

# THE NEW YORK BOTANICAL GARDEN

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October 31, 1972

Dr. Donovan Correll  
Program Director  
Systematic Biology  
National Science Foundation  
Room 332  
Washington, D. C.

Dear Dr. Correll:

This letter and enclosures will serve as a final report for the New York Botanical Garden Plant Exploration Program "A Plant Survey of the Planalto do Brasil," supported by National Science Foundation Grants GB-6458x (June 1, 1967 - May 30, 1969), GB-6458x1 (June 1, 1969 - May 30, 1970), and GB-6458x2 (September 30, 1970 - September 30, 1971, extended without funds to March 31, 1972).

The research project was initially funded by the Foundation as GB-2293 in 1964 for one year and as GB-2293-1 in 1965 for two further years. Thus the overall program has continued for approximately eight years with a total NSF investment of \$157,200.

Throughout the term of the program the basic purposes have been:

- (1) to develop a basic inventory of the plant species of the Planalto;
- (2) to develop a more satisfactory basis for floristic treatments in the area;
- (3) to provide data for correlative studies of the botanical relationships between the Planalto and the Guayana Highland;
- (4) to collect and prepare large sets of carefully selected, fully documented specimens for deposit in world centers of research on neotropical plants;
- (5) to provide unique, highly valuable field opportunities for collaborating botanists and promising graduate students of tropical plant systematics;
- (6) to strengthen cultural ties with Brazil's vigorous academic community.

The history of botanical exploration in the Planalto has mainly been one of activity by itinerants. From the beginning of

the 19th Century until World War I, the area was studied by a succession of European botanists, many of them physicians, whose collections were made in large part along or near established trade and transport routes, from the coast to the relatively few towns in the sparsely settled interior. The advent of the motor vehicle did not attain significant impact on the area until after World War II, whereupon some Brazilian botanists began the study of some localized areas, but hardly ever within a systematic plan.

The principal investigator first visited the region in 1955 in connection with some research on Cassia. An extended jeep excursion through Minas Gerais, Goiás, and Mato Grosso in 1958-59 showed that roads and services would support a well planned field program and that the diversity of habitats over an extensive area would require a long-term program of activity. Such a plan was conceived in due course, both to serve the principle investigator's basic research goals, a monograph of the genus Cassia, and the collection, preparation, and distribution of specimens of the flora as a whole.

Some urgency was lent to the implementation of the plan by the establishment of the new federal capital of Brasília in 1961, for its foundation and subsequent growth quickly led to a great increase in human populations in much of the Planalto and to the destruction of vast areas of the predominant natural vegetation forms, cerrado and gallery forest. This urgency was intensified after the governmental crisis of 1964, for the subsequent succession of governments has brought redoubled efforts toward industrialization, with the concomitant intensification in mining and clear-cutting of woodland to supply the ores and fuels for this new industry. The urgency for plant surveys has now reached crisis proportions in some parts of the Planalto, especially in much of the mineral- and forest-rich state of Minas Gerais and around several metropolitan areas elsewhere. In general, the collecting activity under the program has been dictated by the occurrence of the some 400 Cassia species endemic in the area, which, as might be expected, have proved reasonable reliable indices of rare and little known species in all phanerogamic and many cryptogamic groups.

Beside the principal investigator, some 13 botanists, mainly taxonomists, have participated in the field work, of whom 9 were from the United States. Nearly all professional participants had pre-existing monographic interests in genera or families occurring in the Planalto, and all contributed to the overall field effort. Throughout the period, the field parties were served by three carefully trained Brazilian field hands, two of whom began with the initiation of the program in 1964. The two vehicles purchased with grant funds, jeep wagon in 1964 and a small school bus in 1965, have

served as rolling stock throughout, thanks in large parts to the consistent maintenance and much gratis repair by the Universidade de Brasília. Over 200,000 km have been covered by the former vehicle, about 50,000 km by the latter. A total of 94 collection stations have been registered, about three quarters of them outside the federal district and all of those consisting of camp sites set up in remote areas. Our records show that a total of 32,197 collections were made, averaging seven duplicates per number for a grand total of 225,379 specimens. The first set has been deposited in the herbarium of the Universidade de Brasília; the second in the herbarium of the New York Botanical Garden. About two thirds of the collections have been determined and distributed. Much of what remains belongs to families or genera for which no specialists are known at this time.

Studies of specimen material collected with the support of GB-6458x.1.2 have revealed one and possibly a second new genus and approximately 100 new species, of which nearly half have been published. Equally important are scores of topotypes, many of them of species previously known only by specimens destroyed in Berlin. In addition, hundreds of second and third collections have been made of species known only by fragmentary or indifferently prepared, or badly preserved, or scantily distributed specimens. Finally, the vast majority of collected materials of previously known species document range extensions: southward from Amazonia, especially in the gallery forests; westward from the coastal forests, especially in eastern Minas Gerais; eastward and northward from the cerrados of São Paulo and the heavily settled South.

My own research has lagged because of heavy administrative responsibilities, which have now impinged to the point that it is no longer feasible for me to continue serving as titular head of even the field aspects of the program. Studies on the very large, complex, almost exclusively Brazilian section Absus of Cassia have reached a stage from which completion is largely a matter of drawing up descriptions for publication. At least 12 new species will be added in this treatment. I hope to finish this paper within two years, possibly in collaboration with Dr. Mary Arroyo. At the present time I am also collaborating with Dr. David Gianassi on a chemosystematic study of the sectional relationships in Cassia, based on considerable part on materials collected in the Planalto. Dr. Arroyo and I have begun a series of reports in which we describe new species of Harpalyce and, in turn, Andira. Dr. John Grear, when a graduate student at Columbia, completed his doctoral study with a revision of the American species of Eriosema, a genus heavily represented in the Planalto; grant funds supported this study. Mr. Joseph Kirkbride, a doctoral student at C.U.N.Y., is presently preparing a monograph of the rubiaceous genus Declieuxia, also

also greatly diversified in the Planalto; this work has been supported in part with grant funds as well as with NSF dissertation grant GB-31978.

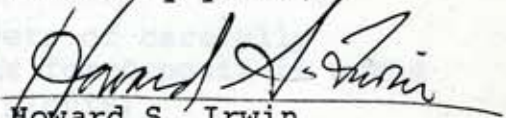
Much other research has been promoted by the materials collected and distributed subsequent to field work. During the eight-year course of the program approximately 100 taxonomic collaborators have been involved in the study and determination of collected specimens; for the great majority of them this material has expanded research horizons and facilitated a large number of papers, far too many to list here. Not all of this spin-off value has been limited to research in systematic botany. For example, Drs. Trevor McMorris and Marjorie Anchel at the New York Botanical Garden have initiated a series of studies on the antibiotic activity of certain compounds found in Cassia species, based almost entirely on material collected in the Planalto. Wood collections have been made for comparative studies at Syracuse and Madison. Collections of propagules and living material have been shipped to New York, Kew, and other centers with large conservatory collections of tropical plants.

The one basic goal which has thus far received little attention is the third, relating to floristic ties between the Planalto and the Guayana Highlands. In a general sense, my observations, together with those of Bassett Maguire, suggest that there is very little relationship among extant plants at the species level. Certain families are well developed in both regions but neither between nor elsewhere in tropical America (e.g. Velloziaceae); the same applies to a lesser degree to a number of genera. Some families and numerous genera are absent from one region or the other. But the situations that have led to so much taxonomic interest in the Planalto are the high degree of narrow endemism in the moderately high sandstone mountains in the east-central portion of the region (Serra do Espinhaço, Chapada dos Veadeiros, Serra dos Pireneus) and the regional endemism over the vast areas of cerrado vegetation where aluminum-ion concentration is at such high levels as to be toxic to most exotic plants and conversely to limit Planalto species to that region. This latter phenomenon helps to explain why so very few of the superbly ornamental plants of the region have found their way into the ornamental trade, the efforts of such horticultural leaders as Burle-Marx notwithstanding. It also helps explain why any determined improvement of the vast areas of agriculturally impoverished soils will depend in part on the discovery and employment of native legume forage, a line of agronomic research underway at such centers as Goiânia, Viçosa, and Matão in which plantings from some of our seed collections are being subjected to field trial.

I have gone on at some length to stress directly and by implication the great importance of continued botanical work in the Planalto. There is only one major university located within the region and that is the Universidade de Brasília, without the collaboration of which this program could not have proceeded. Because of progressively tightened regulations governing the activities in Brazil of expatriot scientists, any future work will depend even more on the collaboration and sponsorship of the University. Considerable effort has been expended in behalf of the program to develop and cultivate a good working relationship between the University and the Garden; this effort has been very successful, to the extent that equipment and vehicles are reliably maintained, personnel made available as needed, governmental regulations satisfied, and numerous other time-consuming and therefore costly details often peripheral to the program are absorbed or obviated without cost. In view of the real and heightening likelihood that Brazilian scientific manpower and resources will not be equal to the challenge, and also in view of the increasingly expressed need for intensified sampling of existing biotas to proceed while there is still time, not only to provide specimens for future systematic studies but also to contribute generic material to germ plasm banks, it is hoped that this program will not be allowed to lapse simply because of the preoccupation of the present principal investigator with other responsibilities. A new program for furtherance and expansion of the work in the Planalto reported about, based in part on the foundations laid by this program, lies before the Foundation. We hope that affirmative action will be taken to support this new program while the foundations are still firm.

In closing, the New York Botanical Garden is deeply grateful for the generous support of the Foundation during the course of the program, one that has served positive and creative ends at several levels.

Sincerely yours,



Howard S. Irwin  
Executive Vice President

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Encls.

cc: Dr. Walter Hodge  
Dr. William C. Steere

cc: Dr. Mary Arroyo