

SECOND EXPEDITION TO NICARAGUA, 1969-1970

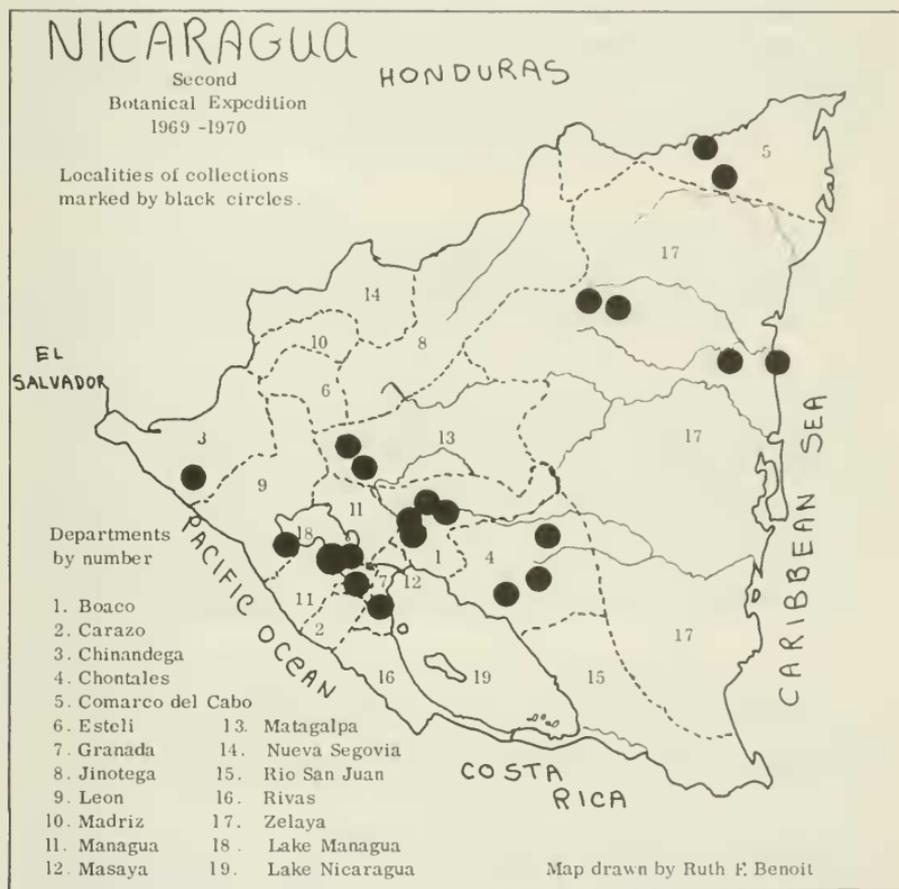
Frank C. Seymour

That the flora of Nicaragua is rich in variety is one of the features which attracts botanists to return again and again. A large factor in providing such variety may be the extremes of rainfall. At one extreme the rainfall is reported by B. W. Taylor as zero during the month of February in Managua. At the other extreme is San Juan del Norte, on the east coast at the mouth of Rio San Juan, where the joking remark is that it rains all the time. There 823 mm of rain are reported during July.

Differences of soil must account for some of the variety in flora. Clay appears to be the most widely distributed soil, but volcanic ash and even volcanic clinkers are conspicuous types, while large tracts of land such as those at Waspan and between Siuna and Limbaikan are characterized by sand. B. W. Taylor has estimated that the number of species mounts up to 10,000 although the area of the whole country is smaller than New England, which, with a notably varied flora, supports only about 2900 species, about .043 per square mile. Nicaragua, with its 57,915 square miles and 10,000 species, accordingly can boast of .172 species per square mile. This is in spite of the fact that 3,475 square miles of its area are covered by water. Thus if the estimate is not too high, Nicaragua luxuriates in about four times as many species per square mile than New England.

The personnel of this second expedition consists of only three men, all of whom participated in the first expedition. The three are: (1) Frank C. Seymour, the writer of this article, then associate curator of the Pringle Herbarium of the University of Vermont; (2) John T. Atwood, Jr., then a graduate student in the University of Vermont, majoring in botany; (3) Eduardo Narvaez S., then a student in the Escuela Nacional de Agricultura y Ganaderia in Managua. Members of the first expedition who were unable to return were deterred mostly for financial reasons. We have been unable to find a foundation which could make us any grant, with the result that each member of our party had to pay his own expenses.

Acknowledgements. For identifications, we are indebted to Dr. Henry K. Svenson for Cyperaceae; to Mr. John T. Atwood for Orchidaceae; to Dr. Lyman B. Smith and Mr. Atwood for Bromeliaceae;



to Dr. Harold N. Moldenke for Verbenaceae; to Dr. R. M. Tryon for some Pteridophyta; to Dr. Bernice G. Schubert for Desmodium.

The dates of the second expedition, Dec. 15, 1969 to Jan. 29, 1970 were only two weeks later in the season than the first, chosen largely because it was the time of college vacations when students could come.

On December 15, 1969, Seymour left Burlington, Vermont, by airplane, arriving in Managua the next day. For five days he collected alone, until, on December 20, Atwood joined him in a trip to Teustepe. By December 23, Narvaez joined us. On the trip to Sebaco, Placido Mejia B., a student in the same Escuela Nacional, collected with the other three.

We wish to express our appreciation again to Dr. Gustavo Jarquin B., then director of the Escuela Nacional de Agricultura y Ganaderia and his staff for their generous hospitality in welcoming us to their dormitory and making available to us the facilities of their botanical laboratory.

A day-by-day record of our collections follows. At the end of a day's record are given the collection numbers of each person.

Dec. 15. Managua, Route 1, in the region of the Escuela Nacional de Agricultura y Ganaderia. This is a remarkable area for its rich black soil and abundant water supply under ground. On this, the first day of arrival, only a few roadside weeds were taken. Seymour 2333-2340.

Dec. 16. Tipitapa, Route 1, just a few kilometers east of the Escuela and with the same type of habitat, including a shallow muddy pond, a cotton field and a swampy meadow. Eichornia azurea (Sw.) Kunth and Tithonia rotundifolia (Miller) Blake were flourishing. Seymour 2341-2347

Dec. 16. Potrerillos, Dept. Boaco, Route 7. A fault line extending approximately from the Gulf of Fonseca in the northwest to San Juan del Norte in the southeast, runs about 20 km east of Tipitapa. East of this fall line, one enters a region of very dry infertile soil where lies the tiny village of Potrerillos. Altho it is in the Dept. of Boaco, the soil and vegetation are extraordinarily different from the rain-forests and lush growth of the eastern part of Dept. Boaco. Collections in Potrerillos were made along the roadside and in a stony field. Characteristic species were Amaranthus scariosus Bth. and Jacquinia pungens Gray. Seymour 2348-2371.

Dec. 17. No collecting.

Dec. 18. Managua, near the above-named Escuela, which will be referred to in the following pages simply as the Escuela. Seymour 2372-2376.

Dec. 18. Nagarote, Dept. Leon, on the unnumbered route. Altho this locality was chosen because it was near to Lake Managua (not more than 3 km from the western shore), the soil was parched and dry, consisting of fine volcanic ash. Unlike the region of the Escuela and Tipitapa, here the streams were low and dried up. Altho in the "Area Code", it is designated as "Seasonal Tropical Forest", little forest of any kind was observed. Antigonon leptopus Hk. & Arn. and Tecoma stans (L.) HBK. were conspicuous. Seymour 2377-2392.

Dec. 19. No collecting.

Dec. 20. Teustepe, only 10 km east of Potrerillos on Route 7, also in the Dept. Boaco. Atwood having arrived, Seymour and Atwood, collected at first on the south side of the road, where in spite of scrubby growth, nevertheless the soil was dry and brooks dried up. On crossing to the north side of the highway, we forded the Malacatoya River. Here were far more interesting species including Hymenachne amplexicaulis (Rudge) Nees, Salix chilensis Molina and Muntingia Calabura L. The river here is a wide shallow stream with an abundance of water bubbling over the many loose stones. Atwood 2392-2422. Seymour 2423 - 2457. Unintentionally numbers 2413-2422 were used twice.

Dec. 21. Managua, casual collections near the Escuela. Seymour 2458-2462.

Dec. 22. Near the Escuela, Atwood 2463, Mangifera indica L.

Dec. 23. Sebaco, Dept. Matagalpa, Route 1. At this point, Rio Grande is a small stream but with an abundance of water gliding over a sandy bed. High above its present level, it had left debris in trees and shrubs to show what it could do in the rainy season. Dividing into pairs, Narvaez and Seymour explored downstream, Atwood and Mena upstream. Most of the vegetation was familiar, but Cyperus canus Presl in good fruit was unusual. Atwood 2464-2496. Mena 2497-2521. Narvaez 2522-2529. Seymour 2530-2548.

Dec. 24. Casual collections near the Escuela. Atwood 2549 - 2553. Seymour 2554-2555.

Dec. 25. Calabazas, Dept. Matagalpa, Route 1, 80 km north, a short distance south of Ciudad Dario. Having no apparent means of celebrating Christmas, keeping busy collecting was the best antidote for homesickness. For the first time we met a crowd of men, naturally

not at work on this holiday. Habitats were, as usual, parched. A tiny pond, mostly dried up, still retained some soft black muck. Exposed clay mud had been baked hard.

Seymour having dropped his knapsack onto a low clump of bushes thought nothing of it until a group of men began showing an extraordinary interest in it. They flourished their machettes and pulled out a snake ! It was a harmless species. This was one of the few times when we saw any snake, dead or alive. Atwood 2556-2573. Seymour 2574-2603.

Dec. 26. Managua, Route 1. The Escuela being not far from the shore of Lake Managua at its southern end, Seymour, Atwood, and Narvaez attempted to hike across country to the shore. After an interminable walk in the broiling sun, still no lake was in sight, so we gave up the lake and collected a few numbers along lanes and in scrubby growth. Climbing a tree we brought down a species of Phoradendron. Nothing appeared more notable than Cyperus panamensis (Clarke) Britton and Fuirena umbellata Rottb. Atwood 2604-2614. Seymour 2622-2629, 2594. Narvaez 2615-2621.

Dec. 27. El Viejo, Dept. Chinandega. For our first sampling of the flora of this department, we collected along a brook near where it empties into the Atoya River. The vegetation proved to be very similar to what we had found all along the dry strip of land a few kilometers east of the Pacific Ocean. Legumes were abundant, among them Desmodium triflorum (L.) DC. and D. procumbens (Miller) Hitchc. We are indebted to Dr. Bernice G. Schubert of the Harvard Herbaria for identifying the specimens of this genus. Atwood 2630-2646. Narvaez 2647-2656. Seymour 2657-2678.

Dec. 28. No collecting.

Dec. 29. The breakdown of buses is not always opportune, but it was this time. In all our travels this is the only time when our bus broke down. As we entered Dept. Chontales along Route 7, where it crosses Cano Gordo, at 150-151 km, our bus came to an unexpected stop. To improve each shining hour, we nearly filled two field presses here while we waited. Hyptis pectinata Poit. and Borreria suaveolens Mey. were growing near the river. Narvaez, better than collecting, helped to persuade the bus to roll again. Atwood 2679-2685. Seymour 2686-2703.

Nicaragua has a very efficient system of locating places along the highway. At intervals of 1 kilometer, posts give the number of kilometers distant from the capital, Managua. What could be more efficient to aid botanists in locating their collections? When near a highway, we used this means of identifying our locality.

A further advantage of the breakdown was that when we arrived in Santo Tomas, Dept. Chontales, in rain-forest, not only had we already made collections, but also we were rested again and ready to start anew. The score for the day in terms of the number of specimens collected became: Atwood 159; Narvaez 124 (a small score because of working on the bus); Seymour 216. Grand total 489.

In Santo Tomas, we sampled a variety of habitats from a low wet spot to an open hillside and a luxuriant thicket. Panicum stoloniferum Poiret was clambering, vine-like, over other vegetation, such as Eleocharis retroflexa (Poiret) Urban. A small scrawny tree yielded Catopsis Berteroana (Schultes f.) Mez and several orchids including Scaphyglottis cuneata Schl. We are indebted to Dr. Henry K. Svenson for identifying our Cyperaceae and to John T. Atwood for identifying our Orchidaceae and many Bromeliaceae; to Dr. Lyman B. Smith for identifying many of our Bromeliaceae. Atwood 2704-2738. Narvaez 2739-2750. Seymour 2751-2804.

Dec. 30. No collecting.

Dec. 31. The region of the Escuela, although much cultivated, yielded a surprising variety. When time was lacking to go farther afield, we took a closer look at some promising spot nearby. So, on this date Seymour and Atwood hiked to a Heliconia swamp over the line in Tipitapa. Sagittaria lancifolia L. was growing luxuriantly as well as Heliconia latispatha Bth. Atwood 2805-2825. Seymour 2826-2847.

Jan. 1, 1970. Near the Escuela again, Seymour 2848, Panicum maximum Jacq.

Jan. 2. By airplane, we descended upon Siuna, a mining community in the northern part of Dept. Zelaya. With not even a breathing time, we boarded a truck and reached Limbaikan (Limbaika) on the Prinzapolka River toward the end of the afternoon. While waiting for a boat to take us down the river, Atwood grabbed some epiphytes and hid them in the crotch of a tree where he found them in fine condition a few days later, on our return trip. To while away the time on the boat, from 6 p. m. until nearly 3 a. m., we studied the stars. On arriving in Puerto Isabel on the coast at the mouth of the river, we fell in bed, too exhausted even to undress. At Limbaikan, Atwood 2849-2853.

Jan. 3. Puerto Isabel, on the Caribbean Coast at the mouth of the Prinzapolka River. Collecting within a few feet of the sea proved very profitable. The land was all very low, and so far as we could see, level. There appeared to be no forest, only scrubby growth and grassland, obviously pastured. Atwood picked up Rhynchospora nitida (Torr.) Wood var. hispaniolica Kukenthal, new to Central America. He and Narvaez

both brought Kyllinga peruviana Rottb. , a strikingly characteristic sedge. Seymour added a second sedge new to Nicaragua, Eleocharis Sellowiana Kunth. The large number of Cyperaceae in this locality was very remarkable. Atwood 2854-2881. Narvaez 2882-2893. Seymour 2894-2935.

Jan. 4. Puerto Isabel, again. The second day at this same locality yielded Cephaelis tomentosa (Aubl.) Vahl and Lipocarpa maculata (Mx.) Torr. , the latter not found elsewhere. Atwood 2936-2959. Narvaez 2960-2964 . Seymour 2965-2991.

Jan. 4. Leaving Puerto Isabel at six o'clock in the evening, we traveled all night by boat up the Prinzapolka River, and via Limbaikan returned to Siuna.

Jan. 5. Siuna. In spite of an almost sleepless night before, we picked up here some of the plants at which we could only gaze longingly two days before as we hurried on our way. This is the place where oranges and grapefruit were lying on the ground in abundance, with no one to pick them up, delicious as they were. We enjoyed the delightful hospitality of the La Luz Mining Co. Emilia sonchifolia (L.) DC. was especially common on a hill in this mountainous region. Eragrostis pusilla Hackel, apparently new to Central America, was so tiny that it took a long time to pick enough for a set. Atwood 2992-3003. Narvaez 3004. Seymour 3005-3021.

Jan. 6 was one of our big days. By the kindness of a member of the mining staff, Mr. Wilbur, we were taken to Mt. Liveco in Madregava. Tropical ferns such as Polypodium crassifolium L. , Vittaria minima (Bk.) Benedict, and Adiantum macrophyllum Sw. grew along the gentle trail thru the rain-forest. Olyra latifolia L. was an impressive wide-leaved grass. Numerous epiphytic orchids graced the branches of the trees. Prescottia stachyodes Lindley is one orchid which I think we did not find elsewhere. Hygrophila guianensis Nees at the edge of a small pool was new to us. We collected eagerly. Atwood 3022-3053; Narvaez 3054-3067; Seymour 3068-3106.

Jan. 6. Having put our morning's collections into press while in the field, as was our custom, we were able to take still more plants right near headquarters in the afternoon. The orchid-laden trees and bushes yielded numerous species such as Notylia bicolor Lindley. In a grassy ditch grew Coix lacrima-Jobi L. Atwood 3107-3140; Seymour 3141-3162.

Jan. 7. Siuna. Not to miss one minute of our time, we spent the forenoon hiking along a trail leading from one farm to another. Among plants not seen before were Oplismenus hirtellus (L.) Beauv. , a species of Smilax, and Clematis dioica L. Atwood 3163-3179. Narvaez

3180-3185. Seymour 3186-3209, 3284.

Jan. 7. Mt. Liveco, Madregava, again. So great was our success yesterday that our presses were soon so full that we had to pass by many choice plants which we wanted. So we returned to this rain-forest. Scleria latifolia Sw. var. arundinacea (Kunth) is typical of the locality. Several species of Hyptis were there, including H. pectinata Poit. and H. pulegioides Pohl. Perhaps the greatest excitement on this occasion was furnished not by plants. Running back down the trail, where Seymour was collecting, Atwood called, "We've found a snake! Do you want to see it?" Seymour hurried up the trail after him. By a tree festooned with epiphytes, we paused. "It's in there", breathed Atwood. A moment before, he had been exploring those epiphytes with his hand. With a long stick, he pointed and poked, while Narvaez poised with staff raised, ready to strike or run as occasion demanded, and Seymour stared at the epiphytes with popping eyes. Suddenly a tiny brown snake dropped to the ground! We could say that we had seen it; that was enough. It may have been a coral snake, the deadliest of all, but which has so small a mouth that it cannot bite a man except on his little finger or the lobe of his ear. We did not wait for positive identification. Atwood 3210-3239. Narvaez 3240-3247. Seymour 3248-3283, and later, on return to Siuna 3284.

Jan. 8. Siuna. In a few minutes snatched before the plane took off, Seymour 3285-3287.

Jan. 9 & 10. No collecting. Back in Managua, caring for recent collections.

Jan. 11. Lake Masaya, Dept. Masaya. Climbing Mombacho was the order of the day, but we could get no nearer than the city of Granada. Foiled in that attempt, the day was salvaged by revisiting Lake Masaya where we had botanized a year ago. The soil at lake level is composed of volcanic clinkers. Lava cliffs rise abruptly at water's edge, encircling most of the shore as we saw later from an airplane. To this lake came women to do their laundry. On leaving, they climbed the steep cliffs with huge bundles of laundry balanced on their heads. In the clinkers grew Tetramerium hispidum Nees. On the cliff was Bromus exaltatus Bernh. Wigandia caracasana HBK. thrive in the clinkers, a species characteristic of extremely dry soil. Atwood 3288-3300. Narvaez 3301-3303. Seymour 3304-3323.

Jan. 12. Managua, Escuela. Only Seymour 3324.

Jan. 13. Santo Domingo, Dept. Chontales, in a rain-forest on a mountain-side. Coccocypselum hispidulum Standley, new to us grew in abundance along the trail. Most orchids which we have encountered

were epiphytes, but here was Habenaria alata Hooker, a terrestrial species. Of three species of Hyptis, H. recurvata Poiret, had not been encountered before. Likewise there were two species of Scleria, S. pterota Presl var. melaleuca (C. & S.) Standley and S. secans (L.) Urban. To cite an example of the friendliness and hospitality of the people of this country, a friend of Narvaez, Sr. Gracias, received us into his home and made us his overnight guests with very delightful courtesy. Atwood 3325-3355. Narvaez 3356-3376. Seymour 3377-3422.

Jan. 14. No collecting.

Jan. 15. Tipitapa, Dept. Managua. Having but a little time left after retouching day before yesterday's specimens and putting them onto the drier, Atwood and Seymour, yet again, looked around nearby for anything which had been overlooked on previous occasions. An Amaryllis grew in a swamp, too few to enable us to get a set. Panicum molle Sw. was common. Atwood 3423-3431. Seymour 3432-3455.

Jan. 16. Boaco, Dept. Boaco. Along a city street grew a Lepidium. This genus has apparently not become well established, as it was not seen elsewhere (up to that date). Cruciferae, as a family, are scarce in Nicaragua in strong contrast to New England. Seymour 3456.

Jan. 16. Camoapa, Dept. Boaco. Changing buses at Boaco, we rode up hill and down dale again and again, instead of following a valley as roads usually do. As there were no bridges in this very sparsely inhabited region, we forded streams thirteen times by actual count. Altho it was evening when we arrived in Camoapa, we improved the remaining hour of daylight. The sun rises and sets in Nicaragua at about six o'clock the year around. With great courtesy, the proprietor of the hotel, our host, guided Seymour and Atwood to the most likely place for us to find flowers. All the land which we saw had been thoroughly grazed. To find specimens which had not already been partially "collected" by cattle was one of our most persistent problems. Most plants had had at least one branch bitten off. As cows are not giraffes, above a certain height, epiphytes still flourished, such as Catopsis nutans (Sw.) Griseb. and Brassavola nodosa (L.) Lindley, Epidendrum ionophlebium Rchb. and E. chinense (Lindley) Ames. Atwood 3457-3473. Seymour 3474-3505.

Jan. 17. Camoapa, Dept. Boaco. Next morning, rising at daylight to accomplish something before the one bus of the day for Managua left, we returned to about the same spot, but went a little farther. Again the best specimens were epiphytes undisturbed by cattle; they included Leochilus scriptus (Scheidw.) Rchb. f. and Jacquinella globosa Jacq. Cows do not climb cliffs, so above a tiny cliff were two fleshy species of Pe-

peromia, still unidentified. Atwood 3506-3521. Seymour 3522-3540.

Jan. 18. No collecting.

Jan 19. Waspan, Comarca del Cabo, one of the northernmost communities in Nicaragua, is separated from Honduras only by the C o c o River. Across the river, rice is extensively cultivated. A precipitous clay bank drops from the very level land of the town down to the river below, where it is bordered by very low meadows. Most of our collections along the river upstream from the town were very ordinary except Drosera capillaris Poiret which we found rarely. Salvinia in abundance was floating on a small pool. Dianthera comata L. grew in the swamp. Only Atwood and Seymour came to Waspan. Atwood 3541-3563. Seymour 3564-3595a.

Dr. Robert M. Hooker, a life-time resident of Bluefields informed us that this name should be spelled Waspan because in the early days gold-seekers washed their findings here in pans.

Jan. 20. Waspan, still. Within easy hiking distance was a new type of habitat which we had only glimpsed before, between Siuna and Limbikan. The pines here, Pinus caribaea Morelet, do not grow close together like some other species of pine, but are scattered. Later we were informed that if the land were not burned over frequently, they would grow close together. The ground was covered with standing water, drained a little by a tiny sluggish stream. Sedges were abundant, such as Eleocharis mitrata (Griseb.) Clarke, new to Central America. Rhynchospora flourished in four species, namely, R. rariflora (Mx.) Ell., new to Central America; R. hirsuta Vahl; R. globosa (HBK.) R. & S.; R. divergens Chapman, identification somewhat doubtful, but if correct, a species previously known in Central America only in British Honduras; also R. barbata (Vahl) Kunth, and R. setacea (Berg.) Bäckl. Burmannia sp., an Eriocaulon and a Xyris; two species of Utricularia; Hyptis lantanaefolia Poit. and H. conferta Pohl. There were other unusual species too numerous to mention. Atwood 3596-3649. Seymour 3650-3706.

Jan. 21. Cororia Bush, 35 km southwest of Waspan. This locality was sometimes misspelled on our labels; it is correct as given here. After a long ride by jeep, we reached a point where the jeep could go no farther and the vegetation made an abrupt change. The pine-savannas ended abruptly to be replaced westward by rain-forest. Here was a geological fault along which ran Kisalaya Creek. The rain-forest was dense. Far overhead, tree-tops basked in the sunlight but on the ground daylight was dim; shade was so deep that few plants could survive. Only along the borders of the forest was there much to collect. Scleria mitis Berg. had not been found before. Two species of Cephaelis, C.

glomerata D.Sm. and C. tomentosa (Aubl.) Vahl, grew not far apart. This spot yielded another Rhynchospora, R. rugosa (Vahl) Gale, and Dichronema Watsonii Britt. and D. radicans C. & S. and a scrap of Scleria bracteata Cav. In the time available we could nowhere near do justice to this extremely rich and productive area. Atwood 3707- 374 5. Seymour. 3746-3811.

Jan. 22. Waspan. Exhausted tho we were from the previous day, Atwood spurred himself to rise early in the morning and gather in a few more specimens before we had to board the plane to return to Managua. These were collected in pine-savannas near the town. Atwood 3812-3817.

Jan. 23. No collecting.

Jan. 24. Escuela. While waiting for a bus, Atwood found Asclepias sp. which we had not found elsewhere. It became more common later in the season. Atwood 3818.

Jan. 24. Boaco, Dept. Boaco. The good places which we drove past in Boaco a year ago without a chance to sample them lured us back on this date for what we feared would be our last trip this year. Climbing a mountain south of the city, we picked a few straggling specimens, at first meeting nothing but heavily grazed slopes. On our squeezing thru a barbed wire fence, everything was changed; we were in a rain-forest near the summit, where the land had not been grazed. Trees were loaded with orchids such as Epidendrum Schlechterianum Ames and E. masayensis. One of the memorable discoveries was a fragrant Adiantum, A. trapeziforme L. Cattleya Skinneri Bateman, Atwood recognized at sight from living flowering plants in his home in Vermont. Umbelliferae as a rule are scarce in areas where we collected, but here was a species of Eryngium. The most interesting species are as yet unidentified. A flock of monkeys were frolicking in the tree-tops far above. Narvaez did not come on this trip. Atwood 3819-3836. Seymour 3837-3879.

Jan. 25-26. By this time we were desparate to get our specimens tied up in bundles and packed for shipping back to Burlington. Therefore there was almost no collecting on these two days.

Jan. 25. Managua, the Escuela. Seymour 3896, Pennisetum ciliare (L.) Link.

Jan 26. Managua, the Escuela. Seymour 3897, Panicum hirticaule Presl.

Jan 27. Managua, the Escuela. Seymour 3898. Antheophora hermaprodita (L.) Kuntze.

Jan. 27. Mombacho, Dept. Granada. To the others, packing seemed well enough along to warrant one more trip, so Seymour continued packing while Atwood and Narvaez made a second attempt to climb this mountain, one of the highest extinct volcanic cones in the country, which we already knew to be rich in tropical vegetation. Reaching the mountain was not too difficult, but time was lacking to attain the summit. Orchids from this mountain included Oncidium Cebolleta (Jacq.) Sw. Ferns were plentiful, among them Polypodium plebejum C.&S. and P. dissimile L. For the return, no vehicle could be commandeered. With heavily loaded presses, the two men, already very tired, had to hike six miles to Granada and arrived at headquarters in the Escuela by bus too tired to speak. Atwood 3899-3924. Narvaez 3880-3895 and 3925-3927.

Jan. 28-29. Managua, the Escuela. Just to mark the fact that we were still in Nicaragua on these dates, Seymour 3929, Atwood 3930-3931, including Oncidium ensatum Lindley.

Nos. 3932-3945 have been assigned to orchids which flowered in Vermont after our return from Nicaragua.

Our first expedition, almost exactly one year earlier was spent largely in the thickly populated dry strip of land near the Pacific Ocean. Our special objective on this second expedition was to explore the eastern part of the country which was characterized by rain-forest. Except for short sallies to make use of odd bits of time when time did not permit us to go far, nearly all of the field work was in rain-forests. Nagarote was one of the few exceptions, selected because we had spent very little time a year ago in Dept. Leon. The other exception is the trip to Chinandega, undertaken because a year ago we did not botanize at all in Dept. Chinandega. Now we have explored to a slight extent every department in the country except Cabo de Gracias a Dios and have spent the largest proportion of our efforts in that most fascinating and largest department, Zelaya.

The Pringle Herbarium

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Reference: Taylor, B. W. An Outline of the Vegetation of Nicaragua. Journal of Ecology 51:27-54. 1963.