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**Commodity, Conservation, and Nation Building:
The Orchid and the Singaporean Identity.**

By

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Chapter 1:***The Growth of a Nation and its Orchids***

A miniscule seed difficult to see by the naked eye is thrust into a small flask of sterile agar gel, with a swirl of necessary nutrients. The flask is thrown on to a large centrifuge, spun to allow the tiny seed to begin to germinate. The seed after some time will soon erupt, revealing a small, two-leaved plant. Kept in the confines of its personal sterile green house, the plant uses photosynthesis to achieve a more mature form. Eventually the plant will be moved to a larger flask until it is large enough to be de-flasked. The young plant will be brought out of artificial light to its new home: a small medicine-cup-sized plastic pot. It will be years until the plant will finally show the fruits of time and nurturing from its human caretakers and, if everything goes as planned, the flower produced will be examined and (if approved) will be kept in secret, hidden from the public. This process will be an investment of seven or maybe even ten years before the plant blooms. This meticulously grown plant will only be seen by a handful of individual government workers until it is needed. The orchid will then be given a unique name and will bloom forever within the national gardens of Singapore. While this orchid waited many years to finally be appreciated by the public, many of its companions will instead be thrown into spectacle, stapled to a tree, placed in the living room of an apartment, or gifted before a business meeting.

Orchid cultivation is a global practice, yet orchids have their own history unique to Southeast Asia. Before the Nation of Singapore came in to existence, orchid innovations were occurring in the heart of the island. When Singapore was faced with the opportunity to become a modern city-state, the challenge of forming a new national identity came with it. The botanic

gardens were considered one of the most valuable resources within the island. Orchids are quotidian objects that are involved in almost all areas and social worlds in Singapore. Orchids are tended by government employed botanists and a large migrant working force. Orchids in Singapore rely on a system composed of many private and public institutions that ensure that these plants will continue to thrive in different spaces around Singapore. These institutions include the Orchid Society of South East Asia and the Royal Horticulture society. The places orchids reside include religious spaces, streets, parks, public and private institutions, and the private home. Examining the production of orchids in Singapore goes beyond a story of nation building. If one carefully observes orchids in Singapore, they will see how a global commodity produces its own particular local power. This power can be used for both international relations as well as indigenous commemoration.

Orchids are flowering plants with a unique flower pattern that is composed of the most diverse flowering plant family. The symbolism of orchids is critical to the national foundation of Singapore, and their communicative value is grounded in the orchid's own materiality. Emiko Ohnuki-Tierney, an anthropologist who has studied the effectiveness of nation-states and their use of botanical objects, combines other theories on culture and communication to explain that "communication is of fundamental importance not only for the survival of a social group but also for the daily interactions among social animals, especially humans. Communication is the bedrock of any society and is synonymous with culture (Hall [1966] 1969, Leach 1976)" (Tierney 2015, 2). The meaning behind orchids is also one that involves the entwined global and local hybrid narrative. Ohnuki-Tierney's defines her concept of meanings as "every meaning is always defined in relation to other meanings if a given symbol, Orchids meanings are defined by their

name and which space that they occupy. Rather than being discrete entities, each in a pigeonhole, meanings are embedded in social relationships and life processes (Ohnuki-Tierney 2015, 11).” Orchids’ wide range of meanings in Singapore is due to their place in a globalized material culture.

Using anthropology to approach stuff or things has been increasingly important in the field. *Stuff* by Daniel Miller, outlines the key theory to the study of material culture: “our use and identification with material culture provides a capacity for enhancing, just as much as for submerging, our humanity (Miller 2010, 19).” Miller argues that not only do we make things, but also the things we make, make us human. Miller further insists that this relationship is not unidirectional. In Miller’s description that stuff can submerge our humanity, he is attempting to show that we begin to define ourselves through our stuff. In studying orchids in Singapore, we see this phenomenon. When the Singaporean government creates orchids, the orchids create the Singaporean identity. Studying the orchid relationship with different spheres in Singapore is integral to understand how the orchid becomes Singaporean. Arjun Appadurai outlines the methodology for understanding material culture by the fact that “we have to follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories (Appadurai 1986, 5).” Studying how objects such as orchids move illuminates their human context and social value. The orchid is involved in many transactions within Singapore, either as a commodity or a gift. The orchid in Singapore is also incorporated in to the health of the nation. I argue that the orchid, despite its global existence, becomes part of the Singaporean identity due the governments active role in orchid production.

The central data for this thesis came from an opportunity to participate in ethnographic research in Singapore. While the research was focused on Singapore's water story, all of the researchers were given the chance to focus on an environmental subject of our choice. At an early age I was fascinated with orchids, so seeing the streets and trees covered in orchids captivated me. My research included visiting and communicating with both the private and public sectors of the orchid industry. I kept careful observation of every time an orchid appeared in both physical and symbolic form. Many of these observations are supported by much of the literature written about orchids. This paper relies on the fact that behind every orchid is a group of people that were involved in its creation. Most people are interested in orchids purely for their aesthetics. If not for their beauty, we should care about these plants due their extensive history of being sought after throughout the world.

The Botanical History of a Nation

On May 11th 1967, Lee Kuan Yew, the founder of Singapore, introduced the concept of a "garden city" (The Strait Times 1967). Lee Kuan Yew recognized the botanical success of orchids throughout the origins of the nation. The greening of Singapore was a direct response to cleaning up the remnants of a polluted landscape from colonial rule. The garden city vision was critical to the increased role of orchid placement in the public. The Singaporean orchid story starts with the history of the island and its changing dominion. Singapore, a relatively young nation state, can trace its modern roots back to a complex relationship with China, the British empire and Malaysia. Today, Singapore is a wealthy technocratic state that prides itself as a

global city. The question is why does such a technocratic state invest so heavily into Orchids? The reason can be explained when looking at the history of the island.

When considering the earliest records of what we know today as the nation of Singapore, the narrative is not very clear. Although there is some archaeology and Malay oral tradition that gives some insights to the origins of this global city, and although new evidence is constantly being found, many of the earliest narratives are mainly conjecture (Perry 2017, 11). What is important when referring to the nation of Singapore, is that Singapore only came to existence in 1965. For most of its history it was considered as part of what Great Britain named the Malayan peninsula. The Malayan peninsula itself, the colony of Malaya, was a British creation. One thing we know about Singapore is that it appears to be one of the earliest overseas Chinese communities. Before the rise of the European empires or European global colonialism there was already a global network of trade occurring in the Southeast Asia. This is seen by the early arrival of Chinese communities permanently moving to this area (16). It was the Straits of Malacca or of Singapore that made this location geographically desirable for both early seafarer traders and the later colonial powers. These waterways allowed for an easier, faster and safer sea transportation from the South-Chinese sea to the rest of the world (4-45). Today, the government breaks down the demographics of Singapore into Chinese, Malay, Indian and others (Singapore Open Data 2108). This is a gross over simplification. For example, this is seen in the Peranakan population, who were some of the earliest Chinese families to move to this area far before British intervention. The Peranakan population of this area have developed their own unique identity and traditions distinct from later Chinese communities that moved to Singapore.

During British colonial rule, there was a plethora of botanical interactions occurring in Singapore, including the origins of Singapore's claim to their earliest orchid success. Opium would be the first product associated with British colonial rule. Opium was one of the largest botanical products consumed within the island and the region. The ill-effects of opium would be one of the reasons Singapore today has a such a strict drug policy. Opium would find itself incorporated in the upmost negative aspect during British colonialism. In contrast, at the end of the 19th century, it was the classification of a new orchid hybrid that put Singapore on the global map and enabled it to rival the capabilities of the colonial centers of the world. This is one of the earlies stories of colonial success for the island. Orchids, while still a global fascination at this time and hobby to the colony, would soon get over shadowed. This would occur due to the horticultural success of a South American Native plant, *Hevea brasiliensis*, commonly known as the rubber tree. It was the head of the Singapore Botanical Gardens, Henry Ridley, who helped mobilize this crop to be successful in growing conditions in Southeast Asia, making it the most lucrative crop in Malaya in the early part of the 20th century (Drabble 1967).

The botanical success of rubber reflects the relationship between the Malayan peninsula and the island of Singapore during this time. It is important to recognize a demographic distinction between the Malayan peninsula and the island Singapore, where ethnic majorities began to emerge during this time period. Malay populations on Singapore, a British construction, soon become the minority of the island compared to the growing Chinese population. Yet despite the demographic shift, the British colonizers and the island inhabitants still considered themselves under one colony. This is important because while the rubber

tapping technique originally started on the island of Singapore, the lack of land on the island forced these large plantations to move onto the Malayan peninsula (Drabble 1967). While it may not be obvious to the casual traveler through Singapore, the wealth of rubber is still very heavily present within Singapore, most notably with Peranakan individuals whose wealth was obtained by the rubber industry and whose current philanthropy caused a plethora of names (in the form of endowments) to be seen throughout the city. Many of those who were involved in the rubber industry also directly partook in early orchid culture on the island. While orchids eventually became the main agricultural product of Singapore, the history of cultivated orchids spans for thousands of years from China (Teoh Eng Soon, 1989).

From Occupation to Independence

Singapore's horticultural past-time would somehow persist during the war period and Japanese occupation of the island. The Japanese occupation of Singapore took place between 1942 and 1945. This event was quickly absorbed into the Singaporean state's narration of not just tragedy but national solidarity. This solidarity was evident from early Singaporean leaders that recognized the failure of the British ability to protect the island from outside forces. The Japanese occupation involved the imprisonment and murder of many of the island's residents. The Chopsticks Memorial, officially known as the Memorial for Civilian Victims of the Japanese occupation, would become the tallest structure in the city for a short epoch. Yet, despite a period of despair and death, the Botanic Gardens of Singapore share a more complicated history with the occupation. While many of the British colonial systems were replaced or dismantled by the Japanese government, the Botanic Gardens were allowed to maintain their

operations. While there was a Japanese official in charge of the gardens, most of the botanists were not just allowed to continue their research and projects but encouraged to do so. While the defeat of the British government and the Japanese occupation left a rancor among Singaporeans, the collective memory of the gardens and their executors still held a positive valence. Japan cared about the livelihood of another colonial botanic garden because of imperial Japan's imagination of the Greater East Asia Co-Prosperty Sphere, in which the Japanese state recognized the geographic and commercial importance of Singapore (nParks Board 2018).

After the liberation of Singapore and the surrender of Japan, the building animosity towards the British government caused the colony of Malaya to become a new independent nation, Malaysia. Malaysia included the Malayan peninsula, the Crown colony of Sarawak, the Crown Colony of Borneo and Singapore. As the early political leader and founder of Singapore, Lee Kuan Yew described a Malaysia for Malaysians, composing a new national identity. The 1950s was an era of post-empire nation building, a time where modernization theory was at full strength, and many colonies felt the need to become a nation state. Singapore's population at this time was a majority Chinese, and the disparity between the Chinese majority and Malaysia's Malay majority started to gain friction. Soon Singapore went through another phase of independence and separated from Malaysia. The separation from Malaysia was not considered a positive break by many of Singapore's politicians. There was a lot of concern within this small island state.

When thinking about what Singapore could become, the founder and prime minister Lee Kuan Yew felt that the concept of a modern maritime city state was a farce (Perry 2017,

xix). This concern by Yew complicates the current heritage or national collective memory of wanting to be its own independent state. Singapore, an extremely small nation, currently has only around 5.5 million citizens on a small main island roughly the size of Manhattan. This nation had to navigate its way to success with no natural resources, with barely any agricultural land and now, newly independent from Malaysia, with no natural supply of water. Due to the necessity of needing potable water, the new independent government incorporated utilities into the nation building initiatives and programs. Water initiatives were a critical part of nation building due to the reliance on Malaysia for fresh water. This reliance on their former country would only extend the multitude of hindrances that this small nation would have to go through in order to be self-sufficient. The water initiatives nationalism of public utilities, the creation of the Public Utilities Board(PUB) is crucial to understand the imagination of these early Singaporean leaders towards the integration of nature and modernity. While these waterworks may not seem related to orchids, they were directly responsible for the creation for many parks where orchids can be found today. These parks were created because additional reservoirs needed to be built and many of these reservoirs are surrounded by green spaces and are part of Singapore's ABC (active, beautiful, clean) Water Programme (Public Utilities Board 2018).

When Singapore became an independent nation, the Botanic Gardens would become part of a new national movement of greening the city. Part of the newly formed government's goal was to modernize the small city state, and part of this movement was to tread the fine line between industrialization and urban green initiatives. It is now written in Singapore's history that Lee Kuan Yew introduced the concept of a "garden city". These initiatives were planned in order to increase tourism and foreign investment, while also improving the daily lives of

Singaporeans. Orchids would not only be swept into green idealism of Singapore but would play a role as signifier of Singapore's success.

The presence of the orchids expanding within the nation of Singapore and exportation to the globe reflect an observation by Emiko Ohnuki-Tierney. Ohnuki-Tierney describes this relationship of culture, as a combination of the transnational and local. This is seen in her work exploring fascist flowers:

“Culture is never static or singular, even at its basic paradigmatic level. Even the meanings of quotidian symbols, such as Japanese cherry blossoms and European roses, pulsate in the vertigoes of geopolitics. If this continuous interpenetration of the local and the transnational/global is what constitutes culture, it is a logical contradiction to propose that a culture is a “hybrid” and idea predicated upon the notion of a pure culture, two which could meet and combine to produce a hybrid (Ohnuki-Tierney 1995, 2001,2006; Ohnuki-Tierney 2015, 6).”

The theory that culture is a hybrid reflects well within the Singaporean orchid story. In Singapore's case their cultural landscape history has generally been described through a global narrative, always being defined by other institutions. The hybrid case of Singapore can be with the public private relationship within orchids in Singapore, this hybrid relationship is discussed in the next chapter. The orchid itself is also a hybrid between two species, yet this also shows the hybrid nature of orchids as being both natural and artificially sculpted.

Singapore's task to create a unique collective memory to give the new nation a foundation involved not only the tragedy of the Japanese occupation but also important mythos such as the Hybrid Vanda Miss Joaquim. Ohnuki-Tierney's research on cherry blossoms is a model for this research. Tierney's narrative of cherry blossoms explores how a new regime

took over a symbol, a botanical object, as tool to establish its power. The new Japanese government understood the communicative properties of cherry blossoms and was able to use these plants as a state ideological apparatus, as seen with kamikaze pilots. While the orchid in Singapore follows a similar narrative to Japanese cherry blossoms, so far there has been a lack of sinister or even negative connotations or affiliations with orchids. Even with the absence of a sinister connotation it is important to realize that nation-state is still an institution that is using orchid symbolism as way to establish and reaffirm power. The orchid is in some ways an even more advantageous object than the cherry blossoms, since orchids are often in the form of a commodity. The orchid is a social object that was appropriated by a new institution, the nation of Singapore, in order to ground its sense of self in something real.

The Singaporean government's use of the orchid as a powerful tool starts with the origins of growing orchids. The remaining section of this thesis will carefully discuss not only how the orchid became a commodity but also how it was expanded through its production and consumption in the public market. The following chapter will specify the state's political use and direct role in partaking in the production of orchids for their ritual use. The final chapter will explore how and when orchids are involved with conservation practices in Singapore. It is these green initiatives that combine both the new nations heritage practices while also promoting their modern status. These three chapters should start to show how the orchid was incorporated into the new nation of Singapore, creating the Singaporean identity.

CHAPTER 2

The Roots of The Production and Consumption of Orchids in Singapore.

The global movement of orchids from colonial curiosity to common commodity comes from the Victorian orchid craze. Bringing the orchid into the home as a house plant was at that time considered a luxury, but now with the current industrial production of orchids, one is easily able to bring cut orchid bouquets into the home for a relatively inexpensive price. The history of orchid keeping, and the mass production of orchids, is a story that has occurred all around the world and independent of one another. These multiple independent orchid cultivation origins contribute to the loose taxonomic definition of the orchid and allow the orchid to occupy both a local and global place. The Singaporean government recognizes this attribute and allows for the orchid as a national symbol to be a powerful tool for communication both within the nation and internationally. This chapter will explore the Singaporean orchid market, how and who produces orchids, and where orchids find their final homes. Understanding the orchid as a commodity contributes to how the orchid became present throughout the island of Singapore before the government's independent interest in orchids.

When approaching the stereotypical orchid, one outside the botany community would usually think of a tropical epiphyte with vibrant colors. While these are indeed orchids, the accepted taxonomic definition of the orchidaceae includes a much larger range of flowers that span all the continents besides Antarctica and are found in almost all ecosystems. The orchid family classification, as with almost all taxonomy, has changed many times since its origin. With today's molecular systematics, plant classification is constantly being rearranged and updated by botanists. The Malayan Peninsula played an important role in the scientific organization of orchids, stemming from both Henry Ridley and J.J. Smith, botanists at the Singapore Botanic

Garden, with their work *Icones Orchidacearum Malayensium* (Reinikka & Gustavo 1995,46).

Much of the early orchid literature in Singapore gives detailed growing strategies for mass producing and home growing tips for orchids. This early literature also reflects on the fact that a distinct Singapore hadn't come to existence yet, as written in *Malayan Orchid Hybrids* by M.R. Henderson & G.H. Addison (Henderson & Addison 1956). When thinking about the growth of orchids in Singapore today, it should be thought about in a very high-tech, artificial way. The current cultivation of orchids is futuristic and almost removed from the orchids' own organic essence (see Image 1).

Before getting into the production of orchids in Singapore, it is important to understand exactly what an orchid hybrid is. As mentioned above, the orchid is a broadly defined plant, with the largest number of varieties in the flowering world. The original definition of a species is a distinct group of life (flora, fauna, fungi etc.) that can reproduce and produce fertile offspring. The ability to produce fertile offspring was a crucial contribution to biology as taxonomic systems took off. With the Linnaean system and binomial nomenclature established, species' ability to interbreed became more common, most famously seen in the example of the mule. In the plant world the chances of hybridity are remarkably more common than in the other worlds. Natural hybrids are quite common and their chances of being able to produce fertile offspring are not unheard of. Orchids are one of the latest plant groups on the evolutionary time scale and their recent origins allow for many of these plants to be able to cross within genera. For many years, humans have been crossing plants to obtain certain desired traits--larger leaves, larger fruit, smaller seeds, better tasting fruit--and the same can occur with flowers as well. Traits such as color, size, curvature, pattern, and life cycle are all traits that

humans are able to experiment with through crossing in the hopes of finding a new plant that will fulfil their needs. Orchids are no different than other flower hybrids. Even from the start of orchidmania, the attempt to cross orchids and produce new ones was desirable. Every cross could produce a wide variety of different flowers. Some orchids can more easily create hybrids than others. While there are certain trends seen in world orchid consumption, Singapore consistently still has the market hold on vandaceous (*Vanda*) orchid hybrids. These hybrids, while not nearly as common in the United States, are heavily produced in Singapore and occur naturally within South-east Asia and East Asia. To understand the orchid market of Singapore is to understand *Vanda* orchids. This is due to early history of the Singapore Botanic Gardens hybridizing *Vandas* and the difficulty of growing these genera [(Elliot 2005; Goh & Kavaljian 1989)]. Singapore not only has risen to become one of the largest producers of orchids, rivaled by Taiwan, but has cemented the leading role in *Vanda* hybrid production. Singapore's focus with *Vandas* allow for little overlap with competing nations such as Taiwan's moth orchids, *Phalaenopsis*. While Singapore has fallen as a national competitor against Taiwan as well as Thailand, the investment and production of orchids may be in flux but is far from falling short (Ng 2018).

Literature on orchids extends much farther back in time than the literature produced by colonial botanists in Southeast Asia. The earliest forms of orchids in literature are both related to medicine. There were reports of potted orchids in China during the Qin dynasty. Orchid guide books include texts from 1288 CE, such as *Orchid Guide for Kuie-men and Chang Cho* by Chao Shi ken. There are even references to a monthly cultivation book around 1600 CE (Reinikka & Gustavo 1995, 14). These early texts, while no longer in existence, are kept alive

through reference books. These archaic texts reveal an extensive history of bringing orchids into the domestic space, that had been going on for an extended period of time and occurring long before colonialization. While orchid cultivation and care took place independently throughout the world, what initiated the global movement of orchids was the Victorian orchid craze, orchidmania.

Orchid consumption, with its basis in medicine, slowly turned into being an almost purely aesthetic obsession (Endersby 2016). The industrial production of orchids today is almost entirely for the cut flower or houseplant market with one exception, a new world orchid *Vanilla planifolia*, known for the common flavor vanilla as the genus suggests. There are multiple species of vanilla orchids. New world orchids refer to orchids that are native to North and South America. While there are new world orchids kept and produced in Singapore, the relationship between new world orchids and the island state is negligible in this study. Due to the presence of the Royal Horticulture Society and the colonial botanic institutions that formed around the globe, it is European consumption and cultivation that dominate the global orchid narrative. The early history of orchid cultivation in Asia and the Americas lack appreciation in the western world due to the Eurocentric narrative. In 1893 when the colony, at the time Malaya, was able to produce the first *Vanda* hybrid, it was therefore huge, global-reaching news (Elliot 2010, 34). There was a British colonial mentality of dominance and superiority when it came to orchid cultivation and horticultural innovations. Although the British Empire felt they were the center of scientific advancement, their dominance would be tested many times, including within Singapore. Early cultivators from Singapore won many orchid competitions, directly usurping power away from their colonial captors. This story is still

heavily present within the Singapore Botanic Gardens and has taken on an almost national mythos, which reinforces Singaporean early horticultural success during its Malayan period.

Widespread cultivation of orchids in Singapore started occurring around the turn of the 20th century. The Orchid Breeding Programme started in 1930 which focused on the commercial success for orchids. The island's space constraints also made the small footprint of orchids more favorable to choose to grow than any other agricultural product. With Singapore's population, the land mass alone wouldn't be able to produce enough food. Singapore relies on other nations to provide it with food but is still able to support itself through multiple alternate industries. Today on Singapore's landscape a large number of farms or nurseries are almost exclusively producing orchids (AVA 2018). The available acreage of agricultural land was reduced further by its frequent development into public housing by the Housing Development Board.

In Singapore, there are roughly eleven private industrial orchid growers. Despite the miniscule size of available agricultural land, these nurseries are able to compete with nations that have much more agricultural space. The success of these Singaporean orchid nurseries was far from easy. The obstacles they faced include the availability of land, increasing labor costs for production and handling, increasing shipping costs, the demand for new hybrids, and the income level of potential buyers in other countries (Goh & Kavaljian 1989, 254). This analysis on the orchid industry, originating from the 1980s, may seem dated, but many of these issues still seem to be present in this industry today. While the lack of land cannot be controlled, many of the costs of the orchid industry have been dealt with. The increased cost in labor was solved by a massive migrant labor working force that has come to Singapore and is able to complete

almost all the labor needed for the orchids. The only labor not completed by the migrant working force is the actual initial crossing and creating of new orchid hybrids, which is usually done by Singaporean botanists. The migrant working force is not just involved with the production of orchids in the state but with almost any of the physical labor in Singapore. The costs of shipping orchids were decreased with the creation of the Changi Airport. The port of Singapore which historically and currently still allows for goods to be moved in and out of the nation with ease is another shipment method. While orchids can be grown and matured in indoor nurseries, it is still common to grow orchids in outdoor spaces. Exposing cultivated orchids to the outdoors is critical for tropical areas such as Singapore, so the plant will be resilient enough to live in many indoor and outdoor spaces.

The number of orchids produced in Singapore have consistently grown. Despite what may seem a niche industry, there almost appears to be an unlimited demand for orchids not just within Singapore but in flower markets across Asia and the world. This industrial mass production of orchids today should be placed in the background context of rare plant hunting within the 19th century. Orchid hunting exhibitions were completed at immense scales. Some of these orchid hunts systematically destroyed forests and ecosystems. One example can be seen in 1895 when 10,000 orchids were collected resulting in 4,000 trees being cut down (Reinikka & Gustavo 1995, 29). Who are the individuals consuming orchids in Singapore today? Why is there such a voracious appetite for these plants?

The consumers of orchids belong to many different socio-economic classes but go beyond individual consumption. The most noticeable example is the Singaporean State, whose consumption of orchids makes it an important local actor within the orchid economy.

This is because the government sustains a permanent demand for orchids within Singapore.

The individual consumer can take part in either the cut flower market or elect to bring an orchid into the home. Due to the industrial agricultural complex of orchid growing, the price of both options makes them available for every consumer to partake in. The orchid which used to be fetishized by Europeans as tropical, exotic and beautiful continues to hold these values even when everyone is able to have one. An example of orchid fetishization can be seen in early lithographs about orchid hunting from mid to late 19th century, where all these themes are present (Endersby 2016, 100) (see image 2). Part of the obsession of orchids directly belongs to the materiality of the orchid. Many of the orchids that are chosen for market retain their flowers for quite some time, beyond a month if properly taken care of. While cut orchids don't last nearly as long they are readily available and cheaper than buying the plant as an option. Stalks of orchids currently can cost up to \$3.00, while a potted orchid, if a common variety, can cost between \$10 and \$20.00 (Ng 2018). If potted orchids are properly taken care of, many varieties are able to flower multiple times during a year. The variety of orchids that consumers want can change throughout time. Orchid fads occur often and throughout time, there are many hybrids and orchids that become very popular depending on their aesthetic. These fads are seen in the records from the Singapore trade statistics by the Singaporean government, department of Statistics (Goh & Kavaljian 1989, 251).

Where do consumers find their orchids? One could buy cut orchids at a flower stand at a hawker center, travel to an industrial orchid nursery, visit a floral shop or even purchase an orchid from the plant department of Ikea. Finding orchids for sale both cut and potted is readily available all around the island of Singapore. Even easier than finding orchids for sale in

Singapore is viewing the display of orchids both in the built and seemingly not built environment. Orchids found outside the built environment are discussed in the fourth chapter. Orchids are displayed outside of a store front, a decorative display within storefront, the centerpiece at a hotel, on the decks of HDBs, religious spaces, even found at the airport of Singapore. Get off at any MRT stop and it will be difficult to find space without an orchid present. Singapore orchid research is most lacking in the area of personal spaces. Personally, I was only invited into a small assortment of homes owned by citizens. While the intention of my visits was not focused on orchids explicitly, I noticed that most of these private homes had an orchid or cut orchids in a bouquet. The expanse of bringing orchids into the home goes beyond citizens of Singapore, which I observed through a visit with a colleague who was a permanent resident of Singapore (a non-citizen living full time). When entering her huge apartment, I was greeted by a beautiful large orchid adjacent to her grand piano.

Mass production of orchids in Singapore started around the turn of the 20th century with individuals and their private gardens, containing patches of multiple different orchids. Individuals realized that some of these orchids could be grown elsewhere; therefore, there was an export of *Vanda* orchids for industrial growth outside Singapore. While there were famous orchid hybrids being created in Singapore, they often were soon exported elsewhere for mass production. The most famous historical case occurs with the national flower of Singapore, the Vanda Miss Joaquim. This *Vanda* was extremely desirable and was able to easily grow in tropical conditions. Due to these attributes, the Vanda was exported to the territory of Hawaii where it obtained a new name, the Princess Ahoi orchid, and became an instant commercial success. This orchid was quickly appropriated as part of the cultural identity of Hawaii. The

orchid hit the United States popular demographic due to WW2 stationed military individuals, which caused the global distribution of the orchid. This orchid represents an important part of the incorporation of ecology into tourism. Despite not even being native to Hawaii, this Vanda became a natural symbol of the islands, as a tropical, exotic, and beautiful commodity (Reinikka & Gustavo 1995, 72). While this relationship between Hawaii and the Vanda isn't as present today, this is a case in which the global movement of individuals was integral to the circulation of orchids. This goes beyond individuals through showing a hybrid of local and international relations, where this prized Singaporean orchid was once appropriated into the Hawaiian identity.

The industrial production of orchids is one of last remaining agricultural practice on the island of Singapore (AVA 2018). The image of Singapore often includes the downtown skyline, even outside the downtown rows of HDB's, shop houses or luxury apartments mark neighborhoods. Bringing orchids to the cut flower market was an idea that came out of the 1950's (Goh & Kavaljian 1989, 243). Some of the hurdles that orchid producers in Singapore have to overcome are the climate, extremely high humidity and high sun exposure. These parameters forced growers to choose specific genera and hybrids for mass production, these include mostly Vanda's and Arachnis (commonly known as scorpion orchids) varieties (246). Transportation of these orchids outside of the nation was another challenge. In the 1950's air travel wasn't common enough, so Singapore was reliant on sea travel. Luckily, as mentioned before, Singapore is home to one of the largest ports in the world, so the infrastructure to ship orchids out existed. Additionally, there was still the obstacle of having the flowers last, the vase life of the plant, when they get to their end location. The importance of long vase life was

evident when German plant importers ranked Singapore orchids behind New Zealand, Hawaii, and Australia due to their shorter vases (253).

A Trip to the Sungei Tengah Agrotechnology Park

While the Sungei Tengah Agrotechnology Park is not a place frequently visited by tourists, if you take the MRT (mass rapid transit) to Choa Chu Kang and start to head west into the western water catchment area of Singapore, you will dive into a world that seems like a stark juxtaposition to downtown Singapore or even the Jurong Industrial Park. Here, multiple reservoirs, military areas, a lack of HDBs, and, most importantly, an agricultural landscape reside. The roads are relatively barren minus the few trucks, the stray car or empty bus that does its scheduled loops. While I walked down the side of the road, as there was no sidewalk, the thick grass and little cover from the sun transported me into the romanticized image of the anthropologists in a remote island. The corporate sky scrapers and the government-built apartment buildings were not in sight. After spending weeks witnessing orchids in parks, domestic settings and government displays, it was integral for me to explore this commercialized private sector of Singapore. This area does not contain all of the nurseries in Singapore, but it does include a small grouping of growers as well as other farms that represent a rare private sector, one that is seemingly low tech and out of place. Entering this neighborhood of nurseries and farms, there is one sign with the label *Orchidville* (see image 3). While *Orchidville* turned out not to be mainly focused on orchid production, but instead primarily on agritourism, with the focus on farm to table, this area represents the absorption of orchids in Singapore into their businesses. Despite being a relatively short distance, the walk

through this area was exhausting. Despite this area seeming to be out of place in the nation of Singapore, myself walking to and through this area was just as out of place. The few trucks that transported people would slow down and a driver glared at me. In one instance a truck turned around and the driver asked if I was lost. Far from being lost, I had actually reached out to one nursery ahead of time to ensure that I could meet with workers and explore the facilities attempt to get a further understanding of this niche but prominent industry.

Toh Gardens was the nursery I would spend the most amount of time at. When I entered the garden, it was clear that despite their website showing that they are open to the public that this nursery isn't frequented by many stray visitors. After wondering around for a while, and watching workers load trucks with striking orchids ready to enter circulation. Finally, after briefly talking to a manager I got to gain more information about this complex. The first and probably most important observation about Toh Gardens is the parallel to the government orchid growing facilities (explained in Chapter 3). There are a few services that this nursery and other private nurseries are able to do that that the government doesn't participate in. The first is that the Government supplies only flasks for individual consumption, the majority of orchids produced by the government goes back into the many displays and events that the government puts on. Toh gardens is able to provide both flasks and mature plants for consumption. It's also possible to rent orchids as well if you don't want to purchase them, this allows for a revolving change in flowering orchids without the need to store them. Toh gardens also provides the service to let companies and individuals grow their orchids at this site. This is very different from the government orchid breeding facilities that aren't even open to the public to explore. The issue surrounding labor costs for production and handling of these

orchids was solved in both by the government and private sectors by the use of a migrant labor force. While exploring Toh Gardens the manager asked a migrant worker to accompany me while I examine the rows of potted plants and racks of cut flowers. The worker apologized for the lack of options, I was taken back since I felt that there were plenty of options both in genera and color. What I was exploring was an apparently exhausted garden, which had to work hard to supply for the current flower/ garden show at the Gardens by the Bay (see image 4). What was clear about Toh Gardens and this area was that not only did they produce an incredible supply of orchids for private individuals and groups but also aided in fulfilling the governments seemingly excessive consumption of orchids. My trip to Toh Gardens ended with a ride back to the MRT station by the manager of the garden, he insisted I take a ride back apparently walking in this area was out of question. The actual ride back to the MRT station is important, because of the lorry it took place with. The lorry is a small truck that would be used to transport migrant workers throughout the island. This is where I would finally realize the disconnect between the direct role of the migrant working force in producing a Singaporean symbol.

The Toh Garden's participation in the government's role of distributing orchids was seen concretely in the Singapore Garden Festival. While always helping in production for the national orchid garden, Toh Gardens was responsible for the task of setting up some of the extravagant orchid displays at this festival. This festival while not specifically centered around the orchid, includes a collaboration with the Orchid Society of South East Asia which shows hundreds of winning orchids from their orchid show. Orchid shows are like dog shows. Just like dogs are judged on how they best represent their breed description, orchids are judged on how the hybrid best represents its original description (see Image 5). This is important to know that

Orchids from Singapore both by the government, corporate gardens and personal growers are able to still compete and win in this international stage. This enables for the hybrid orchids that inject themselves into the public setting to maintain their extraordinary sensibility.

One space in particular that showed how ingrained orchids are in Singapore surround some of the religious spaces in Singapore. While many of the main religions in Singapore have always incorporated the use of flowers, a few of the religious spaces in Singapore currently take this to another level. Two examples of this is with the Buddha Tooth Relic Temple and the Masjid Yusof Ishak. The Buddha Tooth Relic Temple on its roof top house an extensive orchid garden surrounding a large prayer wheel (see image 6). The Masjid Yusof Ishak contains its own orchid garden, this garden includes orchids that were originally registered by Yusof Ishak, the first president of Singapore (Masjid Yusof Ishak Facebook).

The production and consumption of orchids is an industry in which the Singaporean government directly invests and actively takes part in. It will use the orchid as a symbol of nation, using an object that has been circulating commercially in Singapore a long time before the independent nation came to exist. While it hinders the private industrial sector through land leasing or only allocating a specific amount of land for agriculture, the use of orchids in government buildings, parks, and purchased by the citizens keeps the market from ever disappearing. Since these plants end up on street corners to large national displays, this chapter described how these orchids are created and that behind each and every orchid there is a scientist, a migrant worker and an owner.

Chapter 3

Branching away from the Commodity: National Commemoration Through Orchids

While Orchids are integral to the city scape of Singapore, the streets and city are also filled with other vegetation (see image 7). While citizens of Singapore partake in consuming and owning many varieties of flowers and house plants, the government is exclusively involved and reliant on Orchids. To affirm the power in a state, the state must successfully communicate their goals and be stable enough for citizens to trust the state. As mentioned earlier, the independence of Singapore was one of deep concern; could a small city state exist in modern times? Singapore had to work to create a new nationality, and in the 50+ years of the independent government's existence actively rooted the Singaporean nation with a culture surrounding orchids. Orchids have a complicated relationship with both colonization and the local traditions. As elaborated in the previous chapter this relationship between colonial powers and local practices is directly related to the Royal Horticultural Society, Victorian orchid collecting, and East-Asian orchid cultivation. This chapter examines the political world the orchid occupies and proves how the government uses the orchid as part of its national identity.

The nation-state of Singapore partakes in their own orchid naming ritual. Whenever a new hybrid is created it must be given a name and registered. Registering a hybrid protects it from being renamed and gives credit to the origins of the hybridizer. Unlike a natural species that uses a binomial nomenclature, a hybrid uses the parent that's most present as the family (italicized) then the hybrids given name (lettering) then the parents separated with an X (mother followed by the father). For example, *Renanthera* Ahmad (*Renanthera coccinea* X *Ascoglossum calopterum*), this hybrid has the *Renanthera* genus heavily dominant, then name Ahmad was for the breeder's eldest son. While in general the orchids new name is after a

person, this isn't always the case and could be anything the registrant decides to name it. While there are many hybrids, once there is a successful cross and is registered no one else may be able to register that orchid hybrid. This means that through the horticultural societies, individuals or organizations can create and name orchids without concern of someone else taking away their orchids name. This whole system is built on horticulture societies keeping a detailed registry of orchids; to name new orchids relies on the Royal Horticultural Society in order to ensure the sanctity of orchid names. The Royal Horticultural Society which was chartered in 1809, still stands as an institution that helps protect horticultural innovations globally (Royal Horticultural Society 2018). The Royal Horticultural Society is also important to hosting many of the international orchid shows, because of their history an award from this society is considered the highest honor.

While most of the Orchids referenced here are intentional hybrids that were mostly created in a sterile protected laboratory, this is not the case with all of the hybrids that came out of Singapore. Although not common in a lot of flowering plants, natural hybrids between orchids is a much more common occurrence. One example of this is with the national flower of Singapore, the Vanda Miss Joaquim (Papilionanthe Miss Joaquim). This orchid was originally thought to be an artificial hybrid, and whether intentional or not was considered to be one of the earliest and most successful commercial orchid hybrids. This ambiguity between whether the hybrid was naturally formed or was intentionally crossed made it an even stronger case to be the national flower. The director of the Singapore botanic gardens, Alphonso, felt that this cemented the decision for this to be that national flower due to its naturalness (Elliot 2005, 221). The truth about the origins of the Vanda Miss Joaquim doesn't necessarily matter. In its

memory the Vanda Miss Joaquim is considered the first hybrid and the start of Singapore's role in international botanical success. The Vanda Miss Joaquim was also recently determined not to even be part of the Vanda alliance of orchids (Khew & Chia 2011). Despite molecular systematics moving the genus of Vanda Miss Joaquim from Vanda to Papilionanthe, Vanda has become colloquial enough where it is still referred to by its former Genus.

This research about the origins of Singapore's national flower was completed by the Singaporean government staff at the Orchid Breeding & Conservation Biotechnology Laboratory. This laboratory, which is under the National Parks Board, is responsible for overseeing the majority of research of orchids in the nation. Its task for researching the national orchid is due to the government's extensive use of this orchid as an icon. Around the time of national day, it is not uncommon to see many government banners with the Vanda Miss Joaquim on it (see image 8). The use of the national flower even merges into other departments of the Singaporean government. The best example of this is with the Ministry of Education and their Singapore Teaching Practice (or STP). The ministry of education states that "The STP is represented in the form of an orchid to reflect the Singapore context within which we practice our craft (Ministry of Education 2018)." Here the Singaporean government explicitly shows that the orchid is a symbol of not only the Singaporean state but also what it means to be Singaporean. The statement exemplifies Miller's theory of stuff, in which stuff or the material world becomes our humanity.

Before the orchid became integral to the Singaporean identity, historically the nation's orchid program was intended purely for the commercial market as their goal was to create "plants suitable to the local climatic conditions and to produce hybrids which are attractive,

useful commercially and at the same time free-flowering (Henderson & Addison 1956, iii)". The production of orchids after independence from Malaysia became critical to the national image of an ideal garden city. This is through the nation's use of orchids as gifts which transform into living monument within the national orchid garden. It is in this garden that there is a safe haven for orchid hybrids to be displayed. These unique hybrids will be kept in order to perpetuate the memory the individual. The government is growing these exclusive hybrids because despite an orchid being named and gifted doesn't necessarily account for that orchid to still be grown today. It is important to note that there are many hybrids that only exist on paper today, and since some hybrids are more difficult than others recreating the same hybrid is not easy. Plants do not live forever and if it isn't properly taken care of the gift may wither and perish. The gift of naming an orchid hybrid is a gift that lasts much longer, the orchid may die but that hybrid is registered. This orchid gift would be a unique hybrid and thus even if someone else cultivates the plant it remains that person's orchid, the orchid exists on paper eternally. While it is nice that the hybrid will not be renamed, for the owner its often important to keep their plant alive by propagating new ones from the original plant. The National Singapore Botanic Gardens takes this one step farther, when they name an orchid the plant will be maintained and continued to be cultivated within the gardens. Even more importantly the orchid will be displayed to the public adjacent to other important exclusive orchid hybrids.

The National Orchid garden is a hybrid space of both the indigenous and global (see image 9). The garden is a space that celebrates and monumentalizes individuals that are determined to be important. This monumental process is through the orchid naming ceremonies. Who or what that is commemorated is completed by a bureaucratic system that

involves a collaboration between the National Parks Board, high government officials, such as the president (currently Halimah Yacob), and the Orchid society of South East Asia(OSSEA). This hybrid space is also exemplified by the migrant working force also involved with the grounds (see Image 10). An orchids' name is up to the registrant of the orchid. While it is most common for the orchid to be named after an individual, the orchid can be named after anything. Orchids not named after people are usually named after a building, a corporation, an event or a holiday. The most prominent example of this is the *Dendrobium* Changi Airport, named after the airport in Singapore. Another example of this is The *Dendrobium* Nanyang Primary School; this orchid is kept on school grounds as well as used in advertisement for their flower harmony floral arrangement competition. *Dendrobium* Nanyang Primary School is an important example where another organization is trying to mimic the government's use of orchids. Orchids celebrating events come as recent as 2015 with Papilionanthe Singapore Golden Jubilee. This hybrid was created in the celebration of the 50th anniversary of Singapore as an independent nation (Khew 2015, 17). The Papilionanthe Singapore Golden Jubilee was created to have the appearance that clearly resembles the national flower of Singapore that is slightly larger and has more robust petals (Khew 2015,17).

Exclusive Orchids from the Singaporean Government

The orchids of the National Orchid Garden are categorized into three main groups: VIP orchids, Celebrity orchids and Heritage orchids. These three groups also make up the small micro gardens within the National Orchid Garden. While this garden is known for its exclusive hybrids, it also contains another group of orchids, the species or non-hybrid orchids, a majority

of the ones important to Singapore are native to the island. The VIP Orchid gardens is home to orchids named after important politicians, when these individuals come to the gardens they are greeted with the orchid naming ceremony. The other individuals that are named are celebrities that come to visit the gardens. Not just any celebrity can obtain an orchid, the individual must also have contributed something exceptional to the world. An example of this would be for the hybrid named after Michael Kors, *Dendrobium Michael Kors*. Kors, the famed fashion designer was awarded this orchid after opening a flagship store in Singapore as well as his general contribution to the international fashion scene (Woo 2016).

The Singaporean government recognizes the long history of orchid cultivation on the island in the National Orchid Garden with the Heritage Orchid Garden. Heritage orchids are orchids that have a historic significance within Singapore that are either celebrated early hybrids, hybrids named after key early political or philanthropic individuals, or orchid hybrids that were integral to the cut flower market (either the hybrid itself, or parent hybrid) (Singapore Botanic Gardens 2018). An example of a hybrid that is on display at the heritage garden is the *Oncidium Golden Shower* (*Oncidium sphacelatum* X *Oncidium flexuosum*) this orchid was an early success for the cut flower market and was extremely popular in Japan. *Oncidium Golden Shower* is also considered a beginner's orchid due to how easy it is to grow (Henderson & Addison 1956, 182). The heritage garden serves to establish a historical basis of the Singaporean orchid naming ritual.

While the state produces many hybrids, a majority of them will be kept secret until it is time for a ceremony. These ceremonies almost exclusively take place within the National Orchid Garden. This event includes lots of press and there will always be an accompanied

article published by the Straits Times, the main newspaper of Singapore. All of the hype surrounding these orchid naming ceremonies is an attribute of the government's power. Keeping the orchid hybrids secret allows the performance of the ritual to be stronger increasing the power of the state. Not all orchid hybrids for these ceremonies are created equally, some of the hybrids involve a much more serious investment. An example is with orchids that are gifts for Japanese politicians and royalty such as Princess Michiko of the imperial family, orchids are generally white in complexion. Pure white petals and sepals were the most preferred combination according to the principle researcher, Dr. Gillian Khew of the Orchid Hybridization and Conservation Biotechnology Lab. The model example for a hybrid that was meticulously planned out was with one of the few ceremonies that took place outside of the garden walls. The gift of *Dendrobium Michelle & Barack Obama* was created through a cross of the *Dendrobium Pink Lips* and *Dendrobium Sunplaza Park*, one hybrid originated in Hawaii while the other from Singapore (Leow 2016). This gift was to commemorate the relationship between the United States and Singapore, this orchid was revealed by the Singapore Prime Minister Lee Hsien Loong. This exception was a key moment in the use of soft power politics by Singapore. The hybrid orchid was named and revealed around the passing of the Trans Pacific Partnership but was in celebration of the nations' 50th year relationship. This is an example of the government's investment in their breeding program, which takes not only financing the lab but also time due to how long it takes to grow an orchid from seed to maturity. This production of orchids as a tool of soft politics and to honor trade deals is a recurring phenomenon as seen with the *Trichocentrum APEC Singapore 2009* and *Dendrobium China World trade* (Elliot 2015, 31-2). Once an orchid blooms there is no guarantee that the orchid is an appropriate hybrid to

be given as a gift. The time investment in orchids is important because not all of the crosses that are completed are successful. In conversation with Dr. Gillian Khew, I was told that sometimes due to mutations and genetics in general a hybrid's flowers can sometimes be considered ugly, even though this plant can still be named and given it is often lost to time, the government cannot risk gifting someone or something an ugly orchid.

The relationship between the heritage garden and the VIP orchid garden is critical to the collective imagination of Singapore's integral role not only in botany, but the expansion of horticultural techniques to initiating the cut flower market. Within the National Orchid Garden, the spatial relationship between national building projects, current and past politicians and international celebrities create a hybrid or global space, that overtly shows the visitor the importance of Singaporean success. Despite the fact Singapore is a relatively new independent nation, the heritage garden brings back the colonial past of Malaya and extends the history of Singapore in order to showcase that Singapore has always had a role of growing and creating new orchids. Singapore's Botanic resources have always seemed to be protected even during moments of high tension political turmoil. During the Japanese occupation a majority of research was protected and encouraged by the Japanese. Even with the split of Singapore and Malaysia, Malaysian government officials were amicable to Singapore's orchid breeding and the OSSEA. This is still evident today by the patronage by the Sultan of Johore, Ismail Al-Khalidi, who today still has a medal in honor of him. This medal is awarded to the best amateur orchid grower (Elliot 2005, 23).

This national movement of growing and breeding orchids has been reflected within independent and private gardens. While there was always a historical interest in keeping

orchids, the role orchids play in Singapore has changed since the government's partaking and support of organizations such as the Orchid Society of South East Asia. Although the government is the largest contributor to new hybrids on the island the private sector is still actively involved in this process. Since the governments active role in publicly naming orchids, many individuals and businesses have had an interest in this ritual and have successfully reproduced this same sentiment, this can be seen through the Dendrobium Nanyang Primary School and Dendrobium SGH(Singapore General Hospital).In both cases these organizations wanted to have an orchid to honor themselves. The independent governments role in orchid production increases and stabilizes the meaning of orchids within the nation. The government has invested deeply in the production of orchids and in doing so perpetuates new generations to keep a vested interest in orchids.

The National Gardens of Singapore create a space that both helps the residents as well as the tourists that explore the nation. The sheer density and perfection of all the manicured public green spaces contributes to an important industry of tourism. Tourism was considered just one of the ways in bringing a financial income to the new nation of Singapore. The role of orchids within the world of tourism is seen at the Gardens by the Bay, the futuristic massive greenhouses surrounded by the futuristic super trees. These super trees are covered in a wide arrangement of plants, including orchids. Gardens by the Bay can be described as a plant theme park. With long lines, light shows, and spectacular displays Gardens by the Bay is tailored for tourists who visit the island. Orchids are found not only within the displays of the garden but also within the water park located in the gardens. The orchid themed water park is an extreme

case of the government's use of the orchid, in which the orchid is neither used as a gift or a commodity but as an experience (see image 10).

Historically many homes in Singapore had their own gardens where individuals could have a plethora of outdoor orchids, now with a changing landscape only a minority have this luxury. Today with the rise of Singapore's public housing, individual breeders are reliant on the space of their apartment as well as a private commercial garden. It is important to note that despite some of the heritage orchids being available for commercial consumption, most of the orchids produced for naming are exclusive to the National Orchid Garden and their recipients. So, while anyone could name an orchid or grow orchids in their homes, the government ensures that their orchids are both exclusive and powerful tools for both local and international recognition.

Chapter 4

Orchids Blossoming in a Garden City

Orchids in Singapore are not only a display of the governmental power or placed in vase within the home but also are integral to the green landscape of Singapore. Although orchids have been hybridized to create new orchids with extravagant colors and other attributes, there is still a demand to see them in their original state. Orchids inhabit an extremely specific niche within the environment. The modernization of Singapore during its early nation building incorporated the building of new ecosystems throughout the cityscape. So far, this paper has elaborated on the orchids role in ritual commemoration; this chapter will discuss the orchids

role in political initiatives that are focused on the environment. The goal is to show how the orchid becomes an indicator for the health of the new nation.

Singapore's history as a port city and during Great Britain's colonial history is often one of an overcrowded polluted city. Early Singaporean politicians would refer to the city as third world, present in Lee Kuan Yew's book, *From Third World to First*. Singapore's small land mass and large population created a multitude of inequalities, including environmental injustice. The rapid industrialization and mass urban initiatives sponsored by the government set up the physical infrastructure for the creation of new environmental projects. When the government actively incorporated the orchid as an important part of what it means to be Singaporean, the Singaporean government was forced into a multitude of conservation practices due to their adoption of the orchid as a national symbol. The reason is simple, what would it mean for a nation-state to not have any natural, free flowering orchids on the landscape? This would be seen as failure of this relatively new independent nation, that has historically and currently invested in orchids.

Today when entering Singapore every space has become or is becoming a green space. While there is still the central Singapore botanic Gardens, carefully landscaped space has spread throughout the island. While the island is small due to the governments ownership of all land it is able to directly sculpt and create a space that has been able to fulfill the early imagination of Singaporean leaders. The idealized garden city couldn't have been done without the efforts of Lee Kuan Yew and his associates. The ecosystem model has maintained itself as an important apparatus for politicians and beyond. The ecosystem is a concept that contains both a structure and a function, these parameters can be used to determine the overall health

of the system. This has remained a common frame work for its efficiency and ability to model. Singapore which prides itself as being a technocratic efficient nation, is an ideal urban ecosystem in which the form, the physical infrastructure, functions in the most efficient way to move both people and goods throughout the city while simultaneously being immersed within green spaces. Since Singapore is a technocracy and acknowledges global climate change, the government seeks to have the nation thrive both technologically and environmentally within the changing climatic conditions we live in.

The political discourse in Singapore has always had to be figure out how to create and maintain the ideal garden city, with its small land mass and large population. The question is how and when does the orchid become entwined with industrialization while the government actively partakes in large conservation and eco-practices. In other words, how does the orchid play a part in the technocratic landscape of Singapore today?

The Singaporean government's conservation model is outlined by the nParks board in three principles:

"1.The biodiversity resources of Singapore are our natural heritage and should be conserved for future generations. 2. Considerations on biodiversity and ecosystems are factored into the national planning process. 3. A balanced view is adopted of national priorities and international and regional obligations (nParks Board 2018)."

While orchids aren't explicitly mentioned in these principles, anyone should be able to spot them within any of the green spaces of Singapore. Green spaces in Singapore are defined by the government as both primary and secondary forests, swamps and grass lands, that were

preserved and what are often referred to as untouched or natural, all of these habitats are suitable for orchids. The other ecosystems are categorized under recreational parks in urban ecosystems, this includes urban parkland, buildings and gardens and verges. This category of ecosystems represents the extent of how the government uses the ecosystems concept. A critically important ecosystem that involves both nParks (national parks system of Singapore) and the PUB(Public Utilities Board) are the reservoirs, which are generally surrounded by vegetation and of course orchids. Despite walking around any of the gardens, parks, park connectors or reservoirs and seeing orchids, this wasn't always the case. A majority of the orchids spotted or seen in these areas were introduced by the government. It is the Orchid Breeding & Conservation Biotechnology Laboratory, the same lab responsible for producing the nations exclusive hybrids, that was responsible for the research and conservation practices. While the original orchid program today focused on creating orchids for the commercial market, now the task is to ensure that native orchids of Singapore are successful.

The role of Orchids in ecosystems is a topic generally not discussed, this is because orchids don't generally contribute to ecosystems. Ecosystems have two components function and structure. Orchids generally don't contribute to the structure due to their usual small size. Orchid contributions to ecosystem services are generally minute due to their extremely specific ecological niches. Orchids rely on many aspects of an ecosystem, naturally they are fragile relying on specific pollinators and fungi. The humidity and light levels are also specific to the individual orchid species. Due to these highly specific parameters orchids found in an ecosystem indicate that it is a healthy ecosystem. These parameters also make it a quite difficult challenge to introduce new orchids into an ecosystem. Since this is a difficult task it is

an active job that the government botanists must constantly be involved with. Defining a healthy ecosystem is difficult, the definition is specific to the parties involved and usually include a slew of both quantitative and qualitative analysis to determine if the ecosystem is functioning as it should. Despite orchids making up 10% of all named plants, orchids are still relatively rare and due their specific climate needs are at higher risks of extinction (Koopowitz et al., 2003). Despite orchids critical role within Singapore, the island succumbed to the same ill fate of the world, massive biodiversity threatened.

While one could argue that the lab grown hybrids would not be harmed by the extinction of natural orchids on the island, this claim fails to explore the *kinship* of hybrid orchids. Many of the famous orchids hybrids that were hybridized in Singapore have a parent orchid that is a native plant in Singapore or Malaysia. With Singapore's geographic location the tropical climate is ideal for many orchids, this meant that at one point there should be seemingly an island covered with orchids. Now with the infrastructure change of Singapore many of the habitats were destroyed or wiped out. While orchids in captivity seem too have always been present in Singapore natural orchids at one point seemed to disappear. While there have been 221 native orchids known to Singapore, 170 of these are considered to be extinct (Yam & Thame 75, 2005). While this still means that there are 51 orchids on the island, only four are considered common. This reason for this mass extinction is primarily due to habitat fragmentation and destruction from the massive urban infrastructure projects.

This mass extinction of orchids in Singapore was not something that was seen as a surprise, very early on Singapore as an independent nation did not allocate resources to help secure the future of native orchids. This could most prominently be seen in the 1980s where

the hybridization and conservation lab took a break from creating new hybrids and focusing on the propagation and introduction of native species (Elliot 2005). The government was interested in funding the resurrection of many of these orchids due to their indication of a healthy system. If the newly planned green spaces didn't have orchids, it would be a key indicator of failure by the state. Finding these native orchids in Singapore is easily done because of the intensity of green infrastructure within the city. Plant conservation is a global phenomenon, but due to Singapore's small size and large economic resources it strives to be a leader in orchid conservation. The reasons behind the conservation projects go beyond protecting native wildlife and national heritage, there is an economic state for Singapore to keep up having healthy ecosystems.

Some of the orchids that became extinct in the world were due to a combination of factors. While the original threat to orchids were rare orchid collectors that would fragment and destroy populations. Currently the biggest threat to orchid habitats is massive development destroying habitats. In Singapore the massive industrialization and movement away from shop houses to HDBs directly contributed to the loss in native orchid diversity. The rebuilding of the city also incorporated the current land management laws, the near abolishment of private land created the compartmentation of the nation. This new designation of land ensured the current new habitats for orchids on the island. The newly independent Singapore both contributed to the extinction of orchids while simultaneously ensuring the safety of the remaining species.

Part of any conservation movement also includes education on this subject. Luckily while during a visit to the gardens, I got to witness a group of school children about to enter the National Botanic Garden. All of the children were holding a work sheet about orchid biology

both for hybrids and the native orchids on the island. While these children are able to gain early education on orchids, education on orchids is readily available for others. Through plaques and guided tours information on orchids in Singapore can be found within and outside the national botanic garden. Pulau Ubin, a satellite island off the coast of northeast Singapore, is just one of the many locations in which you can see the conservation efforts first hand. While either cycling or walking on one of the many paths and looking up in the trees. Here it will be noticeable to see orchids mounted on small planks of wood fastened to the side of trees (see image 11).

While many orchids are able to naturally use the tree as natural home, due to many of orchids small population sizes expanding their geographic range is critical for the success of any threatened species. Just attaching orchids to trees is far from a successful introduction. Most orchids rely on a specific mutualism with mycorrhizal fungi. Also, many of these orchids were produced in a sterile lab environment and although researchers try their best to acclimate orchids to the outside elements, these plants are still relatively fragile and their success rates when introduced is not very high.

Additional Methods in Orchid Conservation

Other conservation techniques include molecular systematics, the study of genetics to explore evolutionary relationships between species. This was used to understand the taxonomy and relationship between orchids. The most prominent study on this was with the national orchid and whether it was a native natural hybrid or one that was indeed a cross by Miss Joaquim. Learning that the national flower was actually from a different genus was crucial to help understand ways for conservation. Another example of this is with *Grammatophyllum*

Speciosum, also referred to as the Tiger Orchid. This native orchid is also the largest orchid. This is found throughout Southeast Asia and was originally thought to be extinct on the island until there was a discovery of an extremely large plant located in the center of the gardens.

Systematics are now being done to see if the tiger orchid has multiple genetic variations among the many populations known in Southeast Asia. While it may seem that molecular systematics has nothing to do with the social worlds of orchids or for nation to use, this is actually not the case. To prove the importance of Tiger Orchids to Singapore there is an ongoing effort to show that these orchids in Singapore are a distinct species. If the Tiger Orchids of Singapore could be determined to be its own species, then this would show a distinction between Singapore and Malaysia. This research question and work is one of the many ways in which orchid research is directly used in sculpting the Singaporean nationality.

As mentioned earlier it is the same lab that creates the unique hybrids for gifts as it is for the propagation for native orchids. In the national nursery and lab, we see both hybrids and the native plants being grown side by side. In one example were highly cultivated Vandas which were displayed stretched out vertically adjacent to a young tiger orchid. Field scientists will soon go to the areas where native orchids are introduced, check on their success and determine if there needs to be an increase in native orchids. If it is the case that a population isn't doing well it will be up to these field scientists to introduce new orchids by mounting the orchids into the habitat.

The intersection between orchids, conservation and natural heritage may not be explicitly stated by the government or the residents but this can be noticed with their placement on heritage trees. Heritage trees is part of a movement by nParks that registers

trees in order to protect them from development. These trees are considered a green landmark that directly contribute to Singapore's national heritage (nParks Board 2018). Heritage trees can be nominated by the public and the government will help set up the proper interpretive material for the tree. The panel that decides which trees get approved to be a heritage tree is composed of individuals from multiple organizations, including the National Parks Board, the Housing Development Board, the Peoples Association and Nanyang Technical University (nParks Board 2018). For a tree to be considered as a heritage tree it must either have a large trunk circumference or a botanical, historical, cultural and aesthetic value. Although there is no mention of orchids with heritage trees, many of these older trees support many species of native orchids. These heritage trees are protected from being destroyed which means that the orchids that decorate them are also protected.

Native orchids represent another world in Singapore. These orchids occupy a space that has now been protected within a highly planned city-state. The green spaces, the habitats for native orchids, are incorporated within the streets of Singapore. Whether on a heritage tree or on the outskirts of a reservoir what makes these orchids particularly powerful is how they blend in within the landscape. Many of these native orchids aren't like their hybrid kins, they aren't as free flowering which allows them to truly disappear. These orchids ability to mask their presence is an incredibly powerful act, these orchids are considered a necessity. Native orchids once were prolific but due to an extensive change in landscape through industrialization these orchids were rapidly going extinct. Now, the independent government's value on orchids allow these native plants to continue and thrive among the manicured city-state. The value comes from the role as a health indicator of an ecosystem, their highly specific ecological niches mean

that the more orchids within a system the healthier the system. The more orchids that Singapore has ecologically means the healthier the nation is.

Chapter 5

Conclusion and Future Research

“Even in the 1960s, when the Government had to grapple with grave problems of unemployment, lack of housing, health and education, I pushed for the planting of trees and shrubs. I have always believed that a blighted urban jungle of concrete destroys the human spirit. We need the greenery of nature to lift up our spirits (Yew 1995).”

This was the opening to the speech Lee Kuan Yew gave for the opening of the National Orchid Garden. Lee Kuan Yew had persistently outlined the importance of green spaces, he recognized the importance for both citizens and tourists during their visit to Singapore. This garden represents what Lee Kuan Yew would consider the crowning attraction of the parks in Singapore. Fascination with orchids is a global act, these plants have a history of rarity, luxury and alluring quality. There is an inherent materiality of the orchids that cannot be reproduced in other plants.

In 1965 Singapore had a challenge that even its' leaders were concerned over, an independent city-state. With the failure of a “Malaysia for Malaysians”, Singaporean government leaders would work knowing that to make this city-state successfully it would have to sculpt a Singaporean identity. How did the new government attempt use the orchid to shape the Singaporean identity? Orchids find themselves in many worlds within Singapore, from

public parks to religious institutions. Yet one common place orchids have been for centuries has been within domestic settings. In Singapore's history these plants were brought in to the homes and enjoyed by many different social classes and ethnicities. With historical ground-breaking innovations and their innocuous relations, it became the perfect symbol for Singapore. Today, the Singaporean state has become synonymous with orchids.

As with any academic work, this research is far from complete. This past year marks an announcement that could cause a dramatic shift with orchids within Singapore. Under a recent announcement the land allocation for growing orchids has decreased by half (Rashith & Lee 2018) . With already so little land, the decision to determine this land to be needed for other uses question the current government's value of orchids. What could this mean for the commercial orchid market in Singapore? Will orchids decrease within the domestic and private worlds of Singapore? To answer the possibilities and the future of orchids within Singapore it is necessary to do additional research within those who own and actively keep orchids within their homes. Does it matter where the orchids are grown? While orchids have been appropriated in to the Singaporean identity, further questions arise on other nations and their citizens with orchid keeping, specifically with Malaysia. I didn't get a chance to study Malaysia and their relationship with orchids, but I do know that there are many orchid nurseries in Malaysia as well as their orchid history is Singapore's pre-independence history.

This paper was inspired after an extensive trip to Singapore, in which I worked on ethnographic practices with an environmental focus. Early on in my childhood I fell victim to the allure of orchids. With years of growing orchids in my home and college dorm, the orchids

of Singapore shouted out to me. While some orchids were stapled to trees, others exclusive gifts, and many in extravagant public displays, it was the orchid in the corner of a cafe, on the streets in front of shop-houses, and the ones found in personal homes that reveal their true value. Orchids are truly a universal flower but their meaning to Singapore is their own.

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All photos (besides image 2) was taken by myself during my time in Singapore.

Photos



Image 1: Propagation of orchids in lab setting



ANGREKUM SESQUIPEDALE AND NATIVE FERNS.

Image 2 An example of an early etching depicting an orchid hunt. Retrieved from William Ellis's, *Three visits to Madagascar*.



Image 3 Entrance to the Sungei Tengah Agrotechnology park



Image 4 An example of one of the many spectacular orchid displays within the Gardens by the Bay Flower dome.



Image 5 The Singapore annual orchid show. This image shows the best of show orchids, with the audience flooding the awards table.



Image 6 This is the orchid garden on top of the Buddha tooth relic temple.



Image 7 Two examples of streets incorporated with plants



Image 8 National banners that include an icon of an orchid



Image 9 A worker within the National Orchid Garden.



Image 10 Orchid themed water park



Image 11 A close up of introduced orchids mounted to a tree.