

RECONNECTING THE LUSHAN BOTANICAL GARDEN AND THE ARNOLD ARBORETUM OF HARVARD UNIVERSITY - A BOTANICAL BRIDGE BETWEEN CHINA AND THE U.S.

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1 ABSTRACT

The collaboration between the Lushan Botanical Garden and the Arnold Arboretum of Harvard University formed a botanical bridge between China and the U.S. in the early 20th century. Founded in 1934, the Lushan Botanical Garden is China's first modern botanical garden, modeled after the Arnold Arboretum in several respects. The Arnold Arboretum played an important role in training the first generation of Chinese botanists, including the core founder of the Lushan Botanical Garden. From the early 1930s through the late 1940s, active engagement between the two institutions enabled the botanists in China and the U.S. to collaborate across cultures and borders, despite successive years of wars. However, the two lost contact after China's regime change in 1949, and only reestablished the connection 55 years later. Although some initial collaborative efforts were made, active collaboration between them is lacking at the present day.

This paper traces the long relationship between the Lushan Botanical Garden and the Arnold Arboretum. It celebrates their inspiring teamwork in the past, and emphasizes the importance of strengthening the bonds and carrying the collaborative endeavor by the Chinese pioneers in botany, and their American mentors and colleagues into the future.

Historical connections and current challenges are examined through literature reviews, observations, and dialogues with the researchers at both institutions. Recommendations are put forward as key strategies in order to fortify long-term collaboration between the Lushan Botanical Garden and the Arnold Arboretum - a botanical bridge between China and the U.S.

1.1 Keywords

Lushan Botanical Garden, Arnold Arboretum, Dr. Hsen-Hsu Hu, botanical bridge, collaboration

2 INTRODUCTION

The Lushan Botanical Garden (LBG) has a long relationship with the Arnold Arboretum of Harvard University since its inception, and even before it was officially founded in August 1934. The Arnold Arboretum played an important role in training the first generation of Chinese botanists, including Dr. Hsen-Hsu Hu (1894-1968), the core founder of the Lushan Botanical Garden. While studying at Harvard University in the 1920s, Dr. Hu formed close personal ties with Professors C. S. Sargent and J. G. Jack at the Arboretum. In several respects, the Arnold Arboretum, especially its extensive research collections, served as a model for the Lushan Botanical Garden (Del Tredici, 2005). The collaboration between the Lushan Botanical Garden and the Arnold Arboretum formed a botanical bridge between China and the U.S. in the early 20th century. However, the two institutions lost contact after China's regime change in 1949. Collaboration was interrupted and eventually ceased for over half a century due to political, social and physical barriers.

The broken link was resumed in 2003 after two Boston-based landscape architects (including the author) from Carol R. Johnson Associates, Inc. (CRJA) visited the Lushan Botanical Garden during a business trip to China. The Garden was put in touch with the Arnold Arboretum soon after they returned to Boston. Following the steps, the Arnold Arboretum sent out two scientists to Lushan in the following year on the LBG's 70th anniversary to participate in an international conference in botany, and officially reestablished the connections. Although the lost ties were restored and initial collaborative efforts were made over a decade ago, active collaboration between the two institutions is lacking at the present day.

This paper intends to examine the long relationship between the Lushan Botanical Garden and the Arnold Arboretum, emphasize the importance of strengthening the bonds, and explore effective ways to fortify a long-term partnership to carry the inspiring collaborative endeavors by the Chinese and American botanists from the past decades into the 21th century.

3 BACKGROUND / LITERATURE REVIEW

3.1 The Lushan Botanical Garden

The Lushan Botanical Garden is situated at the famous Hanpo Pass scenic area in Jiangxi Province in Central China. It is part of the Lushan National Park - a UNESCO World Heritage Site.

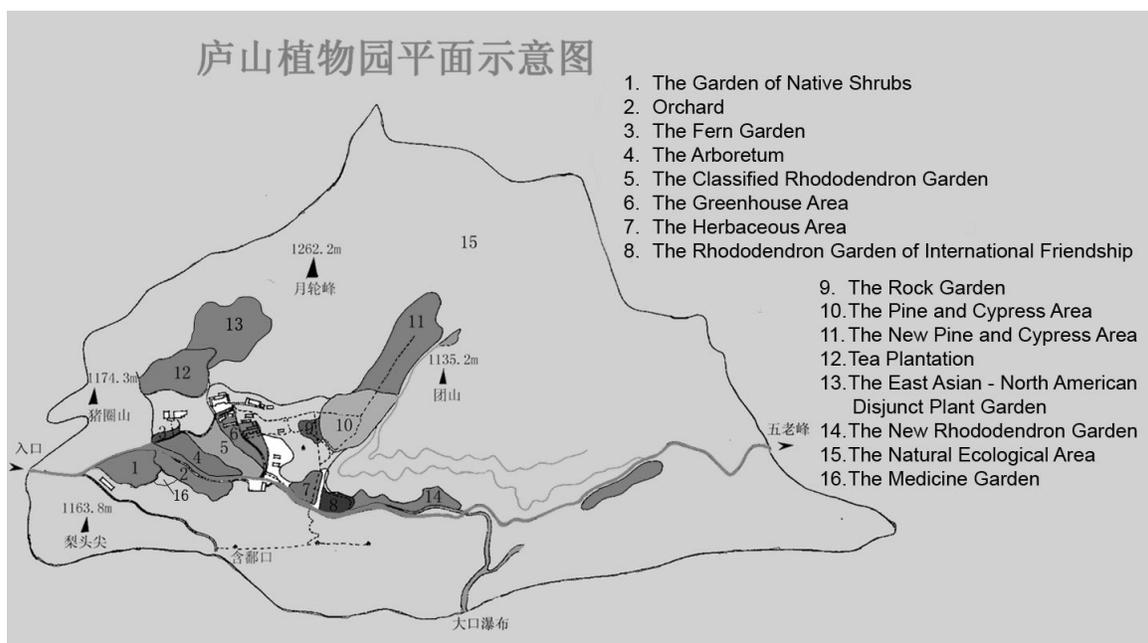


Figure 1. Map of the Lushan Botanical Garden (Image source: the Lushan Botanical Garden).

Founded on August 20, 1934 by Hsen-Hsu Hu (1894-1968), Ren-Chang Ching (1898-1986) and Feng-Hwai Chen (1900-1993), the Lushan Botanical Garden is China's first subtropical forest botanical garden, formerly named Lushan Arboretum and Botanical Garden (Lushan Botanical Garden website, 2017). The Lushan mountain area's complex topography and unique microclimate provide a heterogeneous environment for plant genetic diversity (LBG Report, 2009).

Currently under the dual leadership of the Chinese Academy of Sciences and Jiangxi Province Science and Technology Bureau, the LBG is a well-known research center as well as a popular tourist destination, attracting 800,000 visitors each year. Covering over 815 acres in area (see Figure 1 site map), the Garden's live collection consists of over 5,500 plant species, including 157 endangered species (Lushan Botanical Garden website, 2017). The introduction and preservation of gymnosperms, ferns and *Rhododendron* species is especially noteworthy, becoming the three salient features of the Garden (Lushan Postal Bureau, 2003).

The Lushan Botanical Garden's new branch, the Poyang Lake Botanical Garden was established in June 2011, covering an area of 89 acres in the north of the Lushan Mountain. With diverse terrains of mountains, plains and wetlands, the Poyang Lake branch encompasses a wide range of vegetation and ecosystems, especially aquatic and wetland flora resources (Lushan Botanical Garden website, 2017).

As a member of BGCI (Botanic Gardens Conservation International), the Lushan Botanical Garden has established working relationships for scientific research with 271 institutions in 69 countries (Lushan Botanical Garden website, 2017). The institution has been actively engaged in the introduction, conservation and exploitation of wild plant resources in the subtropical zone, playing an important role in conserving the biodiversity of China (Lushan Postal Bureau, 2003).

3.2 The Arnold Arboretum of Harvard University

The Arnold Arboretum is the oldest public arboretum in North America, managed through a unique partnership between Harvard University and the City of Boston. The Arboretum was planned and designed in collaboration with Frederick Law Olmsted (1822-1903), the father of American landscape architecture, as part of Boston's Emerald Necklace (Arnold Arboretum website, 2017).

Established in 1872, the Arnold Arboretum is justifiably famous for its contributions to the scientific study of trees, including aspects of their taxonomy, ecology and biogeography (Del Tredici, 2007). Occupying approximately 281 acres (see Figure 2 site map), the Arboretum's living collection of some 15,000 accessioned woody plants, representing almost 4,000 unique taxa with 2,100 species, is recognized as one of the most comprehensive and best documented of its kind in the world (Friedman et.al. 2016).

The Arboretum's research and education activities in Asia began over 120 years ago, led by its founding director, Prof. C. S. Sargent (1841-1927). It advanced dramatically in 1905 when Sargent hired E. H. Wilson (1876-1930) to explore central China on behalf of the Arboretum. The Explorers Garden and Chinese Path located along the Bussey Hill Road showcased many plants brought back by Wilson, who went to China for two long expeditions at the beginning of last century. Through a variety of means, the Arboretum has led or supported more than 150 discrete collecting events in over 70 countries since the late 1800s (Arnold Arboretum website, 2017).

Today the Arnold Arboretum is launching a new era of discovery, focused on collecting exceptional representatives of botanical variation from a rapidly changing world. A plant collection plan in spring 2016 aims to secure the collections' scientific importance for the next century. The agenda is spurred by widespread destruction of native plant habitats due to global development, as well as threats to the diversity of plant populations caused by rapid changes in prevailing climatic conditions (Shaw, 2016). According to the 10-year collection plan, China, with temperate zones not unlike Boston's, will be the single most important source of acquisitions from the wild (Shaw, 2016). Collaboration between the US and China is key to the Arboretum's goal to strengthen the conservation and study of plants (Friedman et.al. 2016).

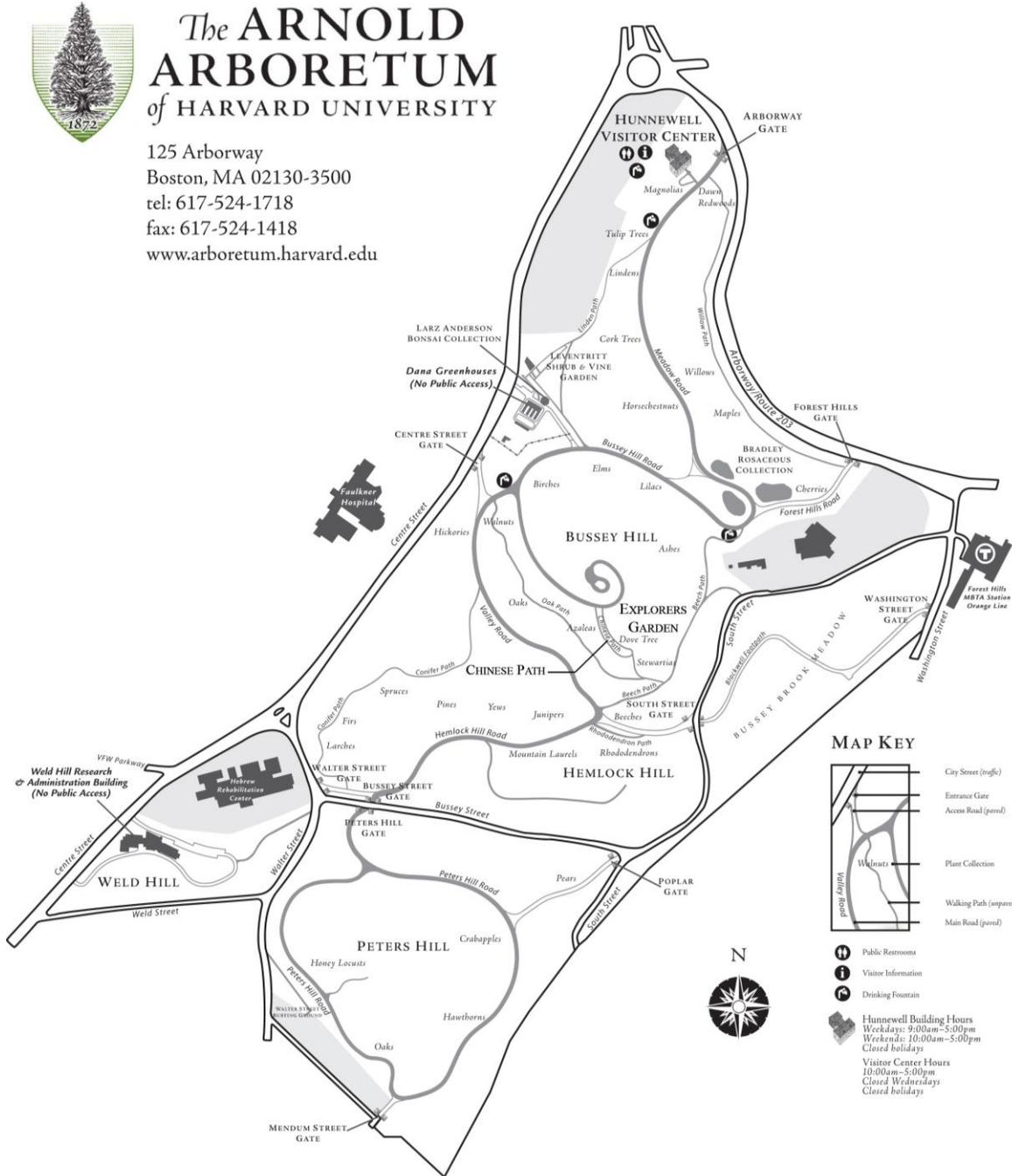


Figure 2. Map of the Arnold Arboretum (Image source: Arnold Arboretum website, 2017).

4 METHODS

The findings of this paper are largely based on a review of publications and unpublished written documents in both English and Chinese closely related to the research topic, following an inductive research approach. Historical connections between the two institutions and current challenges are examined through literature reviews, observations, and interviews with the researchers on both sides.

5 HISTORIC STUDY

5.1 Dr. Hsen-Hsu Hu and the Arnold Arboretum's influence

The Arnold Arboretum of Harvard University is deemed as an origin of Chinese plant science (Luo & Li, 2011). It played an important role in training the first generation of Chinese botanists who became founders of modern plant taxonomy in China. The author's recent literature research reveals that Dr. Hsen-Hsu Hu (Figure 3) was the core founder of the Lushan Botanical Garden established in 1934. Among all the Chinese botanists who studied in the U.S. in the early 20th century, Dr. Hu was mostly influenced by the Arnold Arboretum (Luo & Li, 2011).

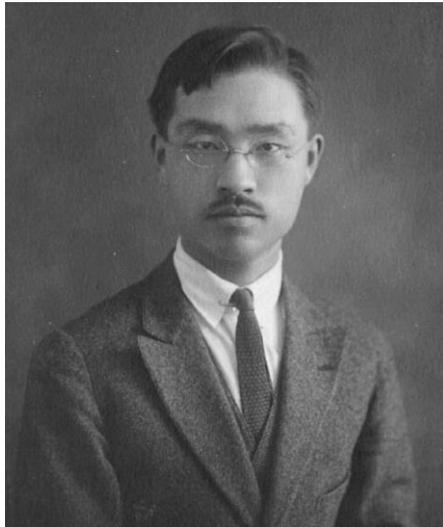


Figure 3. Hsen-Hsu Hu's Harvard University portrait, taken in 1925
(Image source: The Archives of the Arnold Arboretum; Del Tredici, 2007).

Dr. Hsen-Hsu Hu was a scientist, a poet, a political thinker, a father, a teacher, and a builder of great institutions (Ma & Barringer, 2005). As a founding father of modern plant taxonomy in China, he was best known in the West for the role he played in identifying *Metasequoia glyptostroboides* Hu & Cheng, the dawn red wood, and facilitating its distribution throughout the world (Del Tredici, 2007). The discovery and distribution of *Metasequoia*, a living fossil species, is considered one of the greatest contributions in botany of the 20th century.

A native of Jiangxi Province in China and a child prodigy in his day (Shi, 2017), Hu was sent to University of California, Berkeley to study botany and earned a Bachelor's degree in 1916. He returned to the U.S. in 1923 to study for a doctorate in botany, and became the first Chinese National who received a Doctor of Science degree from Harvard University in 1925 (Ma & Barringer, 2005). Hu was strongly influenced by the Arnold Arboretum's staff members, including C. S. Sargent, Alfred Rehder, J. G. Jack, E. D. Merrill (Del Tredici, 2007) and E. H. Wilson (Luo & Li, 2011).

While studying at Harvard University, Hu took four forestry courses from Prof. J. G. Jack (1861-1949) at the Arnold Arboretum and became his good friend and confidant (Del Tredici, 2007). An enthusiastic and effective teacher, Jack (see Figure 4) went out of his way to help his Chinese students, often paying their wages for work at the Arboretum out of his own pocket or arranging Harvard loans for them. He helped them classify their plant specimens and prepare their manuscripts for publication (Madsen, 1998). After returning to China, Dr. Hu honored Jack (and his relationship to Chinese botany) in the name of a new genus, *Sinojackia* (Madsen, 1998). A Chinese tree, commonly called Jacktree (*Sinojackia rehderiana*), was named to honor both Jack and Arnold Arboretum's dendrologist Alfred Rehder (1863-1949) (Missouri Botanical Garden website, 2017).

Dr. Hu's dream of building a botanical garden in China began while he studied at Harvard University. In his Chinese poem "The Song of the Arnold Arboretum" written in 1925, Hu wrote a prologue in old style Chinese, translated as "The Arnold Arboretum has the most flourishing trees and flowers in North America.

Flowers bloom endlessly in spring and summer, attracting many tourists to enjoy and wonder all day long. This poem is created to express my appreciation and also show my country an example in order to follow the path of this Arboretum.” (Hu, 1925; Luo and Li, 2011; Hu, ed. 2014).

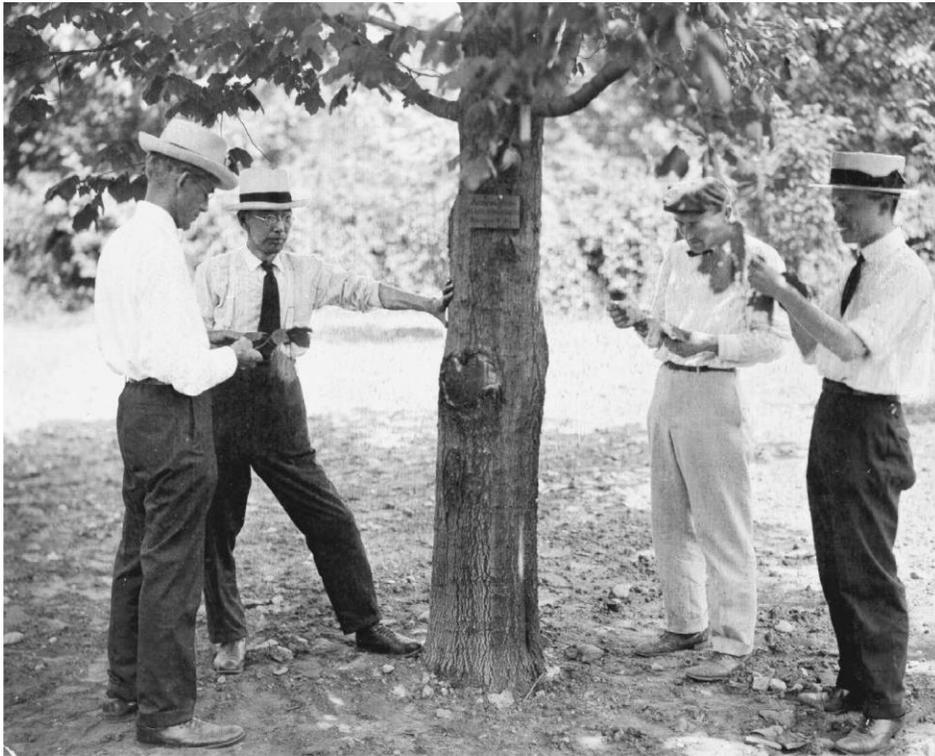


Figure 4. Prof. Jack and his Chinese students examining a black maple at the Arnold Arboretum, 1917 (Source: The Archives of the Arnold Arboretum; Madsen, 1998; Del Tredici, 2007).

5.2 Collaboration in the early years

The earliest collaborative effect can be traced to 1926, when Prof. Sargent, the first director of the Arnold Arboretum, initiated a plan to establish an arboretum together with Dr. Hu in China. Due to the various wars and Prof. Sargent passing away in 1927, this plan was never implemented (Hu, ed. 2009).

Eight years later, China's first botanical garden was founded in Lushan. From 1934 to 1949, the Lushan Botanical Garden was under the dual leadership of the Agricultural Institute of Jiangxi Province and the Fan Memorial Institute of Biology in Beijing, where Dr. Hu served as the director for 17 years. The collaboration between the Lushan Botanical Garden and the Arnold Arboretum was led by Dr. Hu, as part of the Fan Memorial Institute of Biology's exchange program (Hu, 2017). The LBG's annual reports reveal that the Lushan Botanical Garden gained good support and help from the Arnold Arboretum from the very beginning. Table 1 shows the amount of seeds LBG received from the Arnold Arboretum from 1934 to 1937. The information was compiled by the author based on the historic documents from the book of Recollections on the Occasion of 80th Anniversary of the Lushan Botanical Garden (Hu, ed.) published in 2014 by the Lushan Botanical Garden of Chinese Academy of Sciences.

Table 1. Seeds received by the Lushan Botanical Garden from the Arnold Arboretum.

Report No.	Year	Receiving Record
Initial work report	Aug. - Dec.1934	7 varieties of Aesculus seeds
2nd annual report	1935	72 packages of seeds
3rd annual report	1936	20 packages of seeds
4th annual report	1937	254 packages of seeds

(Source: *Recollections on the Occasion of 80th Anniversary of the Lushan Botanical Garden*, 2014)

In exchange, the Lushan Botanical Garden also sent out seeds to the Arnold Arboretum. The Arnold Arboretum maintains a detailed list of plants originated as seeds from Lushan, with total 128 living and dead plants. The following is a list of living plants as in 2004, provided by Dr. Del Tredici.

Stewartia sinensis (AA #769-36 = *S. rostrata*)
 Albizzia julibrissin (AA #125-35)
 Lonicera modesta lushanensis (AA #765-36)
 Viburnum hirsutulum (AA #708-37 = *V. hirtulum*)
 Deutzia ningpoensis (AA #709-37)
 Hamamelis mollis (AA #362-76)
 Pinus hwangshanensis (AA #368-76)
 Stewartia sinensis (AA #373-76)

The Lushan Botanical Garden and the Arnold Arboretum also collaborated in many plant-collecting expeditions in different parts of China. Despite the war with Japan beginning in 1931 and causing many upheavals, Dr. Hu directed a five-year investigation of Yunnan Province, southwest of China that began in 1933 and by 1936 had harvested 30,000 specimens (Madsen, 1989). The Lushan Botanical Garden participated in the expeditions and provided financial support as documented in the LBG's annual report in 1937. In 1938 the Arnold Arboretum joined the investigation and provided USD \$600 financial support (Hu, ed. 2005). On a collaborative seed-collecting trip to the Burma-Yunnan border, many herbarium specimens and rare seeds were collected. New plants were discovered, named, and studied (Madsen, 1989). Like in many collections, the results were shared among the Fan Memorial Institute of Biology, the Lushan Botanical Garden and the Arnold Arboretum.

The Lushan Botanical Garden made remarkable achievements within the first 4 years from its inception. However, further development of the institution was interrupted by Japan's invasion and occupation of Jiangxi Province in August 1938 (Hu, ed., 2009). The Botanical Garden had to relocate to Yunnan Province. A branch office of the LBG was set up in Lijiang, Yunnan Province, where the botanists continued their research and specimen collections until after the World War II (Hu, ed. 2014).

In 1946, Dr. Hu appointed F. H. Chen, his former student as the director returning to Lushan to reestablish the Botanical Garden, which was largely destroyed by the Japanese invaders. The institution suffered severe funding shortages between 1946 and 1949, during the Chinese Civil War period. The botanists and staff at Lushan overcame great difficulties in rebuilding the institution and its collection during this time. The funding from the Agricultural Institute of Jiangxi Province was extremely unreliable and insufficient. The Fan Institute of Biology, led by Dr. Hu continued supporting the Lushan Botanical Garden despite itself also being short of funds (Hu, ed. 2014).

At this very difficult time, in 1948 the Lushan Botanical Garden received USD \$500 from Harvard University for a collaborative project to investigate the forests at the borders of Jiangxi, Hubei and Hunan provinces (LBG Annual Report, 1948; Hu, ed. 2009; Hu, ed. 2014; Hu, 2017). Expeditions were organized in 1947-1948 at the three-province borders with total distance travelled over 1,000 km (2,000 Chinese li), passing 12 counties north of Jiangxi Province, with a total of 1,538 specimens collected including 32 types of tree specimens, 1,100 bulb specimens and 71 types of seeds. There were a few new species and new records among these (Hu, 2009, Hu, 2014). After the Harvard fund was received in the fall of 1948, the Lushan team planned two more expeditions in the following year. However, due to the regime change in 1949, the collaboration stopped and the field work results may have never been sent to the Arnold Arboretum (Hu, 2017). According to the meeting notes dated Dec. 14, 1949, Dr. Hu said: "Harvard University provided a lot of financial support to the expeditions in Yunnan Province. We still owe 30,000 to 40,000 specimens to Harvard University, which should be mailed back to the university" (Hu, ed. 2005).

It is worth mentioning that in 1947, Dr. E. D. Merrill (1876-1956), former director at the Arnold Arboretum provided USD \$250 to Dr. Hu from "the Arnold Arboretum restricted Chinese exploration fund" (Merrill, 1948; Del Tredici, 2007) for the *Metasequoia* seed collection. Due to the hyperinflation, USD \$250 yielded 9,750,000 Old Chinese Yuan (estimated by Merrill). This gave some idea of the financial difficulties under which the Chinese botanists were carrying on their work. The money was sufficient to support the expedition in remote Sichuan Province from August through November, result in collecting roughly 2kg of

Metasequoia seeds, which were later distributed to over 600 different individuals and institutions across the world (Ma, 2003; Del Tredici, 2007).

On January 5, 1948, Prof. Merrill received the first seeds from Prof. W. C. Cheng (1908–1987) (Merrill, 1948), Dr. Hu's former student and collaborator. The Lushan Botanical Garden also received 50g of Metasequoia seeds from Prof. Cheng (Wang, 1950; Hu, ed. 2014). During Lushan's first growing season, about 3500 new seedlings germinated from 25g of Metasequoia seeds with an approximate 35% germination rate in 1948. Among them, about 2700 plants survived (Wang, 1950). According to *Recollections on the Occasion of 80th Anniversary of the Lushan Botanical Garden*, "The germination rate at Harvard University was terrific, but the Lushan Botanical Garden's growth result was the best" (Hu, ed., 2014). It indicates information sharing among Chinese and American botanists, as part of the remarkable group efforts in redistributing and growing Metasequoia around the world.

5.3 Relationship in the new era

The three-province border forest cooperative investigation between the Lushan Botanical Garden and the Arnold Arboretum was disrupted and terminated after the Liberation of China in 1949. Criticized for his political writings and his ties to the West, Dr. Hsen-Hsu Hu's final years were full of turbulence. He died in 1968, in the early years of the Cultural Revolution. Hu's charges were cleared in 1979 and his ashes were buried at the Lushan Botanical Garden in 1984 (Ma & Barringer, 2005, Hu, ed., 2014).

There was no collaboration between the Lushan Botanical Garden and the Arnold Arboretum for over 50 years until, in September 2004, Dr. Peter Del Tredici and Dr. Jianhua Li from the Arnold Arboretum traveled to China to participate in an international conference on the LBG's 70th anniversary. During their visit to Lushan, the two scientists collected seeds and cones in the surrounding mountains, famous for a diverse flora that includes numerous conifers as well as deciduous trees (Del Tredici, 2005). One and half years later, Mr. Xiang Zheng, former Director of the LBG (2001-2005), then Director of Jiangxi Lushan Scenic Area Administration Bureau, visited the Arnold Arboretum in April 2006.

In addition to visiting each other, the two institutions made the following three collaborative initiatives: 1). Dr. Del Tredici would work with the LBG to study the relationship between the Arnold Arboretum, Dr. Hsen-Hsu Hu, and other Chinese pioneers in botany; 2). The LBG would collaborate with the Arnold Arboretum to build the East Asian - North American disjunct plant gardens; 3). The two institutions would carry out plant diversity and systematic evolution research together (Bao, 2016).

On May 8, 2005, a memorandum of understanding (MOU) was signed by Dr. R. E. Cook and Mr. Xiang Zheng, then directors of the two institutions.

"We, Arnold Arboretum and Lushan Botanical Garden, have reached an agreement to establish botanical gardens of disjunct plant genera between eastern Asia and eastern North America at both institutions. Both gardens will display closely related plant species that are naturally distributed at present in eastern Asia and eastern North America. Such gardens will function for both educational and research purposes. Over the next five years, we will collaborate closely on collecting germplasm of about 30 genera and 200 species and introducing them into both gardens. Lushan Botanical Garden will design and implement its specialty theme garden with accessories required to establish the garden at Zhu Quan Shan, and is financially responsible for such activities. Arnold Arboretum will incorporate such plants into its Leventritt Garden under the same conditions.

Arnold Arboretum will provide funds (up to \$5000 per year for germplasm collecting trips in China to be conducted solely by the staff of Lushan Botanical Garden, or jointly with the staff of Arnold Arboretum. Our annual goal is to collect germplasm as well as herbarium vouchers and desiccated leaf material from wild populations of 40 species. The areas selected for exploration each year will be reviewed and agreed upon by both parties in advance of the collecting season. The Arnold Arboretum will collect germplasm of eastern North American plants for shipment to Lushan. The germplasm and voucher specimens will be shared by both gardens..." (The Archives of the Lushan Botanical Garden).

In October 2005, only a few months after the memo was signed, Mr. Zheng was transferred to another job. The original signed documents were forgotten and could not be found until a signed copy in both Chinese and English was rediscovered in the archives of the Lushan Botanical Garden in 2017.

Among the three collaboration initiatives, Dr. Del Tredici completed the first one in 2006. His paper entitled "The Arnold Arboretum: A Botanical Bridge between the United States and China from 1915 through 1948" was published in *Bulletin of the Peabody Museum of Natural History* by Yale University in 2007. Regarding the second and third initiatives, in November 2005, the Chinese Academy of Sciences approved

a grant applied by the LBG to build the East Asian - North American disjunct plant garden. Covering an area of 2 acres, the project started in 2006 and was completed in 2009 after passing the inspection by the Chinese Academy of Sciences (Bao, 2016). The result was a new collection of 22 genera and 80 species, of which 44 species were native in China and 36 were foreign species, including 16 native in the U.S. (Gao, 2017). In the project report prepared by the LBG in 2009, an unsigned copy of the MOU between the two institutions was attached.

However, for some unknown reasons, the collaboration fell apart. The Arnold Arboretum was not involved to any significant degree in this project (Gao, 2017; Hu, 2017). No follow-ups and active collaborations were undertaken since their initial visits a decade ago. Both institutions went on building a disjunct plant garden without collaborating with each other. At the East Asian - North American disjunct plant garden in Lushan, among the 36 foreign species accessioned into the collection, some were from the west coast in the U.S., such as *Torreya californica*. Some were even from Europe (LBG report, 2009).

In July 2011, a delegation of Lushan Botanical Garden called "East Asian - North American plant investigation group" visited the U.S. led by the associate director of the LBG. Invited by the Hoyt Arboretum, the group visited the west coast including Hoyt Arboretum, World Forest Center, University of Oregon and other organizations in Portland, OR (Lushan Botanical Garden website, 2017). However, they did not stop by Boston to visit the Arnold Arboretum of Harvard University.

Presently all of the people involved with reestablishing the ties between the two have left their respective institutions including the directors and scientists from both sides.

6 RECOMMENDATIONS TO ADDRESS THE CHALLENGES

Historic study reveals the main obstacles between the Lushan Botanical Garden and the Arnold Arboretum in reestablishing a closer partnership lie in several aspects, including the political environment and control, organization systems, cultural differences, communication channels and physical barriers. Today, lack of time, funding, proper contacts and personal relationships are the major collaborative challenges in rebuilding the lost bond.

This paper puts forward the following recommendations as key strategies to address the challenges.

6.1 Establish common goals and objectives

Common goals and objectives should be established before the two institutions work together on any individual project. Working towards the same goals will encourage team leaders and team players with a strong sense of purpose. Goal setting can improve engagement and collaboration when people at both organizations realize the goals cannot be reached without teamwork.

6.2 Develop mutually beneficial, collaborative projects

Successful collaboration should be mutually beneficial and reciprocal to achieve a win-win outcome. Many projects in the botanical field can be mutually-beneficial, such as seed exchange programs, staff training and educational programs, joint botanical expeditions, collaborative studies on threatened or endangered species, and joint investigations on the impact of invasive species, etc. It is important to prioritize and carefully select such projects that everyone will be able to benefit from.

6.3 Improve organizational communications and information sharing

In today's internet age, there are many channels for organizational communications compared to those in the old days. The effective way for communication is to send messages across multiple channels, such as face-to-face meetings, emails, faxes, phone conversations, skype and wechat (a social media application widely used in China). This paper suggests both institutions set up and maintain a collaborative website for information sharing.

6.4 Provide a staff exchange and training program

Regarding the collaboration between the LBG and the Arnold Arboretum, some of the biggest challenges lie in language barriers and cultural differences. Staff exchange is one of the most effective means of nurturing cross-cultural professional relationships while also expanding opportunities for other types of botanical exchanges (Seyler & Lyons, 2011).

6.5 Establish personal relationships at the leadership level

Establishing strong personal relationships among decision makers is essential to long-term successful collaboration. With an open mind, strong personal relationships can be built through effective communications with mutual respect, active networking and on-going relationship building.

6.6 Identify key coordinators for collaboration

Key coordinators are critical in developing collaborative projects, exchange of information and organizing events. The failure in the East Asian - North American disjunct plant garden collaboration was partially due to the fact that the scientists in charge of the project from both institutions changed jobs.

Regarding the issue, this paper suggests the following - On the Arnold side, a staff member trained in the West with Chinese language proficiency and similar cultural background is recommended as the key coordinator. On the Lushan side, an experienced researcher with English language proficiency is recommended as the key coordinator. Both coordinators shall remain in contact with each other on a regular basis.

7 CONCLUSION

China has undergone tremendous changes over the past 40 years and has profound impact on the world's natural environment and ecosystems. Biodiversity in many parts of China has been steadily degraded and forests are disappearing due to over-felling and land development.

International collaboration is increasingly pursued by botanic gardens, arboreta, and other scientific institutions around the world as we face more and more pressing challenges today, such as environmental degradation and global climate change. These issues are truly international in scope and require effective collaboration at all levels.

Researchers note that the most successful collaborations are ongoing and involve meaningful institutional commitments that last over time. A successful collaborative relationship goes beyond individual projects, outliving the founders, and significantly benefitting the participating institutions on a number of fronts. Nonetheless, engaging in a meaningful international partnership is easier said than done (Seyler & Lyons, 2011).

The collaboration between the LBG and the Arnold Arboretum will fulfil the missions set aside by both institutions. It will fit well in the Arboretum's 10-year collection plan, with an emphasis on China as "the single most important source of acquisitions from the wild" (Shaw, 2016). As a world-leading botanical research institution, the Arnold Arboretum played an important role in training the first generation of Chinese botanists, who had made incredible contributions to China's modern botany. The LBG still has a lot to learn from the Arnold Arboretum in today's information era. Providing continuous training in botany and beyond in other interdisciplinary fields across countries is essential to build a better and sustainable future together.

The forests of Asia are among Earth's most threatened ecosystems (The Arnold Arboretum website, 2017). The Lushan mountain region has extraordinary ecological resources and biodiversity despite the forest of Lushan has long been taken for granted and neglected. A fortified long-term partnership between the Lushan Botanical Garden and the Arnold Arboretum is imperative and should be restored without any delay. This partnership will have significant impacts and provide enormous contributions in preserving the biodiversity of the world's forests and endangered ecosystems, via research, education, information exchange and mutual support - all of these forming a new botanical bridge between China and the U.S. in the 21st century.

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