As part of this commission, Gerard Hockney, a British infantry officer based in Singapore was tasked to catalogue all native plant species on the island. For a period of one year, his team photographed every single plant they could identify in Singapore. Inspired by recent successes with rubber, the commission was also motivated by the hopes of discovering the next great botanical resource. They catalogued a total of 2432 species.

The team conducting the survey comprised of amateur naturalists, many of them wives and children of British officers. Only a small portion of the original 2,432 photographs remain.

Singapore River (1840-1993)

This is a collection of postcards dating back to the 1840s. The Singapore riverbank has been one of the most dominant features in postcards from Singapore since the 1840s.

The oldest postcards reveal the riverside landscape before the reclamation of the Singapore River, formerly a mangrove swamp. After reclamation, the postcards show the rapid development of entrepot economy, and also becomes a document of how colonial engineering "fixed" the tropical landscape. A rash of ships and sampans fills the waterway, and spreads into the mainland in the form of colonial architecture and civic institutions.

Closer to the present, the river develops into a skyline, and adopts its now familiar touristic quality: skyscrapers grow from the colonial landscape. The desert-like landscape in the horizon is also visible. This is due to the result of modern-day reclamation efforts, which began in the 60s.

It's easy to miss one of the most striking features of these images. A single patch of greenery, a massive Banyan Tree overlooking the river, has been spared for what some arborists believe to be almost 200 years.

It is impossible in tropical climates to determine the ages of trees through tree-ring analysis, so one of the only ways to date a tree is through photographic and anecdotal accounts (and in some rare cases, paintings). In addition, when dating trees, photographic records with a distinct landmark or location are preferred for reliability in corroborating accounts with locations.

It's unclear if this Banyan Tree is the island's oldest, but it is likely to be the tree with the oldest and longest photographic record in Singapore. The Banyan Tree happens to be at a spot of the only ship-building yard along the Singapore River in the 19th century. Photographs of this ship-building yard from the 1890s show the Banyan Tree prominently. Recently, some researchers claim that the banyan's neighbour, a palm, is the older tree, but it is impossible to fully ascertain this.

Collection of the Coast Exploration Society, 1978-1988

In the late 70s, Singapore began a major phase of land reclamation around the Eastern Coast. Before development, the reclaimed land took the form of vast, desert-like sand dunes which were rarely visited by the public.

In 1979, a group called the Coast Exploration Society was formed by a group of enthusiasts drawn to the dunes. The Society eventually began organising tours and activities like picnics, sand-sculpture competitions, and fishing trips for members of the public. Due to the Society's efforts, these sand dunes became very popular weekend destinations with Singapore families.

One activity that became especially popular was treasure-hunting in the sand.

- *Artefacts (In Vitrines)*

  - *Fulgurite*

Fulgurites are natural tubes or masses of sintered soil, sand, and/or rock that form when lightning strikes the ground. Singapore experiences lightning 186 times a year. Fulgurites are natural hollow glass tubes often formed during lightning strikes, in quartzose sand, silica, or soil. Fulgurites are formed when lightning hits sand or silica with a temperature of at least 1,800 °C (3,270 °F) melts sand on a conductive surface and fuses mineral grains together; the fulgurite glass tube is the cooled product. This process occurs over a timespan of around one second, and leaves evidence of the lightning path and its dispersion over the surface or into the earth. It is believed that Fulgurites are the lightning rods of the God and carry with them warnings of impending disasters due to an upset of a natural order.

The members of the Society would regularly find small chunks of hardened sediment in the otherwise smooth sand dunes. Amongst the collection is the largest fulgurite found at the Tanah Merah sand dune, and reveals the path of the lightning as it entered the sand.

  - *White Cockroach*

The visitors who first spotted this cockroach at the East Coast sand dune mistook it for a moulting cockroach, or an albino cockroach, until entomologists theorised that the cockroaches living in the dunes had adapted to life in the sand by turning white as camouflage.

The White Cockroach is an evolutionary instance of directional colour change in the cockroach population. This phenomenon emerged as a consequence of land reclamation during the 70s. Lighter-bodied cockroaches were able to blend in with the light-coloured sand and were less likely to be eaten by birds in the reclaimed lands. Because the light-coloured cockroaches were much more effective at hiding from predators, the frequency of the normal brown morph rapidly dropped to about 0.01%, a phenomenon known as adaptive melanism.

Adaptive melanism in the White Cockroach was an experimental test of Charles Darwin's natural selection in action, and remains a local classic example in the teaching of evolution. It is often describes as "the clearest case in which a conspicuous evolutionary process has actually been observed.

Before land reclamation, the white cockroach was rare. The first white specimen (of unknown origin) was kept in the Raffles Museum. On display is the first live specimen ever caught. It was caught by a member of the Coast Exploration Society, Song Peck Choon, in 1978.

  - *Faces In The Sand : Excerpt from The Coast Exploration Society Monthly. 1 May, 1979.*

Amidst the picnickers and kite-flyers and sand-castle builders, the air of festivity was carried on by the Society's lusty treasure hunters led by Mr. Gerald Ho, keen to unearth more curios and gems from the pristine sands. The ladies retired as usual from the back-breaking work to sip their coconuts at the breakwater while the boys clawed away with gusto. As usual, trinkets, bits, and bobs were turned up, but also some new discoveries, of a rather different sort.

As Mr. Gerald Ho describes it: "today we dug deeper than usual, because we had more men. We dug two men deep with the spades that the ladies brought. We found faces in the sand. Face after face. Faces and small hands."

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2. ECOLOGIES

Bats, Mangroves, Durians, Reservoirs, Tilapias & Floods : The Francis Leow Archives

This section assembles some of the papers, photographs, and objects of Francis Leow (1935-2005), acquired by the Institute after his death. Unlike many amateur naturalists of whom the term "dabbler" might be true, Leow was an avid researcher who spent much of his life meticulously documenting Singapore's biodiversity and ecology through field-work. He developed volumes of field research and subsequently presented his findings in a series of some 100 papers and proposals. Professionally, Leow was personal assistant to Humphrey Burkill, the director of the Singapore Botanical Gardens from 1957-1969.

Leow was not a trained biologist, but wrote numerous scientific papers over the course of his life. He was never taken as a serious researcher, and his papers were disregarded as amateur jottings, mostly because they made use of social histories and personal anecdotes to make often far-fetched claims. Much of Leow's work revolved around Singapore's waterways because of his childhood in stilt houses of what was once the Pandan mangrove, now a freshwater reservoir.

- *Highlights of the Francis Leow Archives: Selected Summaries*

  - *Bats, Mangroves, and Durians*

In 1977, Leow wrote but never formally published a paper, ***Bats, Mangroves, and Durians***. The paper drew on personal observations about the decline of durian trees near Pandan reservoir to make a series of claims about the ecology of the area.

The genesis of the paper was a series of observations Leow had made about the steady decline of durian harvests during his quarterly durian hunts. Leow noted a lack of clear pollinators around the area's trees, and set out to determine what animal pollinated the durian.

In the paper, Leow relies heavily on Walter William Skeat's 1900 ***Malay Magic: An Introduction to the Folklore and Popular Religion of the Malay Peninsula***, which details a deep spiritual connection between durian trees and their "demonic, blood-sucking guardians": bats.

As Leow writes: "we are today inclined to dismiss the ancient folk knowledge of this island's earliest inhabitants, but that is the greatest arrogance. What we understand as 'pollination', the old Malays of the island described as the 'custodianship' of bats." Leow would eventually note small numbers of bats hovering around the trees at night.

The paper goes on to argue that the decline of durian numbers must be connected to declining bat populations and attributes this decline in bat populations to recent reclamation activities in the Pandan area.

It was only after Leow's death that scientists confirmed that the sole pollinator of durian trees is the Cave Nectar Bat. They also established that local populations of cave nectar bats have been on the decline because of the loss of green cover and mangrove areas which are a major source of food and shelter.

  - *Flyovers as Day Roosts for Bats*

In 1987, Leow wrote a paper, ***Flyovers as Day Roosts for Bats***, as a proposal to relevant government agencies to mitigate the displacement of bat populations. It was never adopted.

In secret, Leow worked on a few flyover tunnels himself to create more urban "caves" near forested areas, which local authorities only discovered after Leow's death.

  - *Tilapias*

One of Leow's lifelong obsessions was the common tilapia. ***Oreochromosis mossambicus*** was introduced to Singapore during World War II. The Japanese Army brought a breeding stock from the island of Java and introduced the fish to Singapore as a protein source during their colonisation of Singapore. The tilapia is therefore also known by its local names: Japanese Fish and Java Fish. But the true origins of the fish lie in East Africa. Tilapia were in fact brought to Asia by traders.

Leow kept detailed journals of the tilapia he caught and observed from that over the years the fish began to exhibit strange changes to their appearance. He realised that the original variety of tilapia, the ones brought in by the Japanese, was slowly declining, replaced by a hybrid of at least three different species from the same family.

In his journals, Leow writes that he discovered that the original Japanese-introduced variety was breeding with farmed red tilapia, common as a restaurant delicacy. Fish farmers Leow spoke to told him that during periods of flooding after heavy rain, it was common for the farmed fish to escape into local canals.

  - *Where Can All The Rain Go Now?*

After his retirement in 1987, Leow turned his energy to community activities and popular science communication. He led nature tours for children and families, and was eventually invited to give talks and lectures at libraries and

community centres. There, he spoke about ecology and conservation. On display is some presentation material from one of Leow's lectures.

A folder in Leow's personal computer contains fragments of text, photographs, research jottings, and lecture materials from his community talks. Marked ***Where Can All The Rain Go Now?***, the Institute believes this was preparatory material for a book-length project that was left incomplete at the time of Leow's death.

The material suggests the book would have studied the phenomenon of flooding in Singapore, attributing it to the destruction of mangrove environments to create freshwater reservoirs.

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3. THE HISTORY OF BIRDS

The More We Get Together

The Institute has a growing collection of animal traps from around the world. The Institute has the world's largest collection of Singapore-made traps, many of which are on display in this section.

Various Mouse Traps from around the World

Mousetraps from Singapore, Britain, Thailand and Japan.

Pigeon Decoy Hut

This is a set up that was used by early Malay hunters to trap forest pigeons for food, as detailed in Walter William Skeat's *Malay Magic* (1900).

It comprises a conical hut, which in use is disguised by leaves. The hunter crouches inside the hut, and sounds a low incantation into the forest through a wooden tube. He then releases a trained pigeon from the hut. It perches on one of the horizontal rods, and issues a challenge call to other pigeons. When a wild pigeon responds to the call, and lands near the trap, the hunter extends a hooped rod, snares the pigeon by its neck or feet, and drags it into the hut.

Before starting the hunt, the hunter utters a series of charms and prayers, including a ritual involving the scattering of rice-paste.

There is an elaborate, mystical theatre to the trap. During the process, the trap is not treated literally, but becomes a mythic allegory: it is referred to as "The Magic Prince". The tube through which calls and incantations are projected is referred to as "Prince Distraction" or "Raja Gila". The decoy pigeon is called the "Squatting Princess," and the wild pigeons are given the names "Princess Kapor," "Princess Sarap," and "Princess Puding," depending on their species. The horizontal rods in front of the trap are called "King Solomon's necklaces," with which "the Princesses are invited to enter a gorgeous palace". The whole process makes elaborate reference to the "souls" of the wild pigeons.

As Skeat puts it, "the method of catching wild pigeon... brings the animistic ideas of the Malays into strong relief."

Various Bird Traps from Singapore

Trap for Songbirds, Trap for Mynahs, Trap for Pigeons, Trap for Sparrows

Enta Pigeon Trap

This is a modern pigeon trap developed for pest-control by Singapore company, Enta. It is infra-red remote-controlled and can snare at least ten pigeons at any time.

The rooster will crow three times

Due to urbanisation in colonial-era Singapore, the red junglefowl was locally extinct as of 1927. They were re-discovered in 1985 on Pulau Ubin. Since 1993, starting from the east side, they have spread back onto the mainland. The mainland wild red junglefowl population has surged in the past 5 years. They are now a common sight in residential neighbourhoods like Yishun and Bukit Gombak.

All domesticated chickens are believed to trace their ancestry back to the red junglefowl, which is native to Singapore, and was first domesticated about 5,000 years ago. Unlike domestic chickens, red junglefowl are much larger, capable of flight, and roost in trees.

The resurgence of jungle fowl today is related to the selective re-greening of the city, an attempt to soften the urban landscape with greenery.

The red junglefowl's cry is shorter and more clipped than that of the domestic chicken.

These photographs were taken in Sin Ming Avenue. The junglefowl in these photos were put down earlier this year due to complaints by surrounding residents.

Singapore Javan Mynah Society

Sundown at Orchard Road is marked by a massive flurry of mynahs coming to roost, a daily event that covers the sky in black winged bodies, and fills the air with thunderous birdcall.

The noisy mynah-roosting is largely seen by business-owners in the area as an annoyance. Many of them have taken measures — including deploying a hawk to prey on the birds — against Orchard Road's mynah population, mostly in vain.

But in the 1980s, a group of local nature lovers formed the Singapore Javan Mynah Society, hoping to turn the roosting event into a tourist attraction. The business-incorporated Society would lead tour groups out to Orchard Road to witness the roosting, which they marketed as "a spectacular natural phenomenon," a natural event taking place in the middle of the heart of urban Singaporean. They also proposed a line of mynah-centric merchandise, like T-Shirts, toys, and postcards, some of which are on display here.

Chicken Rice Archaeology

The Institute conducted an experiment involving major chicken and duck rice restaurants around the island. In order to determine the uniformity in size of the chickens supplied to these restaurants, bones were salvaged from meals with the aim to reconstruct a whole skeleton.

4. EXPERIMENTS

The Institute conducts experiments that explore the everyday interactions between human beings and the natural world, seeking to represent natural phenomena and scientific ideas in new ways.

Moon Dust (Ash Belonging to 103 Species of Insects Collected from a Lamp Cover)

After 10pm, less than 4% of Singapore lies in total darkness. Insects are attracted to artificial light sources, though no one knows exactly why. The insects are usually killed by exhaustion or through contact with the heat from lamps. After being incinerated, their bodies become a heap of ash, collected in the covers of street lamps. The ash, also referred to as "moon dust", is used by scientists to study the ecological impact of light pollution on insects.

All The Insects In The House

Over a single day, researchers gathered insect carcasses from windows, insect traps, house corners, and other crevices within a single home. These carcasses reveal the wide variety of insect life that can be found in human habitats. In a typical home, hundreds of insects co-exist with human beings, though they go largely unnoticed. There are over 100 varieties represented here.

Tree Dust

The Powderpost Beetle lays its eggs in the branches and roots of trees. The larvae that emerge feed on the walls of their tree nests, consuming the starch content, and release a powdery dust as excrement. In this way, the beetle is a natural decomposer, and given enough time, can completely reduce tree matter to dust. When they mature, the beetles lay eggs in the same patch of wood, and in this way can feed on the same tree for generations until it becomes a pile of dust.

The Institute conducted an experiment to measure the dust-making labour of the beetle in man-hours. It takes a cluster of larvae about three months to reduce a tree branch to dust. With continuous, mechanical action, using only sandpaper, it takes a human being 60 hours.

On display here are two piles of tree dust: a colony of powderpost beetles feeding on a tree trunk, and an accompanying pile of man-made tree dust.

Trying to Remember a Tree

In the interest of conservation, the Institute paid close attention to a young raintree that was sitting along a path marked for development. In 2015, the tree was felled to make way for construction. The Institute set out to document as much of the tree as possible, but only managed to collect the foliage for these purposes. Over a year, the Institute photographed each of its 28,017 leaves for archiving.

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1. HISTORIES

An artist cannot exaggerate the sun (1883–1888)

In 1883, Mount Krakatoa, in the Dutch East Indies, now Indonesia, erupted. The eruption was so massive that tsunamis were reported as far away as South Africa, and emissions from the volcano disrupted weather patterns for five years. The entire island of Krakatoa disappeared into ash, and the sky was darkened for several years afterwards.

This produced bizarre and spectacular sunsets all over the world: between 1883 and 1888, there was a slew of reports and sketches of red suns, purple twilights, and lavender sunsets.

In Singapore, the archives show that from 1883, postcards sent out by British occupants of Singapore rapidly began to focus on sunrises and sunsets. Due to the island's proximity to the volcano and its sulphurous clouds, dusk and dawn turned green for several years, becoming a point of fascination for British inhabitants eager to participate in an international cataloguing of these optic mysteries.

Photographing Singapore sunsets became a hobby amongst settlers, who would send their shots and sketches to a Singapore press run by a Chinese printer, K.P.Hock, to be turned into postcards. These postcards would join a growing international collection of coloured sunsets. Sunset postcards from Singapore, often inscribed with vivid descriptions, became especially prized amongst collectors. During these years, Singapore's "absinthe sun," became a major attraction for Europeans passing through the city, who would hire local guides to take them to the coasts to catch a glimpse of the spectacle.

To Know All the Plants

These images are from ***A Survey of the Flora of the Island of Singapore***. The survey was an attempt to catalogue all of colonial Singapore's plant life and was commissioned for the Great British Empire Exhibition of 1924. The images were first presented at the Malaya Pavilion at Wembley, London.