Young Researcher Overseas Visit Program for Vitalizing Brain Circulation
Trip Report, Easter Island (Rapa Nui), November 28 to December 10, 2011

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Trip dates: November 28 to December 10, 2011

Destination: Easter Island (Rapa Nui), special territory of Chile

Trip report:

I visited Easter Island (Rapa Nui) to provide on-site mentoring to Noa Nishimoto, who was sent there through the auspices of the Young Researcher Overseas Visits Program for Vitalizing Brain Circulation. I arrived in Rapa Nui via Tahiti. In contrast to the subtropical rainforests of the Tahiti archipelago surrounded by coral reefs, Easter Island is a small, isolated island, with no other inhabited islands within a 2000 km radius, buffeted by strong winds and having a shoreline comprising precipitous cliffs battered by rough waves. Completely deforested long ago due to the transportation of Moai statues and population growth, it is now a stark, barren volcanic island. The island covers a total area of only 166 km^2, making it similar in size to Japan's Shōdo Island. This small island has 4 to 5 thousand inhabitants, of which approximately 70% are native Rapa Nuians and the remaining 30% are Chileans who have come to the Island to engage in the tourist industry.

Photo 1. Rapa Nui's lone village, Hanga Roa (the small area with greenery), viewed from the highest point of the island. Due to deforestation in the past, the majority of the island is now grassland. We traveled from the village to the island's high point by horse.

Photo 2. The shoreline is steeply sloped, resulting in substantial loss of land into the sea due to erosion by wind and rain. The photo was taken from a boat offshore.

In order to encourage Ms. Nishimoto to deepen her understanding of the tree species being planted and the status of forest recovery, we visited the local CONAF (Corporación Nacional Forestal: National Forest Corporation) station, where we examined saplings of the various tree species being cultivated and received an explanation from one of the staff members, Mr. Doom Tamaota, of how useful each tree species is. These saplings were brought to the island from Chile and Tahiti. Because Rapa Nui was deforested and is primarily meadowland, soil erosion is extensive. As such, many of the tree species were selected to prevent such erosion. A typical example of such a tree species is *Albizia lebbeck*, in the family Mimosoideae commonly known as Lebbeck or Woman's Tongue. This deciduous broadleaf species is said to be native to Southeast Asia, but is currently widely planted throughout the tropics and subtropics and can often be found along roadsides, etc. The coast sheoak, *Casuarina equisetifolia* in the family Casuarinaceae, known locally as *Aito*, is a non-native species from Chile that is often used as a windbreak, but many saplings have also been imported to prevent soil erosion. The Portia tree, *Thespesia populnea*, known locally as *Mako'i*, is a small evergreen species ranging between 5 to 15 m in height that is widely distributed in coastal areas of the Indian Ocean and the Pacific Islands. The genus name, from the Greek *thespesios*, meaning "devine," is believed to be derived from the fact that the tree was planted in temples and other sacred places in India, and so on. It is further assumed that the species originated in the eastern region of New Guinea island. The hard wood of the tree has been used since ancient times for carving sculptures and the ancient RongoRongo script of the ancient Rapa Nuian language.

Photo 3. The local CONAF (Corporación Nacional Forestal: National Forest Corporation) station on Easter Island. Various species of saplings are being grown for future island afforestation.

The Toromiro (*Sophora Toromiro*) tree is an endemic species belonging to the genus *Sophora* in the Family Fabaceae. The genus *Sophora* comprises approximately 50 species distributed in the tropics and subtropics, ranging from herbs, to small trees and tall trees, all producing Job's tear-like fruit. In the past, the tree could be found growing over the entire island. Seeds collected from the very last tree standing (before they completely disappeared from the island) were brought to Sweden and have since been cultivated in Stockholm, Berlin, and London. Because the tree had become extinct on the island, saplings had to subsequently be reimported to the island and are now being

raised with great care at CONAF. As Toromiro trees are very fragile, the saplings are enclosed in a protective net and strongly aromatic herbs have been planted around their bases to prevent attack by nematodes. It is said that more than 50 years are needed for the saplings to become mature trees. It is hoped that, in the future, the island will be returned to its natural state and once again be covered by native species.

Photo 4. A sapling of the Toromiro tree endemic to Rapa Nui. The fragile sapling is enclosed in a protective net and strongly aromatic herbs have been planted around its base to prevent attack by nematodes.

The root of the fern, *Polypodium scolopendria* i, known locally as *Matua pua'a*, has traditionally been used as a treatment for cancer. The species, endemic to Rapa Nui, was believed to possess energy and was used in traditional medicine before the introduction of Western medicine as a plaster on wounds and to cure sore throats. The bark of another tree species, whose scientific name I don't know but is known locally as *Mahute*, is stripped off and softened by pounding and is used to make paper and traditional grass skirts.

Photo 5. The bark of the tree known locally as *Mahute*, stripped and being woven into a grass skirt.

The endemic Popora tree, whose fruit has long been used as a treatment for stomach aches, is faced with the threat of extinction. As such, efforts are being made to provide free saplings to encourage families to cultivate them in their own gardens. The flower of the tree known as *Tipanie*, a species in the family *Apocynaceae* genus *Plumeria* imported from Tahiti, is used as decoration. The tree known as *Mirotahiti* was imported from South America and, although its name includes "Tahiti," is not found on Tahiti. The tree is used to make carvings that are given as gifts or used as

decoration at home. The Noni tree, which is native to Tahiti and whose fruit is used to treat cancer, naturally grows in warmer areas and, thus, is difficult to cultivate in Rapa Nui's cold climate. In this way, preparations are underway to reforest Rapa Nui for the purpose of preserving the island's natural environment and preventing further soil erosion. I felt that it is important to continue to monitor changes in the island's natural environment.

I instructed Ms. Nishimoto on the significance of the plants that we observed in the global scheme and on the importance of forests to human life. In addition, we saw many eucalyptus trees around the island. Because eucalyptus grows quickly and burns easily, it is highly valued in Africa as firewood and many trees are planted around people's houses. Taking advantage of its rapid growth, on Rapa Nui, eucalyptus is used as a windbreak. Given these differences, I advised Ms. Nishimoto to compare the vegetation of Africa and Rapa Nui.

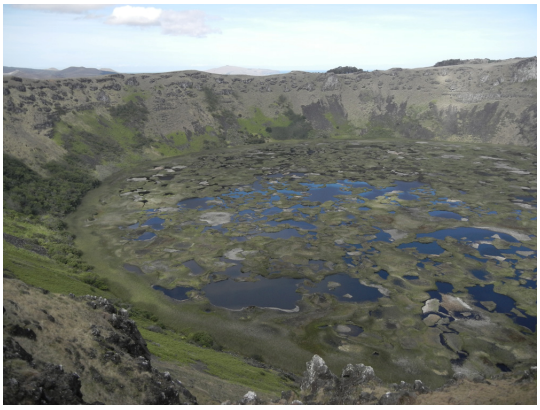
We also visited the Easter Island Museum (Museo Antropologico Antropológico Sebastián Englert) to collect information related to the island's history, environment, and the Moai. Using display boards, I instructed Ms. Nishimoto on the earth science and geological mechanisms by which the volcanic island of Rapa Nui was born.

I met Ms. Nishimoto's botanist informant, Maria R. Pakarati Araki, and also had a chance to look at her Ph.D. dissertation. Incidentally, it is apparently customary in Chile for children to take both their father's and mother's family names. In this case, Pakarati was her father's surname and Araki, her mother's surname. Ms. Pakarati Araki provided us with information regarding Rapa Nui's local trees. Ms. Nishimoto was conducting an investigation of the Rapa Nuian language with the help of Dr. Pakarati Araki. I sat in on a session where she was pronouncing some 1000 key words in Rapa Nui. Given the scarcity of native researchers living on Rapa Nui, Ms. Pakarati Araki, a native of Rapa Nui who received her Ph.D. at the Pontifical Catholic University of Chile (Pontificia Universidad Catolica de Chil), is a rich source of information regarding the Rapa Nui language, culture, and nature. After discussions with Dr. Pakarati Araki, she agreed to continue collaborating and supporting our research efforts in the future. I did my best to secure a research environment that would allow Ms. Nishimoto and other researchers to conduct their investigations smoothly.

Photo 6. Dr. Maria R. Pakarati Araki demonstrating the "cat's cradle" game played widely in Polynesia, including Rapa Nui and Tahiti.

Rapa Nui is a volcanic island. Of the three volcanoes that constitute the island, Rano Kau, which erupted approximately 2.5 million years ago, is now a crater lake measuring 1600 m or so in diameter. While basalt, tuff, trachyte, and obsidian can be found distributed throughout the island, the majority of Moai statues were made from the easily–carved tuff, with some few also being made from basalt or trachyte. We explored the varied volcanic landscape and geologic features, using cars along roadsides, horses in the central mountains, and boats along the island periphery. As we explored, I explained the volcanic landforms and various rocks, the island's geology and landscape, and the relationship to the environment to Ms. Nishimoto. Rapa Nui is a small, solitary island, completely cut off from the rest of the world, with no other inhabited islands within a 2000 km radius. For this reason, it has many endemic plant species; the Rapa Nui language, however, is related to and contains many words similar to those of other Australasian languages spoken in Madagascar, Indonesia, Hawaii, and Tahiti. In order to understand where the differences and similarities in vocabulary lie, it is important, through the auspices of this program, to travel to and conduct field investigations widely throughout the Polynesian region. The local vocabulary is also intimately related to the environment. As such, I believe that understanding Rapa Nui's natural environment is also useful in the study of its language.

Photo 7. Rano Kau crater lake brings home the fact that Rapa Nui is a volcanic island.



On our return from Rapa Nui (Easter Island), I spent one day in transit in Tahiti with Ms. Nishimoto, during which time I explained the transformation from volcanic island to coral reef or, more specifically, the process by which shore reefs, then barrier reefs, then atolls are formed as volcanic islands subside and/or the sea level rises and the mechanism by which coral reefs are formed by coral polyps. In addition, I explained how the lagoon created by the topography of barrier reefs or atolls supplies various materials to support the lives of inhabitants and provided instruction regarding the formation and natural mechanisms of volcanic islands.

Reference Cited: *Shūkan Asahi Hyakka: Sekai no Shokubutsu* [Weekly Asahi Encyclopedia: Plants of the World]