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THE AMAZON, THE MUSEU GOELDI, AND THE NEW YORK BOTANICAL GARDEN

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HISTORICAL BACKGROUND

Man's interest in the biology of the Amazon is not a recent phenomenon. Observations of Amazonian forest plants by European explorers date back to the eighteenth century, predating the "discovery" of Brazil by Pedro Álvares Cabral. We know that early in April, 1500, the Spaniard Vicente Yañez Pinzón reached the gigantic mouth of the rio Amazonas, which he baptized Santa Maria de la Mar Dulce or Santa Maria of the Fresh Water Sea. Comments on some of the plants they encountered after landfall are scattered throughout the accounts of Pinzón and his expeditionary force, including observations of trees that six men with their arms extended could not embrace, referring to the kapok tree (*Ceiba pentandra*), and of other trees such as *Hymenaea courbaril* that produced "anime" (odoriferous resins). The adventurers made other references to plants they saw as similar to canafistula (purging cassia), ginger, and cinnamon (Santa Rosa, 1915).

It is unfortunate that comments about Amazonian plant life were sporadic in the various early chronicles. The observation made in 1740 by Charles de la Condamine on the Indians' use of *Hevea brasiliensis* to make rubber products is a rare example.

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The end of the eighteenth century brought in the era of the naturalists who in the course of their explorations gathered samples of plant and animal life, minerals, and the physical culture of the indigenous peoples. The first botanical specimens from the Amazon were collected by Alexandre Rodrigues Ferreira, who traveled extensively in the region between 1783-1792. His collections are deposited in the herbaria in Lisbon (LISU), Kew (K), and Paris (P) (Fontes, 1966; Prance, 1971).

Some of these naturalist/explorers, such as Richard Spruce (who traveled in the region between 1849-1864) and Carl Martius (between 1817-1820), were botanists already well-known in Europe. Most of the botanical collections made during this period are deposited in European herbaria, although a number of duplicates are at the Museu Nacional in Rio de Janeiro (R) and others in the herbarium of the Museu Goeldi.

At the end of the nineteenth century, the Amazon region began to emerge from scientific obscurity with the creation of the Sociedade Filomática, which was the precursor to the Museu Goeldi. The botany department (Seção de Botânica) was organized by the Swiss botanist Jacques Huber. On July 30, 1895, the department founded the *Herbarium Amazonicum Musei Paraensis*. Huber collected the first herbarium specimen, a *Cleome aculeata* (Capparidaceae), on the grounds of the museum.

On July 31, 1895, one day after the founding of the *Herbarium Amazonicum*, the Commissioners of Public Parks of New York City appropriated 250 acres of Bronx Park and designated them as the grounds of The New York Botanical Garden (NY). The Botanical Garden had been incorporated on April 28, 1891, but the necessary endowment wasn't fully subscribed until 1895. From its founding, NY was associated with the Torrey Botanical Club and Columbia College (now Columbia University): Nathaniel Lord Britton, who was NY's first Director-in-Chief and who was the driving force behind its creation, was a former president of the Torrey Botanical Club and had organized and established the botany department at Columbia College. In 1898, these two organizations donated their historic herbaria, with a combined total of 500,000 specimens, to create the herbarium at NY (Britton, 1915). That same year, Britton carried out NY's first official expedition to the Neotropics (Merrill, 1938).

The first botanist from NY to collect in Brazilian Amazonia was Henry H. Rusby, professor and eventually dean of the Columbia College of Pharmacy, who in 1897 descended the Madeira and Amazon rivers from Bolivia to Belém. Rusby's famous voyage took place before NY was founded, but he was associated with NY from the beginning, first in 1898 as Honorary Director of the Economic Collections, and from 1901 a member of the Board of Scientific Directors. Rusby's collections were an indirect cause of the founding of NY: in 1888 Britton and his wife took the collections to Kew to identify them, and

Britton's wife suggested then that the Torrey Botanical Club should create something similar to Kew in New York City (Britton, 1915).

The second botanist from NY to work in Brazilian Amazonia was Boris A. Krukoff, who traveled widely and made extensive collections throughout the region in the 1930's.

In Brazil, the vast territory of the Amazon called for multiple efforts to understand its diverse flora. Only collaboration between foreign scientific institutions and the Museu Goeldi could provide the manpower and money necessary to mount expeditions to botanically unknown regions of Amazonia. Out of this necessity grew the first collaborations between The New York Botanical Garden (NY) and the Museu Paraense Emílio Goeldi (MG).

CONTACT WITH NEW YORK

The botanical collaboration between MG and NY, which began only in the 1950's, grew out of a meeting of Biota Amazônica in Rio de Janeiro, where Bassett Maguire, then head curator at NY, met Adolpho Ducke, the eminent Amazonian botanist. Maguire may have been pursuing an earlier contact with Ducke by William Steere, who had traveled to various parts of the Amazon region during World War II in search of cinchona, then the sole source of the anti-malarial drug quinine (H. Irwin, pers. comm.).

In 1955-1956, João Murça Pires spent nine months in the United States, five of them at NY, where he trained with Maguire. Pires, who had worked as an assistant to Ducke, was at that time a botanist at the Instituto Agronômico do Norte (now EMBRAPA-CPATU).

In 1959, Maguire made a long trip in Central and South America, entering Brazil from Bolivia. Pires met him at the border and accompanied him throughout Brazil, visiting the states of Mato Grosso, São Paulo, Rio de Janeiro, Minas Gerais, and Ceará. The principal botanical collections were made in Minas, on the Serra do Cipó and around Diamantina and Grão Mogol.

During these travels, Maguire met with Walter Egler, who became director of MG. Together with Pires, Maguire and Egler developed an informal agreement that committed their institutions to two years of collaborative expeditions to the principal river systems of Amapá, from their sources in the Serra do Tumucumaque to their mouths, as well as to the coastal wetlands and adjacent savannas. Financial support was obtained from the Conselho Nacional de Pesquisas (Brazil) and the National Science Foundation (U.S.A.). Logistical support was provided by the Brazilian air force, the commandant of the frontier military post in Clevelândia, and various private companies (e.g., ICOMI).

The field program began in 1960. That same year, Harold N. Moldenke was the first scientist from NY to publish in the *Boletim* of the Museu.

The first expedition, using four canoes with outboard motors, was conducted on the Rio Oiapoque and several of its tributaries, and included forays into French Guiana (e.g., the Rivièrre Camopi). From June 17-23, the participants were Pires, Maguire, and Maguire's wife Celia, and from July 24 to November 7, the botanists were Egler, Pires, and Howard S. Irwin (then a research associate at NY), as well as graduate student Lubbert Y. Th. Westra. Accompanied by eight soldier/boatmen from the frontier post in Clevelândia, the expedition ascended the Rio Oiapoque to a point approximately 10 km from the source, but its progress was hindered by heavy rains and many fallen trees. Despite these difficulties, the expedition was extremely productive, especially in that it extended the known distribution of numerous species of Amazonia and the Guianas. In less than four months, nearly 1,900 numbers were collected, in sets of ten whenever possible.

In order to increase productivity, the program continued into 1961, with two simultaneous expeditions. One group, composed of Pires, William A. Rodrigues (INPA) and the North American Gary C. Irvine, collected 1314 numbers on the Araguari and Amapari rivers between July 26 and October 10. The other party, which worked its way up Rio Jari, included Irwin, Egler, and the IAN field technicians Raimundo R. dos Santos, Temístocles N. Guedes, and Raimundo Souza, as well as North American graduate student Robert M. King for a short time. The work of this group on the Rio Jari was interrupted tragically on August 28 by the death of Walter Egler at the Macacoara waterfall. After the outboard motor on his canoe failed, Egler's companions abandoned it, but he stayed on board to try to start up the motor. He was killed when the canoe went over the 15 m waterfall. His body was interred nearby. Of the 790 numbers collected up to that point, the rest of the group was able to save 291. These were carefully restored at MG by Paulo B. Cavalcante at MG, who had given up his place on the expedition to Egler, at Egler's request.

The next year, 1962, Pires and Cavalcante carried out the third and last phase of the program, a six-week expedition by jeep to the coastal wetlands and adjacent savannas of Amapá that produced 640 numbers. Further expeditions were planned to the Serra do Cachimbo and to the Paru, Micuru, Trombetas, and other northern tributaries of the lower Amazon, but Egler's key role in the program is evident from the fact that shortly after his death this episode of collaboration between NY and MG came to a close.

Relations between the two institutions were strained by the shock of Walter Egler's death. Nonetheless, collaboration between NY, MG, and IAN continued in other forms, most notably the foundation of an important herbarium, when, in 1963, J. Murça Pires was asked to assist in organizing the Department of Botany of the Universidade Nacional de Brasília (UB). At that time, the city of Brasília was still under construction. Pires was accompanied by Maguire who, with Irwin, developed a working agreement between NY and UB.

In the mid-sixties, Amazonia began to emerge from its isolation from the rest of Brazil with the construction of the Belém-Brasília highway (BR-316). In 1964, Maguire and his wife, Pires, and Nilo T. da Silva, traveling in a pickup borrowed from UB and a truck from IAN, collected along the route Belém-Brasília-Goiânia-Barra do Garças-Cuiabá-Porto Velho-Guajará Mirim, returning via Brasília and Belém.

In 1965 the same team, together with Julian Steyermark of the Venezuela National Herbarium and Umbelino Brazão, mounted an expedition to the Serra da Neblina supported by the Brazilian frontier commission (Comissão Brasileira de Limites, whose director was General Bandeira Coêlho). The new family Saccifoliaceae was discovered on that expedition, and the type species of the family, *Saccifolia bandeirae*, was named in the General's honor.

The Museu Goeldi and The New York Botanical Garden renewed their official cooperative relations in the 1970's, when the Brazilian government created Programa Flora.

PROGRAMA FLORA AND PROJETO FLORA AMAZÔNICA

The idea of a national flora program arose in 1974, when Brazil's National Science Foundation (CNPq) called a meeting of Brazilian botanists to evaluate the conditions of botany in the country. The precarious condition of botany and herbaria that emerged inspired a basic plan for Programa Flora. The objective of this program was a basic inventory of the vegetation and of the flora of Brazil in the short term, with focus on the scientific, economic, and social potential of the species. Steps toward the objective were:

- 1) inventories of Brazilian and foreign herbaria in the form of easily accessible data banks on the flora in general as well on useful plants in particular;
- 2) a survey of bibliographic resources concerning the Brazilian flora in national and foreign libraries;
- 3) establishment or promotion of centers of botanical research in Brazil and advanced training for Brazilians in plant taxonomy; and
- 4) botanical expeditions areas either poorly known or threatened with environmental destruction (Prance et al., 1984; Nogueira, 1987).

The program was implemented in 1975 under the coordination of Alcides R. Teixeira, of the Instituto de Botânica in São Paulo. Within the year, the guides, the codified dictionaries, and the format for the data cards were developed for the data banks. Programa Flora effectively began in 1976 with the creation of Projeto Flora Amazônica. The Flora Centro-Oeste (central west) and Nordeste (northeast) projects began later, in 1978 and 1981, respectively.

The foreign assistance and participation in Programa Flora was supported initially by the National Academy of Sciences (NAS), which in 1976 sponsored a meeting in Brasília between Brazilian and North American botanists. The agreement of scientific cooperation that was developed on that occasion was designed to facilitate the execution of the botanical expeditions, the transfer of computer technology, and visits by Brazilian scientists and students to NY and other North American institutions and universities to pursue traineeships and graduate degrees in botany. With the help of a grant from the Rockefeller Foundation, after an orientation in the U.S. for two Brazilians the data-basing system was planned and implemented in Brasília. The botanical expeditions and training activities were supported by CNPq and principally by the U.S. National Science Foundation (NSF), and eventually the direct foreign participation in Program Flora was organized directly by between NSF and the botanical community in the U.S.

Projeto Flora Amazônica (PFA) was headquartered at two Brazilian institutions. In 1976, activities began at INPA and the Museu Goeldi - the Western Amazonia and Eastern Amazonia bases, respectively. A third base in the state of Maranhão was planned for 1980, but was not implemented.

Once the herbarium survey was established, botanical field studies began in some of the innumerable botanically unknown regions of Amazonia. Between October and December of 1977, botanists from MG and NY mounted the first Projeto Flora Amazônica expedition to several locations in the state of Pará: the Trans-Amazon highway (BR-230), Tucuruí, the Serra do Cachimbo, and the Santarém-Cuiabá highway (BR-163). The expedition botanists, consisting of A.S.L. da Silva (MG), G.T. Prance (NY), M.J. Balick (then at GH), and C.C. Berg (U), collected 1921 numbers. Concurrently, another expedition left INPA in Manaus and proceeded north toward the Venezuelan border along the Manaus-Caracará highway in Amazonas state and the Territory of Roraima.

During the following ten years, a number of other PFA expeditions used MG as a base, with the participation of these same botanists and W.R. Buck, D.G. Campbell, D.C. Daly, S.A. Mori, and G.J. Samuels from NY and R.S. Secco, M.F.F. da Silva, J.U.M. dos Santos, A.B. Anderson, M.G. da Silva, N.A. Rosa and C.S. Rosário from MG. In total, more than 60 foreign botanists and more than 40 botanists from all of Brazil participated in PFA expeditions.

This ten-year collaboration between MG and NY, along with INPA, the Museu Costa Lima in Amapá, and several other regional institutions produced thousands of plant specimens, dozens of scientific publications, and traineeships for Brazilians in New York and for Americans in general. From 1977-1987, PFA produced 43,000 numbered sets of phanerogams, 6,000 of bryophytes, and 1,300 of fungi and lichens. Approximately 81 species new to science were described from the 24,411 total numbers collected through 1981 (Campbell, 1989).

Prominent among the results of PFA are the numerous scientific publications that have contributed enormously to the current knowledge of the Amazonian flora. Only a small portion of these were published in the two special supplements to *Acta Amazonica* (1984, 1985).

The arduous work that went into the organization and execution of PFA made possible the solution of innumerable taxonomic problems and built up a more adequate foundation for studies of Amazonian biogeography and for conservation policy in the region.

CONCLUSIONS

The years of collaboration between The New York Botanical Garden and the Museu Paraense Emílio Goeldi have not only generated significant advances in the study of Amazonian plants but also consolidated the ties between these two centennial institutions and created a link of friendship among between their staffs that without a doubt will persist into the next millenium.

This special issue of the *Boletim*, which commemorates 30 years of collaboration between MG and NY, further commemorates the 125th year of the Museu Goeldi and the centennial of The New York Botanical Garden. Botanists from both institutions have expressed their satisfaction in being able to contribute to a celebration of this historic/scientific milestone in their relationship, and anticipate continuation and intensification of their concerted efforts for the growth of science in Amazonia.

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