different parts of the world. Most dyestuff however comes from the genus *Indigofera* that is part of the Leguminosae family. There are more than 650 species of *Indigofera* and among them, "true indigo" *Indigofera tinctoria* (or *Indigo sumatrana*) of China and subcontinent India and *Indigofera suffruticosa* in Central and South America yield the most indican (blue colourant) and are widely used commercially. In East Asia, the precursor to the *Indigofera* species is *Polygonum tinctorum*. Species of *Indigofera* are mostly shrubs and are usually found in tropical and subtropical regions and typically grow 60 to 90 cm tall (some up to 2 m). Flowers are short racemes of pink or violet and its seed pods grow up to 5 cm long.

Another common species for indigo-blue dye is *Indigofera arrecta*. It is widespread in Africa and believed to have been introduced to Java in the mid-19th century where it was referred to as "Natal" indigo. *I. arrecta* is cultivated in Indonesia (Sumatra, Sumba, and Flores), Laos, the Philippines, Thailand, and other parts of Southeast Asia, as well as in India where it is known as "Java" indigo.

Cultivation and Harvesting

The process of producing indigo dye involves first steeping the leaves and stems in warm water and allowing it to ferment for 10 to 12 hours (under certain conditions, for up to 24 hours). The plant residue is removed and used as fertiliser and the remaining broth is then stirred to mix it with air (oxidation process). The resultant blue paste that settles at the bottom of the vat is then scooped up, dried, compressed, and cut into small pieces for use as dye. Fermentation and oxidisation require close supervision by experienced hands, carefully controlling the temperature of the water during fermentation and subsequently careful stirring (also called "beating") of the fermented liquid to control the amount of air being mixed into the substance.

It is this mysterious, alchemic colour transformation process during extraction and the secret, almost intuitive skills of indigo masters (often passed down following a strict lineage) that contribute to a fascination with indigo dye production and give rise to the colour's numerous associations with myths and magic.

For more than four millennia, all dyestuff was made from natural plant materials (with a few exceptions) before synthetic dye was invented in the mid- to late-19th century and subsequently widely available in the 20th century. Countless plants yield yellow, brown, red, and black dye, but indigo, in an organic chemical class of its own, represents one of the world's oldest and most valued dyes—a deep blue that in many ancient cultures was associated with royalty or the divine. For this, and the wide range of colours that can be obtained by combining it with other natural dyes, indigo has been considered "the king of dyes."

For its deep blue colour, insolubility, light-fastness, and suitability for dyeing any type of fibre, the rise in popularity of indigo dye is closely connected to the textile industry and the advance of maritime trade in the 16th and 17th centuries between India and Europe. Prior to this, woad (*Isatis tinctoria*) was used in Europe, which yields smaller amounts of blue dye.

Indigofera tinctoria and related species are also useful as manure, used for example in coffee plantations in India and in traditional rainfed rice cropping systems in Philippines. The plant (and its residue from dye production) is a good nitrogen catch crop, reducing the amount of fertiliser needed. Its leaf extract, seed, and even root, are known to have medicinal use.

Colour of Life

"In many cultures […] it is the powerful fertility of certain women that has been seen as directly conflicting with the fertility of the dye vat, which is equated with a womb […] the delicate process of preparing the dye, considered akin to conceiving and bearing a child, has often been reserved for women beyond the age of child-bearing, as those able to bear children could cause the inexplicable 'death' of a dye vat."

—Jenny Balfour-Paul, *Indigo. Egyptian Mummies to Blue Jeans* (1998).

"Indigo was the 'cross-over' colour par excellence: from the Orient to the European ruling classes, from a colour-filled world of the wealthy and the churches in the West until the mid-Middle Ages to a colour-less world of blacks and blues thereafter, from the ruling classes to the working classes, from its deep blue colour to all colours, thanks to aniline-based dyes replacing natural dyes, from a commodity to something animate and intimate that aged with its owner [. . .]"

—Michael Taussig, "Redeeming Indigo," (2008).

Indigo dyeing in Guizhou, Southwest China, 1993.
Copyright Jenny Balfour-Paul.

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"I believe that there is nothing new to be made. I enjoy following a particular process again and again until I fully understand its potential. It leads to other ideas and possibilities."

— Manish Nai

Manish Nai, trained as a painter, expanded his practice into creating sculpture, photography, and murals, drawing inspiration from the bustle of the megacity Mumbai, where he lives. Since his graduation in the early 2000s, he has been absorbed with materials and materiality, particularly through the use of jute. A hardy plant, jute is woven into burlap, an inexpensive fabric used mostly for packaging familiar to Nai, as his father used to be a jute trader. Using it first as a base for paintings, he then developed techniques to work with the fabric itself by painstakingly removing threads to create the images he wanted. Having gathered all the waste jute into a box, he later discovered these had taken the shape of their container, thus stumbling upon the sculptural form, reminiscent of minimalist abstraction, that he adopted into his practice.

Working with compression, Nai also experimented with discarded clothes and newspapers. The used clothes become poles, the old newspapers, washed off beforehand to not retain images or text, are crushed into circles and assembled into large slabs. These works also draw from minimalism in their use of geometry and modularity. Although allowing chance to play a part, Nai cautiously controls the result. The artist's different series have in common an attention to the material quality of objects and their possibilities of transmutation.

The preoccupation with texture and surface is ubiquitous in Nai's practice. When crossing the city, he looks for "moments of blankness and flatness." He photographs empty billboards and architectural details, almost as abstract ready-mades. Nai's precise and conceptually rigorous expansion of the surface into both the three-dimensional and the completely flat photograph contributes to the discussion around painting and the nature of the medium itself.

Manish Nai (b. 1980, India) received a Diploma in Drawing and Painting from the L S Raheja School of Art, Mumbai. Nai has participated in the Kochi-Muziris Biennale (2014) and the Shanghai Biennale (2012), and has newly completed a 60-foot-long sculpture as a permanent installation in Mumbai's Bandra-Kurla Complex. His works are on view at the Sculpture Park at Madhavendra Palace, Rajasthan, India (2017–18), and at the Smart Museum of Art, Chicago as part of their permanent collection. In 2017, the Fondation Fernet Branca presented a comprehensive exhibition of the artist's paintings, murals, sculptures, and photographs in St. Louis, France. Solo exhibitions include Galerie Mirchandani + Steinruecke in Mumbai, Kavi Gupta Gallery in Chicago, and Galerie Karsten Greve in Paris. He was the recipient of the 2016 Prudential Eye Award for Best Emerging Artist (painting).

Untitled, 2018
Compressed indigo jute cloths and wood, total 99 pieces, each 203 x 7.6 x 7.6 cm, installation dimensions variable.
Courtesy the artist and Kavi Gupta Gallery.

In 2010, Manish Nai started using indigo-dyed fabric for his works, a material that became increasingly central to his practice. He remembers being in high school and working in a clothes workshop run by his relatives. There he found himself in the midst of bundles of indigo-dyed fabric, piles of soon-to-be uniforms for schools and factories. Indigo, extensively used in India, was commercially exploited during the colonial period, having led to the 1859 Indigo peasant revolt in Bengal. However for Nai, these connotations are less central than the material itself. In this work developed for NTU CCA Singapore, indigo-dyed jute is compressed into 99 poles, turning his childhood memories into an abstract manifestation.

21 July – 30 September 2018
NTU CCA Singapore

Project led by:
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Laura Miotto
Khim Ong

Topical Seminars:
Ana Sophie Salazar
Syaheedah Iskandar

Education Programmes:
Magdalena Magiera
Kelly Reedy

Exhibition Production:
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Logistics:
Rhema Events & Arts Services

Conservation:
Global Specialised Services
Bettina Schleier (Sopheap Pich)

Exhibition Construction:
Design 18

Exhibition Photography:
Ung Ruey Loon

Exhibition Collaterals:
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All exhibition documentation:
(covers, inner fold, and pages 6, 14, 22, 26, and 34)
Trees of Life – Knowledge in Material,
21 July – 30 September 2018,
NTU Centre for Contemporary Art Singapore,
installation views.
Courtesy NTU CCA Singapore.

CLIMATES.

HABITATS.

ENVIRONMENTS.

White Cockatoo
Habitat: Southeast Asia
Conservation Status:
Endangered

NTU CCA Singapore's overarching research topic, CLIMATES. HABITATS. ENVIRONMENTS., informs and connects the Centre's various activities for the next three years. Changes in the environment influence weather patterns and these climatic shifts impact habitats, and vice versa. Precarious conditions of habitats are forcing the migration of humans and other species at a critical level. The consequences of human intervention are felt on a global scale, affecting geopolitical, social, and cultural systems. The Centre intends to discuss and understand these realities through art and culture in dialogue with other fields of knowledge.

NTU CENTRE FOR CONTEMPORARY ART SINGAPORE

Located in Gillman Barracks, the NTU CCA Singapore is a national research centre of Nanyang Technological University, supported by a grant from the Economic Development Board. Since its inauguration in October 2013, the Centre links the complexities of the contemporary art field to other forms of knowledge production. NTU CCA Singapore is unique in its threefold constellation of research & academic programmes, international exhibitions and research-based residencies, positioning itself as a space for critical discourse. The Centre focuses on *Spaces of the Curatorial* in Singapore, Southeast Asia, and beyond, and engages in multi-layered research topics, such as PLACE.LABOUR.CAPITAL. (2014–17).

SPACES OF THE CURATORIAL

The Centre seeks to engage the potential of "curating," and its expanded field. What are the infrastructures and modes of presenting and discussing artistic and cultural production in diverse cultural settings and in particular throughout Southeast Asia's vastly changing societies? NTU CCA Singapore's exhibition spaces, designed by artist and curator Fareed Armaly, respond to this curatorial framework to unfold different juxtaposed formats.

SHARED ACADEMIC PROGRAMMES WITH THE SCHOOL OF ART, DESIGN AND MEDIA, NTU

Master of Arts in Museum Studies and Curatorial Practices
Applications open: 1 September 2018

In August 2018, NTU welcomes the first intake of MA students for Museum Studies and Curatorial Practices. The programme prepares graduates for professional positions in the highly complex and diverse museum landscape in Southeast Asia and the ever-expanding field of contemporary curating.

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This research-oriented MA and PhD is designed for students who wish to pursue cutting-edge research in specific areas of Art, Design and Media with a focus on *Spaces of the Curatorial* and *Curating the City*, both key academic research areas of NTU CCA Singapore.

Learn more: adm.ntu.edu.sg/programmes

GIVING

NTU CCA Singapore is a non-profit institution that takes great pride in presenting internationally-acclaimed, research-driven exhibitions, residencies, and extensive educational programmes. Your contribution, regardless of amount, goes a long way in enabling us to play an active role within the local arts scene. Your generous support will also contribute to the development of regional and international arts infrastructures. If you are a taxpayer in Singapore, your contributions are eligible for a 250% tax deduction in 2018!

For enquiries, please contact ntuccacomms@ntu.edu.sg

NTU CCA SINGAPORE PUBLICATIONS

The publishing activity emphasises the holistic approach of the Centre by expanding the connections across the various departments to capture and deepen the knowledge on contemporary art linked to the Centre's ongoing research projects. The mobility and lasting nature of publications allow the Centre to disseminate its contributions to discourse beyond its physical parameters.

PLACE.LABOUR.CAPITAL. Mousse Publishing, distributed by NUS Press, 2018.
SouthEastAsia: Spaces of the Curatorial. Jahresring 63. Sternberg Press, 2017.
Becoming Palm, Simryn Gill and Michael Taussig. Sternberg Press, 2017.
Tomás Saraceno: Arachnid Orchestra. Jam Sessions. 2017.
Theatrical Fields: Critical Strategies in Performance, Film, and Video,
in collaboration with Bildmuseet Umeå. König Books, 2016.

ARTISTS' LIMITED EDITION EVERYDAY ITEMS

NTU CCA Singapore's line of commissioned Artists' Limited Editions Everyday Items—ranging from scarves, umbrellas, and raincoats, to notebooks, tote bags, and beach towels—is created in collaboration with the Centre's local and international Artists-in-Residence. Participating artists include: **Hamra Abbas** (Kuwait), **Julian 'Togar' Abraham** (Indonesia), **Yason Banal** (Philippines), **Heman Chong** (Singapore), **Duto Hardono** (Indonesia), **Alex Mawimbi** (Kenya/Netherlands), **Alex Murray-Leslie** (Australia/Spain), **Arjuna Neuman** (United States/United Kingdom), **UuDam Nguyen** (Vietnam), **Ana Pravčki** (Serbia/United States), **anGie seah** (Singapore), **SHIMURAbros** (Japan), **Tamara Weber** (United States), and **Jason Wee** (Singapore).

For enquiries, please contact ntuccaevents@ntu.edu.sg

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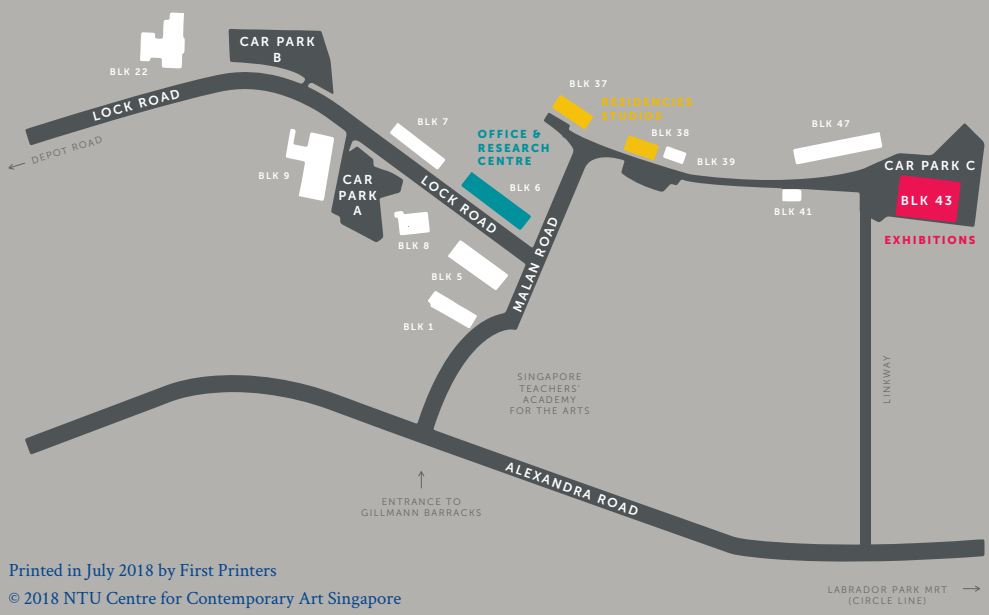

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