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by

Harley H. Bartlett and Rogers McVaugh

C O N T E N T S

(Continued Over)

ANN ARBOR, MICHIGAN

CONTENTS
(Continued)

A BOTANIST'S FULBRIGHT YEAR AT KEW

Robert O. Belcher

MY YEAR in England as a Fulbright scholar may be said to have begun appropriately enough at a tea in the rooms of the English-Speaking Union in New York the evening before the contingent for the British Isles sailed September 15th on the S. S. America. Over one hundred and fifty Fulbrighters in the tourist class gave the ship a distinctly collegiate atmosphere in which new friendships grew quite readily. Indeed, at least two such had matured into marriages before the return voyage. There was also ample time and opportunity to arrive at the conclusion that brains come in very strange and assorted packages, — students from Michigan always excepted, of course.

We docked at Southampton late Saturday, September 22, and were whisked by special boat train into London, where a three-day orientation program introduced us to some of the customs, including such unscheduled features as the shilling gas-meter and boiled herring for breakfast. It also did a little toward teaching us the language, although real proficiency in that began to develop only near the end of the year. In between events there was time for some of us to cast about for lodgings and to make contact with our institutional sponsors.

I had been entrusted to Dr. Leslie J. Audus, Hildreth Carlisle Professor of Botany in Bedford College for Women, an assignment made because my place of study, The Herbarium, Royal Botanical Gardens, Kew, had no official educational standing and academic sponsorship was required. Actually, my registration at the college for all three terms was completed in one pleasantly informal half-hour with Miss Nora MacNalty, the Registrar.

Professor Audus proved to be not only very kind but also extremely helpful. Both he and his wife hold doctorates in plant physiology from Cambridge. A Sunday evening tea at their home early in October gave Dick Scott and me our best explanation of the highly complex English school and university system, as well as some very interesting sidelights on the content of botanical courses and methods of teaching botany. Both Scott and I regretted to see so little of Bedford College in operation, for he was at the British Museum in South Kensington and I at the Kew Herbarium.

The day after landing I encountered my first cricket match while I was wandering through Regent's Park in search of the college, which is located there. Idle members of the team at bat explained the game to me, but the finer points have somehow escaped me. During the spring I occasionally stopped at Kew Green to watch the Saturday afternoon match being played on the "pitch" there. I never could quite fathom exactly what Dr. N. L. Bor (Assistant Director of the Gardens) meant when he called cricket, "baseball for grownups". Among other things, I couldn't quite get used to scores such as 185 to 0, with one team still awaiting its turn at bat.

On Monday afternoon Scott and I went down to the British Museum (Natural History), not the British Museum proper, in Bloomsbury. There I sought out Dr. George Taylor, Keeper of Botany, who gave me a warm welcome, tea, and a four of the Botany department, including the east wing attic where a fire bomb and subsequent smoke and water had done extensive damage. He also arranged for me to stop at a hotel just a block off of Kew Green. I got out to Kew considerably after lilac time. It isn't far from London, about eight miles west and slightly south of Charing Cross, just on the Surrey side of the Thames. There I called on Dr. W. T. Turrill, Keeper of the Herbarium and Library, who took me to morning tea in the staff room where I met staff members, among them Mr. A. A. Bullock, whom I had previously met in Burma. When he was serving as Botanist for the British Typhus Commission in Imphal he paid us a visit at the United States Typhus Commission above Myitkyina. He had some trouble in recognizing me, since I now lacked the eight-inch handlebar moustache with which I had previously been disguised. After tea Dr. Turrill showed me around the three wings of the Herbarium and the Library.

I was accorded an interview with Sir Edward Salisbury, Director of the Royal Botanic Gardens, and learned more of their history and operations. The Herbarium, with over six million specimens laid in, aims at having the broadest representation of species from the most extensive range possible, rather than an intensive coverage of any particular area. The living collection in the grounds and glass houses numbers over forty thousand species and varieties, and is maintained primarily for research. Public display is a rather minor aspect although most of the three hundred acres is open to the public, and some three to four million visitors pass through the turnstiles annually. Over a million come in May and early June, when the rhododendrons are at their best.

Since the packages containing my Typhus Commission collection had just been received and had yet to be fumigated before being passed into the Herbarium, I visited the South Bank Exhibition of the Festival of Britain, then in its last week. This proved to be very poor timing, for Wednesday is "early-closing" day, when almost all the shops give their employees the afternoon off. They had all come to the South Bank, so that I could see little of a very fine exhibition.

The first few days at Kew were relatively uneventful as I became familiar with the arrangement of the families in the herbarium and of the books in the extensive and rather diffuse library. I had the best cooperation from Mr. Marshall, the Librarian, and from his assistants. Indeed, every member of the Herbarium staff, from the Keeper to the mounters and the porters, was unfailingly helpful throughout my ten-month stay.

About the second week Mr. Noel Y. Sandwith, Senior Assistant for the Americas, returned from leave and resumed his quarters at the Priory Hotel, where I was. We had meals together, and thus entered upon a most helpful friendship. From it came such diversions as collecting trips along the Thames towpath in search of adventive weeds, a quest of intense interest to many of the British field botanists. Especially lovely was the rose and purple Indian Balsam, Impatiens glandulifera Royle, now quite common along streams.

As Mr. Sandwith's guest I attended meetings of the Linnean Society, and first saw the sanctum sanctorum of systematic botany, the Linnaean Herbarium, which I later had several occasions to use. (I also saw Linnaeus' collections of fishes and of insects, and his library.) The first autumn program of the Society was a slide lecture by Mr. Frank Kingdon-Ward, renowned for more than thirty years of plant hunting in the eastern Himalayas, whom I had heard much about while in Burma but had failed to meet. He spoke on a collecting trip into northeastern Assam and of his experiences in the catastrophic 1950 earthquake. He and Mrs. Ward were encamped at the time in an open field about a quarter of a mile from the calculated epicenter, and were cut off for six weeks by floods from the dammed-up streams. Then I had dinner at Veereswamy's, an excellent Indian restaurant just off Regent Street, with Mr. Sandwith, Mr. Alston (pteridophytist at the British Museum), and Dr. E. D. Merrill. Dr. Merrill, whom I met then for the first time, was working in Europe until December on a Guggenheim fellowship, mostly at the British Museum but frequently at Kew. He was also making trips to Brussels, where he had found a large and little known collection of Roxburgh types. I had several opportunities to visit with him, and found each time intensely interesting.

In mid-October the Botanical Society of the British Isles held its annual exhibition meeting in the British Museum. I attended as guest of Mr. Peter Taylor of the Africa section (Kew) and Mr. Airy-Shaw, then Senior Assistant for Asia. The membership of this society is largely amateur and is drawn from the whole of the country. I know of no comparable band of such enthusiasm and seriousness in these United States, but could wish for one most heartily. Many of the exhibits of specimens and photographs were truly outstanding. They ranged from a demonstration of the new hybrid London ragwort and its parents, which met and bred on bombed sites, to a collection of the most vivid orange, red, and green gentians from the Bolivian Andes. Two flora additions discovered the previous summer in the Scottish Highlands were also on exhibit and the center of much attention, the discovery of unrecorded species in such a thoroughly botanized country being an event of considerable rarity. Among others whom I met that afternoon were Canon Raven, an enthusiastic amateur and an officer of the Society; W. C. R. Watson, for thirty years a critical student of Rubus, which is to England what Crataegus has been to us and Rubus is becoming; and Dr. Warburg, head of the Botany Department at Oxford.

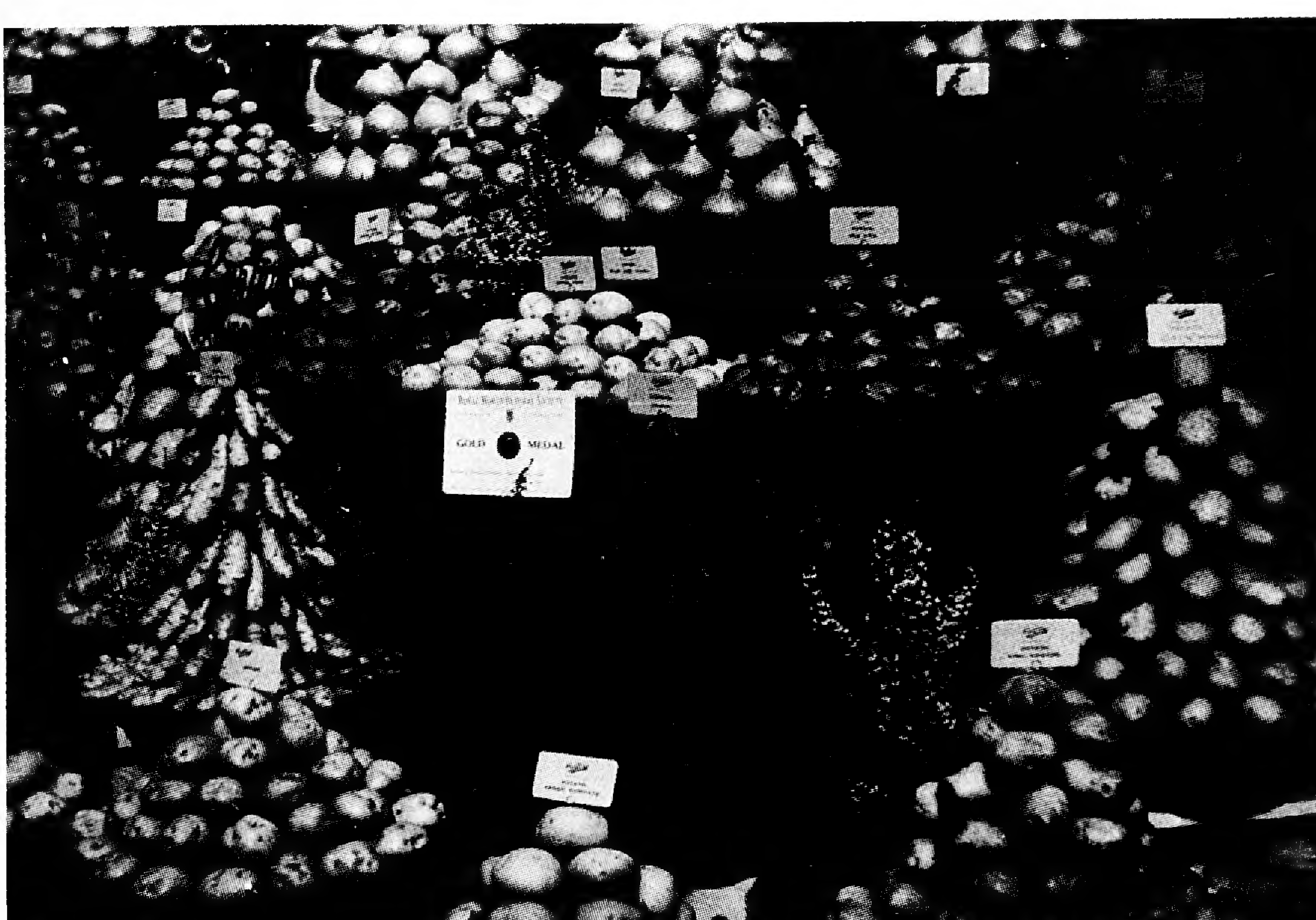
At Dr. Warburg's invitation I visited Oxford the following weekend on a tour sponsored by the British Council, an organization which promotes fellowship among foreign students. The newly completed Botany Building and the adjoining Imperial Forestry Institute are both handsome, excellently equipped, and thoroughly modern structures. In seeking the specimen upon which Linnaeus based Hibiscus Manihot I became the first visitor to consult the Dillenian Herbarium in its new quarters, and am "Abou ben Adhem" in the Visitors' Register. The specimen, however, is still missing, as it was at the time of the inventory by Druce and Vines.

October 30th I took an economic botany trip under British Council auspices, to London's East End to visit Charrington's Brewery. This netted several photographs of procedures which differ from ours. Their principal source of carbohydrate, for instance, is a crude sugar syrup, with only a little malted grain used, and that simply for flavor, since its enzymes are not needed. Before leaving we were allowed to sample freely from the kegs in the quality control lab, and in addition were given a high tea in the cafeteria.

During the fall term I attended early evening lectures at the London School of Tropical Medicine and Hygiene on the scientific basis of medicine. Outstanding was a masterly review of plant viruses by Bawden. Also I made the acquaintance of Bruce A. Stone, an "Aussie" who stayed at the Priory while studying mycological systematics in the Imperial Mycological Institute, just behind the Herbarium. He had been sent from Melbourne by the Australian government for two years of graduate work in preparation for a career of research on fungus-caused deterioration, particularly of fabrics. He was really a zymologist, but was put in the I.M.I. for eight months to learn how to identify attacking fungi. In December we celebrated his twenty-second birthday by attending a lecture on the uses of amylolytic and pectinolytic enzymes in British industry, before going on to dinner at a French restaurant in Soho. After the meeting I met Dr. W. W. Reid, outstanding zymologist and head of the research department of Carter of Coleford, makers of "Schloer liquid apples" and other fruit products. I was invited to visit them at Gloucestershire, but finally declined because the fall apples had already been processed.

By far the most important event in November was the decision to send for my family. After some searching I stumbled onto a five-room furnished flat on Kew Gardens Road, less than two blocks from the Cumberland Gate of the Gardens. It was less than a ten minute walk from the Herbarium, close to a good school for both the children, and handy to shops and transportation. The rental was high, but nothing else presented itself — one apartment house nearby had a six-year waiting list! — so I signed a lease and moved in to hold it until passport, transport, and above all financing could be arranged for Ruby, Harold, and Anna Belcher. They caught the only flight out of Willow Run in the teeth of the December 20th blizzard. They reached London airport the next afternoon, in good time for a far merrier Christmas than any we had expected when we parted in September for, we then thought, a long ten months.

In the fall I had attended the Fruit, Vegetable, and Flower Show of the Royal Horticultural Society. The exhibits were so interesting and attractive that I asked permission to photograph them. No such request had ever been made before, apparently, and I waited for quite some time while an agitated clerk scurried up through the echelons of authority to obtain an unprecedented approval, on condition that none of the pictures be used commercially. I took a number of black-and-



Detail from the Gold Medal Exhibit of potato and onion varieties by "Carter's", famous British seedsmen, at the Fall Fruit, Flower, and Vegetable Show of the Royal Horticultural Society, October, 1951.

Commercial exhibit of fruit varieties carried to full maturity in small tubs of peat moss kept watered with a "nutrient" solution. At extreme left, a dwarfed pear tree the trunk not shown. Left center, two miniature trees: rear, Cox's Orange Pippin, front, Norfolk Royal. Right center: Black Alicante Grape, a favorite dessert variety. Shown at the Fall Fruit, Flower, and Vegetable Show of the Royal Horticultural Society, October, 1951.

white shots of prize-winning displays of fruits and of vegetables, but lamented not having brought any color film for the flower display. It included many kinds of flowers, such as orchids exhibited by commercial growers, but the predominant flower was the dahlia, in every conceivable hue and modification.

The ardor of the British for gardening was well shown there, but even more so at the Chelsea Flower Show in May, which Mrs. Belcher and I attended through the kindness of Dr. George Taylor, one of the secretaries of the Royal Horticultural Society. It was held under acres of canvas on the grounds of the Royal Hospital at Chelsea, for the large halls of the Society were much too small. The passion for gardens and beauty was even better indicated by neat and lovely flower beds in almost every available space from the estates of the well-to-do to the window sills of the very poor, including almost every scrap of yard along the electric and steam railway lines that criss-cross outer London, and the space around the "hoardings" or billboards.

Early December brought the Fulbright students invitations from the Senate of the University of London to the conferring of honorary degrees upon Princess Elizabeth and the Duke of Edinburgh. The very deep feeling of the British for their royal family had strongly impressed me, and I had the liveliest interest in seeing the Princess. From what little information had been released about the king's condition it was already tacitly accepted that she might at any moment be called to the throne, as indeed she was less than two months later.

As academic regalia were in order, I found Norton's, which specializes in such things, and went in to rent an outfit. The cap and gown offered no difficulty, but the hood was another matter. Michigan's colors were nowhere available, and I wound up in what we concluded were those of Columbia, hoping that no one would be any the wiser. The man who outfitted me had made the robes for the royal couple, and had also robed the king on several occasions. He was very warm in his praise of father and daughter: "They are very warm and easy to be with, but shocking conscientious about their job," was the way he put it. He had made up the beautiful scarlet and blue robes from measurements and had then taken them for fitting. I was quite astonished at the shortness of the one for the Princess, who had always seemed much taller in her pictures.

I have kept my copy of the order of the proceedings, amazing for the complexities of its split-second timetable, which was rigidly followed. A feature of the ceremony that struck me as most commendable was that the address of honor devolved upon an officer of the University designated as The Public Orator, who indeed was fitted for the office and did nobly by it. The Princess, who received the degree of Doctor of Laws, having previously received a Bachelor of Music degree there, made a very simple but sincere reply. She acknowledged the presence of the Fulbright and Commonwealth scholars and various dignitaries, but addressed herself mainly to "her fellow students", of whom only a few scattered representatives could be squeezed in. I had hoped to see her at closer quarters at the reception which followed, but she met in a separate room with only a small group. Two Fulbrighters were presented to do the honors for the rest of us, and were photographed with the royal pair.

I did not see Her Highness again, for I did not brave the crowds at the time of the King's funeral, and at the Trooping of the Colours on the official birthday of the Sovereign in June I was too busy at Kew to try to get away on a week day. Of the obsequies for the late King I saw only a small part. Ruby and I were passing Hyde Park on the afternoon of the firing of a sixty-gun salute in his honor. We saw the maneuvering of the Royal Horse Artillery as the batteries were wheeled into position to fire those same silver-mounted field pieces which I had photographed in the Lord Mayor's Show in November. On the afternoon of the funeral I was at the Herbarium and joined with the staff as we observed the two minutes of silence, standing quietly together on the ground floor of wing A. The late king was a man to command the respect of everyone.

In November I got tired of the complexity of Hibiscus, having failed to establish the limits of Hibiscus tetraphyllus Roxb. For relaxation I turned to the Compositae, which bulked large in the Typhus Commission collection and encountered problems which made me look back regretfully to relatively simple Hibiscus. As it turned out, about the only specimens in my Compositae which had no cloud upon their taxonomic titles were two specimens of Bidens, thanks to Sherff's monographic treatment into which they fitted nicely, although not under the same names which were originally assigned them.

All this examination of old collections gave me a chance to become acquainted with one of the historic treasures of botany, the Hortus siccus Cliffortianus, or collection of dried plants corresponding to one of the chief "pre-Linnaean" works of Linnaeus himself, namely the Hortus Cliffortianus. This was the only really sumptuously published work of the immortal Swede. It appeared in 1737, and every description in it has to be taken into consideration in interpreting the basically important "Species Plantarum" of 1753. It is preserved as part of the British Museum (Natural History), whereas the Linnaean Herbarium proper is at the rooms of the Linnean Society. Much of the best work of Linnaeus is "pre-Linnaean" in the technical sense of not using binomials.

By early December I had disposed of several of the less puzzling species, and came to a number of sheets which had been determined as Erechtites hieracifolia (L.) Raf. ex DC. They agreed exactly with the majority of Asiatic sheets laid in at Kew under that name. But the type of this species is American in origin, and microscopic examination soon convinced me that the American material was distinct from my Burman and from most other Asiatic material. My specimens from Burma eventually proved to be Crassocephalum crepidioides (Benth.) S. Moore, originally described from West Tropical Africa. A check of all the Asiatic sheets determined at Kew as Erechtites hieracifolia showed that all but two or three were actually the Crassocephalum, and that the others were scarcely conspecific with American material of E. hieracifolia. Nor could I find any specimens of Erechtites from Africa. This cast doubt on the pan-tropical distribution of E. hieracifolia, maintained by Hoffman as well as by Merrill. I eventually went through the entire collection of Senecionideae (a dozen and a half or so of Kew's big cases) and all of Sonchus in quest of E. hieracifolia under other names, finally locating about a dozen sheets from the Orient, under almost as many names. Included were the types of two new species described as Gynura, which like the others proved to be identical with a pubescent Caribbean form of E. hieracifolia.

By now I was fairly hooked. I began to consider the other eighteen species of Erechtites in DeCandolle's Prodromus in an effort to pin down this more hairy tropical state of E. hieracifolia, for which several names had appeared on the labels. Thirteen of the Candollean species were Australasian, six were American. Several had been reduced to synonomy in the Index Kewensis. Additional species had subsequently been described, to a total of sixty or more, but no detailed consideration of the group had been undertaken since 1837. Before I knew it, I had invested two months of my precious time and had little but a state of confusion to show for it. To salvage that time and effort, I sank most of the rest of my stay in England in undertaking first of all an analysis of the Candollean species and eventually an accounting of all the published names. I am still struggling with some of them, but enough has been accomplished to suggest that the revision will have been worthwhile.

Since no fundamental solution could be reached until the Candollean types at Geneva had been examined and correlated with those of Hooker and Bentham at Kew and especially with those of A. Richard at Paris, I selected carefully a portfolio of some seventy-five sheets, representative of all the apparent taxa which I could recognize in Erechtites at Kew and including some paratype material. Dr. Turrill kindly approved lending these to me and I set forth for the Continent with them, all done up in a neat package.

Although it was time for the equinoctial gales, the Channel was glassy smooth, both going and returning, and I would have felt quite contemptuous of the Channel's bad reputation had I not crossed again under very different circumstances.

Between Dieppe and Gare St. Lazare the customs inspectors came through and I had to try my most inadequate and ill-remembered

French. They were curious about the contents of my package, so I declared: "Specimen botanique - sec!" That startled them so that they gave the rest of the compartment a hasty glance around and hurried out. That led me into conversation with a Cambridge man off for spring vacation to a tiny village south of Paris where he could live with a Russian couple to polish up his Russian conversation. He was already fluent in French, and I already had a reservation in a cheap hotel on the Left Bank, spang in the middle of the Student Quarter, so we teamed up.

The next morning he continued on his way south and I walked up the Left Bank to the Laboratoire de Phanérogamie in the Jardin des Plantes with my specimens and other gear. M. Leandri, the Assistant Director, welcomed me in the absence of M. Humbert, the Director. His English far excelled my meagre French, and he soon had me ensconced at a work table and furnished with all the material of Erechtites and of discoid Senecio from the general herbarium. I also had access to the Humboldt Herbarium and the Jussieu Herbarium for certain critical sheets. I had been told by several botanists, both American and English, that working facilities at Paris were very poor, that the specimens were not in order in the Herbarium, and that one was not allowed access to the collections but could only receive what was brought forth, so that thorough search for material was impossible. Every one of these assertions proved to be wrong. I had every opportunity to make the fullest search that my limited time permitted and was given every assistance and facility. M. Leandri hunted down equipment for me in the darkrooms of the Laboratoire de Cryptogamie, which occupies the north end of the huge building, so that I could photograph some thirty sheets that seemed especially important. These included all of Richard's types of erechtitoid Senecio.

I spent full days at the Herbarium and did my limited sightseeing by night. Sunday I went on to Geneva for four days at the Conservatoire Botanique. My letter inquiring if I could come had not been answered, so I was in some doubt as to my welcome, but needlessly so. I was promptly taken in. The Director, Dr. Charles Baehni, made me welcome, took me up to the top floor laboratory, and introduced me to Dr. Vautier and to Dr. Becherer. They made room for me, and showed me the arrangement of the general herbarium, and the location of the Senecionideae in the Prodromus Herbarium.

The Prodromus Herbarium, one of the most important botanical collections in the world, contains virtually all of the specimens cited by A. P. DeCandolle in his own parts of the Prodromus, collated by him in the final order, page by page and species by species, in which he treated them. It has been carefully maintained as originally arranged. It clarifies what DeCandolle understood of any group which he treated in his monumental work. After three months of trying to analyze his nineteen species of Erechtites from a distance and getting more and more confused, it was most helpful to see his actual material. With the added advantage of just having had a week with Richard's and other types at Paris, and with the help of my loan from Kew, I was able to clarify almost all of his species in the four days which I had in Geneva. I also found time to go over the general herbarium for other sheets of Erechtites and its allies. A Chodat and Hassler type seen here was of crucial importance in resolving finally a very interesting South American tangle of names which had developed in the last years of the 19th century.

A highlight of this visit was an afternoon spent with Dr. B. P. G. Hochreutiner, getting his opinion on my two most troublesome sheets of Hibiscus. His publications on and active interest in the Malvales span more than half a century, and he was kind enough to bring his accumulated experience to bear on my determinations and to confirm them. He was much interested in news of various American botanists whom he knew, and inquired particularly about Dr. Winona Welch, with whom he very much regretted having lost touch.

On Thursday afternoon I cleared away my specimens in preparation for the overnight trip back to Paris, and made my adieux. My family had been disappointed that I had not delayed my trip until the children's Easter vacation so that they could go with me. Thinking of that, I asked Dr. Baehni if he could suggest an inexpensive pension instead of the rather high-priced hotel where I had put up, just in case I could get back with the family at Easter. He wanted to know the dates of their vacation, and when he found that they coincided with his children's vacation, he urged me to use his apartment while he and his family went to their summer cottage! His offer was so spontaneous and sincere that I accepted on the spot, if we could possibly finance it. When I got back to Kew we considered the budget and our dwindling resources, found we could not possibly afford to go, but nevertheless wrote that we would arrive on the Wednesday before Easter for a week's stay!

To gain an extra day in Paris on my return trip, I had decided to go back by the night express and booked a couchette as being cheaper than the first-class wagons-lit. I didn't know quite what to expect, but found the couchette to be one of six padded shelves taking up a standard eight-place compartment, three shelves on either side, facing and opposing the engine. The shelves were not curtained, and my curiosity as to protocol was definitely aroused when the other occupants of the compartment began to arrive. We finally mustered in at two men, three women, and a child, indiscriminately scattered in the order in which the tickets were sold. I tried to find out the order of procedure from the car porter but again the language barrier intervened and I was reduced to going out into the corridor for a long cigarette while waiting to see what the others proposed to do about disrobing. Eventually I discovered that one simply got out of shoes and coat, wrapped up in the blanket, and stretched out!

This gave me two more days to review the Paris material in the light of the Candollean treatment, and to take my photographs. Part of this time was spent in exploring the riches of the collection of Schultz Bipontinus, said to number 50,000 specimens in Compositae alone, which has come to Paris with the Cosson Herbarium and which includes at least some specimens from Sprengel's Herbarium, named by Sprengel and annotated with page and species numbers corresponding to the Systema Vegetabilium, the last significant edition of the Linnaean classic. I returned to London to find Southern England digging out of the only real snowfall of the season.

When the whole family went to Geneva, we stayed only one day in Paris while I made one more quick check in the Herbarium and the others went sight-seeing.

In Geneva, we spent a leisurely and untouristy vacation in the most charming city we have ever seen, just enjoying its beauty and variety. The Baehni apartment, very nice by any standard, was simply heavenly after our drafty antique flat in Kew. With two parks less than a block away the children made full use of the flawlessly warm sunny weather while Ruby and I visited delightful little markets to which Dr. Baehni had guided me on the first afternoon before his complete disappearance into the country. As the spirit moved we wandered extensively over the old town, along the lake shore, and through the modern city along the banks of the Rhone. The Baehni apartment was only a block or so from the old market place where crossed major north-south and east-west trails in the time of Caesar, as described in his Commentaries. Many of the principal buildings around us dated back to the fourteenth century, and the bastions of the old city wall were just beside us.

On Easter Monday we took an all-day excursion in a bus with a roll-back top. We went up the full length of Lac Leman and into the Vaudoise Alps, getting up into the snow and some breath-takingly beautiful scenery, and seeing something of Swiss rural life. On Wednesday I took a hurried trip alone to Vevay to look up some distant cousins, and to Aigle to visit and photograph Le Cloître, the home from which great-grandfather Seilaz set forth for the New World in 1848. I found it a sadly run down apartment house, but had a nice visit there with an elderly watch-maker and his wife, friends of my cousins in Vevay. On Thursday, after failing to convey even a tenth part of our gratitude to the Baehnis we caught the night train back to Paris, in solitary possession of a full compartment of couchettes. With our funds all but gone we came straight on from Paris to London and so back to Kew for the final weeks of our stay.

The critical specimens which I had taken to the Continent were still awaiting re-fumigation when I got back from vacation, and the Erechtites problem had to stand still until they could be readmitted. So I took up other Typhus Commission Compositae again and got into fresh involvement. This time it was over the status of Erigeron linifolius Willd., which led to a consideration of the status of the genus Conyza, which proved to be even more chaotic than Erechtites. A month's work on this furnished a vast sheaf of notes, particularly on the conyzoid species of Africa, in which Kew and the British Museum were especially rich in types and isotypes. These are in process of being distilled into a paper which I hope will help to clarify matters or at least expose the main difficulties. All this served to confirm me in the suspicion that the so-called pan-tropical weeds, which have been considered by some to be so widespread and well understood that it is a botanical sin even to collect them, let alone study them, are much more likely to be among our most misunderstood and confused species.

During this time I received a sizable and very helpful loan from Vienna, plus the type of Sonchus agrestis Swartz from Stockholm, and began to try a final clarification of the Australasian and the American species of Erechthites (as the correct spelling should be). The problem got complicated by the discovery of what seems excellent evidence of extensive introgression among several of the species (?), especially in the Australasian material. I might add that I had by now become convinced that the Old World species were generically distinct from the New World ones, and were actually best to be regarded as a section of Senecio. As there are between three and four thousand published epithets in this genus, by no means all of which are to be found in the standard indices, the problem of finding meaningful unpreoccupied names is a staggering one.

Meanwhile, the gardens at Kew were in full bloom and ever tempting. I had brought an Argus 35 mm. camera from Michigan, intending to get as full a record as possible of Kew in color through the seasons. During the winter this project had been neglected because of bad weather. Photography within the houses was permitted only on Friday afternoons. Between New Year's Day and Easter there was exactly one sunny Friday afternoon, with only very brief bits of what the BBC newscaster likes to call "bright periods" on a few other Fridays. After Easter there were good days for photography almost every week. I did get some of the best of the spring and early summer flowerings, especially of the rhododendrons and of the Azalea Garden. During the year I got some four hundred color pictures, in England and on the Continent, a surprising number of which turned out to be fairly satisfactory.

In May and June, too, came opportunities to see some of the South of England as guests of Dr. C. W. Sparks on whose National Health Service panel we were. He and his wife usually spent his Thursdays and Sundays off in driving to the many spots of beauty and interest within fifty miles or so of Kew. Mrs. Belcher was taken on several of the week-day trips, including one to St. Albans, the Verulamium of the Romans, to see the remains of the Roman theatre. I was included on

Sunday drives, one of which took us to Stokes-Poges, Windsor Castle, and St. Martin's Church and Runnymeade; another included Rochester Cathedral and Castle, St. Martin's Church and Canterbury Cathedral. The camera went along, of course, as it did when we went with Dick and Doris Scott on a British Railways tour to Stratford-on-Avon during April.

In mid-December the Fulbrighters had been notified that if they expected to get home they had better make immediate reservations. I believe I was the first to reach the U. S. Lines office on Pall Mall. I asked for the new S. S. United States if possible, although at that time the day of her entry into service could not be set. It was a matter of luck that we found ourselves booked for the westbound maiden voyage, sailing 10 July from Southampton. As the date approached, we had to wind up our affairs in cyclonic fashion, — just sweep up everything together and dump it in. Some things are still not unscrambled. Among them, I fear, are the Compositae in Kew Herbarium, for the two or three hundred sheets which I kept out for study until the last possible moment, — seven p. m. on July 9th, did not get sorted out and put away. Mr. Sandwith most kindly offered to see to that and to the return of my loans from Stockholm and Vienna, for which I was most grateful, but also embarrassed to have to ask such a favor.

The passage home gave Ruby and the children their first view of the Atlantic, which had been entirely obscured by clouds on their trip over it in December. The ship rode beautifully even during the day we averaged better than thirty-six knots, the fastest run ever made by a ship in passenger service. But the speed of the ship combined with a head wind that reached thirty knots at times made life on deck almost unbearable, the more so because the weather was cloudy and chilly, although New York was having a record heat wave when we docked. In general, I think it would be more pleasant to cross in a vessel that was not winning the Atlantic Blue Ribbon on its maiden run.

We made Ambrose Light about five o'clock in the afternoon, although not due to berth before noon the next day. So we rode at anchor off Ellis Island overnight, then steamed on up to the pier early Tuesday morning to the accompaniment of fireboats, tooting tugs, and circling helicopters. The almost continuously repeated three blasts from our whistle in response to the greetings of almost every vessel in the harbor added to the deafening din. After three sweltering hours of waiting for our luggage to come ashore, and a very efficient passage through customs, we found that we could advance our departure time from New York by four hours. Shortly after five we reached Willow Run and in a few minutes more were safely back in our own home again. The concensus of opinion: We never had a more wonderful year; we couldn't have been sadder at leaving England; we couldn't have been gladder at being home again.

OBSERVATIONS ON THE MICHIGAN FLORA, IV: A BOTANICAL SURVEY IN HURON COUNTY

Edward G. Voss

ONE of the interesting regions in the state of Michigan, from the botanical point of view, is the country near the shores of Lake Huron and Saginaw Bay, in Huron County. In this area, at the tip of the "thumb" of the Lower Peninsula of Michigan, the Federated Women's Clubs of Huron County have established a 120-acre nature sanctuary which they have called "A Wilderness Arboretum."

The tract is located about four miles north of Pinnebog, just south of what locally is called "Oak Beach" (about 15 miles northwest of Bad Axe) on highway M-25 between Caseville and Port Austin. Specifically, it is in the southern part of section 7, Hume Township (S 1/2 of the SE 1/4 and SE 1/4 of the SW 1/4, sec. 7, T18N, R12E) and may be reached by a trail road which passes northeast through the tract, beginning less than half a mile south of Oak Beach and running through to highway M-25. The tract itself begins one-quarter of a mile east of the county road which runs due south of Oak Beach. The trail enters the tract just west of the middle of its southern edge. Another old trail, no longer usable by car, runs more or less parallel to the northwest. A heavy wire surrounds the tract. Just before entering the Wilderness Arboretum, the trail passes through the Hume Township dump (a factor which may cause the addition of non-indigenous elements to the flora).

The project was dedicated on October 6, 1941, and an attractive rustic sign has been erected on the county road south of Oak Beach, at the beginning of the trail road which leads to the tract. In order that the area remain in its natural state, camping and picking of flowers are discouraged.

Co-operating with Mrs. Fred M. Cross, of Bad Axe, in arranging for me to catalog the Pteridophytes and Spermatophytes of the tract were Everett J. Soop, Director of the Extension Service of the University of Michigan, and Stanley A. Cain, chairman of the Department of Conservation in the School of Natural Resources of the University. Mrs. Cross hopes to have the complete list of the flora printed in popular form for distribution by the Women's Clubs in their nature education work with schools and clubs in the "thumb" area.

The region in which the Wilderness Arboretum is located is characterized by a series of low ridges more or less parallel with the lake shore, between which are shallow swales or marshes. The ridges, of sand and beach gravel, were formed by the action of wind and waves as the Great Lakes took on their present boundaries following glaciation. In general, the vegetation of the ridges is a dry heath type, dominated by Pinus banksiana, the hybrid Quercus palaeolithicola, and Populus grandidentata, beneath which Vaccinium angustifolium, Gaylussacia baccata, and Pteridium aquilinum are abundant. On the moister slopes between the ridges and the marsh-like swales are many of the plants characteristic of the cool moist woods of the northern part of the state, for example Clintonia borealis, Coptis groenlandica, Polygala paucifolia, Cornus canadensis, Trientalis borealis. Bordering the swales are often dense stands of shrubs like species of Salix, Alnus rugosa, Pyrus floribunda, Ilex verticillata, Cornus stolonifera, and Cephalanthus occidentalis. Thickets of shrubs and vines also occur in low damp spots where there is not sufficient water to support a permanent marsh.

The amount of water in the swales showed great seasonal variation during the three expeditions made to the tract in 1952. On May 10-11, it was so deep that it was often impossible to cross the swales without high boots; by June 28, many of the shallower swales were dry enough to walk on; and by September 27, there was no place in the tract where one could not walk dry-shod. In the largest swales, however, the ground is permanently very moist, and it is in such places that most of the Typha, Carex, Calamagrostis, and other marsh plants grow. On each of the three visits, all accessible parts of the Wilderness Arboretum were covered, but it cannot be claimed that every single species has been found. The total list is about 180 species.

Apparently there have been only two previously published lists of Huron County plants. One of over 300 species was contributed by C. A. Davis to the Huron County report in Volume 7 (1900) of the Geological Survey of Michigan. C. K. Dodge prepared a list of almost 900 species, which appeared in 1911 in A. G. Ruthven's Biological Survey of the Sand Dune Region on the South Shore of Saginaw Bay.

In the following list, attention is called to those species which seem worthy of special mention. Some of these are clearly new county records, and are presented without comment. Others are records of species reported by Davis or Dodge but which have not subsequently been credited to Huron County in the series of distribution papers published by the Michigan Academy or in the distribution maps in Billington's Shrubs of Michigan and Ferns of Michigan or in Hermann's "The Genus Carex in Michigan". The Herbarium of the University of Michigan includes the collections of both Davis and Dodge, but these collectors did not always preserve specimens of everything they reported. Except as otherwise noted, the University Herbarium contains no previous Huron County specimen (by any collector) of the species listed below.

With the following exceptions, a specimen of every species found in the tract has been deposited in the Herbarium of the University of Michigan: Selaginella rupestris (see note below); Taraxacum officinale, seen in May but not collected then nor seen later. For each species commented upon below, my collection number is given in parentheses; numbers before 1150 are from the May trip, those above 1400 are September, and the others June. Following the collection number are indicated the herbaria, if any besides Michigan, in which sheets have been deposited: EGV—private herbarium of E. G. Voss (presently at Mackinaw City, Michigan); SMU—Herbarium of Southern Methodist University, Dallas, Texas.

The nomenclature used herein follows Fernald's 8th edition of Gray's Manual, with the names used by Gleason in the New Illustrated Flora indicated in parentheses if different. For assistance with determinations I am indebted to W. H. Wagner, Jr. (Pteridophytes), F. J. Hermann (Carex), and C. R. Ball (Salix). In the notes which follow, initials of these specialists are given whenever they have supplied or confirmed determinations.

Equisetum fluviatile L. Listed by Dodge, but for lack of any herbarium specimen in the state not credited to the county in Billington (1952). Scarce in swales. (No. 1437) (W.H.W.)

Lycopodium lucidulum Michx. Listed by Dodge, but not in Billington (1952). Scarce in moist woods. (No. 1105)

Lycopodium obscurum L. var. obscurum. Neither variety of this plant is listed by Dodge, and only var. dendroideum is attributed to the county in Billington (1952). Locally common in more or less moist woods. (No. 1097) (W.H.W.)

Selaginella rupestris (L.) Spring. Seen in dryish woods by John McClymont on September 27, but not collected.

Osmunda cinnamomea L. var. cinnamomea. Listed by Dodge but not in Billington (1952). Uncommon, forming large clumps in moist woods. (No. 1217) (W.H.W.)

Osmunda regalis L. var. spectabilis (Willd.) A. Gray. Listed by Dodge but not in Billington (1952). Locally forming extensive clumps in swales which were wet in May but drying by late June. (No. 1193; 1214)

Dryopteris thelypteris (L.) A. Gray var. pubescens (Lawson) Nakai. (Thelypteris palustris Schott) Listed by Dodge but not in Billington (1952). Frequent at edges of swales. (No. 1211) (W.H.W.)

Picea glauca (Moench) Voss. Two trees, about a foot tall and doing very poorly, in dry sandy woods near the trail road at the south of the tract. The unnatural habitat, absence of any larger trees, and lack of previous records from the region all suggest that these may have been planted. (No. 1475)

Festuca saximontana Rydb. [F. ovina L. var. saximontana (Rydb.) Gl.] Neither this nor typical F. ovina has been previously reported from the county. Davis reported F. ovina var. pseudovina Hack. with a question mark; his specimen taken July 5, 1896, on the sand dunes at Port Austin and labelled F. ovina is referred to F. saximontana (anthers 1.3 mm. long). Uncommon along the road. (No. 1486)

Muhlenbergia mexicana (L.) Trin. The M. mexicana listed by Dodge is now known as M. frondosa (Poir.) Fern., the present species having previously been called M. foliosa (R. & S.) Trin., under which name it has not been reported for Huron County. There is, however, a specimen in the University Herbarium collected near Grindstone City by Dodge Sept. 1, 1912 (after his list was published). Wet woods in the south part of the tract. (No. 1504. EGV)

Oryzopsis asperifolia Michx. Listed by Dodge only by quoting Davis, so it would seem well to place it on record once again, especially since there is no specimen from the county in the University Herbarium. Scarce on a ridge. (No. 1110)

Carex aquatilis Wahlenb. var. altior (Rydb.) Fern. Listed by Dodge, but not credited to the county by Hermann. Common, forming tussocks at the edges of swales. (No. 1239)

Carex lupulina Muhl. Again, a sedge listed by Dodge but, presumably for lack of an authenticating specimen, not by Hermann. Local in wet woods. (No. 1492. EGV) (F.J.H.)

Carex lurida Wahl. Status same as the preceding. (No. 1493) (F.J.H.)

Eriophorum angustifolium Honckeny var. majus Schultz. Scarce, in a large swale in the southeastern part of the tract. (No. 1243)

Smilax tamnoides L. var. hispida (Muhl.) Fern. (S. hispida Muhl.) Listed by Dodge, but not credited to the county by Billington, who for some reason did not cite Dodge's paper as a source of distribution records. Uncommon in moist thickets. (No. 1233)

Iris virginica L. var. shrevei (Small) E. Anders. (I. shrevei Small). There is no Huron County specimen of either this or I. versicolor in the University Herbarium, so it is impossible to determine which Dodge had when he reported versicolor before the general recognition of virginica. Frequent in swales. My specimen possibly is not pure; the pubescence on the bright yellow-orange sepal patch is microscopic. (No. 1205)

Cypripedium acaule Ait. Listed by Dodge, but not included for the county in Darlington's distribution paper. Very common locally on the dry ridges. (No. 1068)

Habenaria hyperborea (L.) R. Br. var. huronensis (Nutt.) Farw. Like the preceding, reported by Dodge but not included in Darlington's later paper. Scarce and local in moist woods. (No. 1235)

Salix discolor Muhl. var. latifolia Anderss. This variety not previously reported from the county. In a swale at the south edge of the tract. (No. 1091; EGV) (C.R.B.)

Salix lucida Muhl. var. intonsa Fern. As with the preceding, this variety previously unreported. Common in swales. (No. 1241; EGV) (C.R.B.)

Salix pedicellaris Pursh var. hypoglauca Fern. Frequent in swales. (No. 1216)

Salix subsericea (Anderss.) Schneid. Probably this is the species reported by Dodge as S. sericea Marsh., but neither is credited to the county by Billington (1949). Common in swales. (No. 1237) (C.R.B.)

Betula pumila L. var. glandulifera Regel. [B. glandulosa Michx. var. glandulifera (Regel) Gl.] Local in swales. (No. 1090; 1242. SMU)

Quercus X palaeolithicola Trel. (Q. ellipsoidalis Hill X Q. velutina Lam.) A study of my collections from several of the black oaks which are so common on the dry sandy ridges indicates that the description of this hybrid fits them best. The buds are only slightly shorter than in velutina (just under 6 mm.), are quadrangular and persistently hairy as in that species, and are much larger than in ellipsoidalis or coccinea. The leaves are of a coccinea or ellipsoidalis type; the nuts are elongate, striped, and exserted about two-thirds, as in ellipsoidalis. Sometimes there is a suggestion of a fringe on the cup, as in velutina. Most trees are relatively smooth-barked, as in ellipsoidalis; some with very rough bark approach true velutina. (No. 1445; 1446; 1447. EGV)

One collection, however, (No. 1495) with shorter but poorly developed nuts may be velutina X coccinea. A specimen in the University Herbarium, collected on Sand Point by Dodge, July 15, 1908, originally labelled Q. coccinea, has been annotated by W. H. Camp "X velutina"; this has a fringed cup with short hemispherical nut, and buds small and densely hairy, at best obscurely angled. A specimen collected by Davis in Huron County in 1897, and originally labelled Q. coccinea, has been annotated "cf. Q. ellipsoidalis" by Camp. So although Q. coccinea was reported as common by Davis and Dodge, there is some question as to the identity of their material.

The black oaks of the state are definitely in need of attention. A preliminary and brief survey of material in the Herbarium suggests that hybrids of velutina with coccinea and ellipsoidalis may be quite widespread, while true velutina is scarce in Michigan.

Nuphar variegatum Engelm. This is probably what was reported as N. advena by Davis and Dodge, but there are no specimens to substantiate this. Local in the larger swales in the northwest part of the tract. In water in May and late June, but the ground only spongy under foot in September. (No. 1202)

Lindera benzoin (L.) Blume var. benzoin. Listed by Dodge, but not by Billington (1949). Scarce in thickets along the southern edge of the tract. (No. 1498)

Amelanchier arborea (Michx. f.) Fern. Very common in the dry woods, intergrading with A. laevis Wieg. in regard to pubescence of the young leaves. Attains a height of 7-8 m. and a diameter of 15-20 cm. (No. 1059; 1082. EGV, SMU) A. laevis is also common in the area. Dodge reported A. canadensis, and a specimen in the University Herbarium which bears his label of 1908 as A. canadensis, collected on Sand Point, is actually A. laevis.

Nemopanthus mucronata (L.) Trel. Listed by Dodge but not by Billington (1949). Locally abundant in swales in the northwestern part of the tract. (No. 1115. SMU)

Rhamnus alnifolia L'Hér. Scarce in swales and moist hollows. (No. 1118; 1472)

Parthenocissus quinquefolia (L.) Planch. Listed by Davis and Billington (1949), but not Dodge. A vine locally in thickets. (No. 1232)

Vitis riparia Michx. var. riparia. Listed by Davis and Dodge, but not Billington (1949). Like the preceding, a vine locally in thickets. (No. 1227)

Viola conspersa Reichenb. Listed by Dodge, but not included for Huron County in Thompson's later paper on distribution of Violaceae in the state. Abundant on moist slopes. (No. 1074)

Viola pubescens Ait. Like V. conspersa, listed by Dodge but not by Thompson. Locally common in one place on a ridge in the south-central portion of the tract. (No. 1111)

Viola renifolia Gray var. brainerdii (Greene) Fern. Very common, especially on mossy hummocks. (No. 1073)

Epilobium angustifolium L. var. angustifolium. Not mentioned by Dodge, although listed as "common" by Davis and given as a habitat for two species of Thysanoptera in Shull's entomological report in Ruthven's survey. Scarce, in dry woods near the trail road. (No. 1488)

Pyrola virens Schweigg. Local in moist woods. (No. 1102)

Vaccinium corymbosum L. (possibly X V. angustifolium Ait. var. laevifolium House = V. lamarckii Camp). V. corymbosum is listed for the county by Dodge and Billington, but this apparent hybrid may be worth describing. This was a shrub almost 1.5 m. tall, in moist woods. Leaves ellipsoid or occasionally obovate, acute at both ends, to 5.5 cm. long and 2.5 cm. wide; margins ciliate-serrulate with broad-based, short, gland-tipped hairs or narrow teeth; under surface prominently pubescent with stiffish hairs to 1 mm. in length, especially on midrib and main veins; upper surface sparsely puberulent. Young twigs and branchlets somewhat short-pubescent. Young fruit (June 28) glaucous. This may be only a specimen of the variable V. corymbosum, but the leaves average smaller than in corymbosum, and the height of the plant suggests a "half-high" hybrid. No other specimens resembling V. corymbosum were seen. (No. 1215)

Vaccinium vacillans Torr. (possibly X V. atrococcum (A. Gray) Heller). V. vacillans is included for Huron County in both Davis (quoted by Dodge) and Billington, but again an apparent hybrid is noted. This was a shrub about 1 m. tall in a moist swale. Leaves just emerging (May 11) and flowers in late bud, 4-5 mm. long, red-tinged. Leaves sparsely puberulent, margins apparently entire or weakly serrulate. Although no specimens of V. atrococcum were seen (or are known from the county), the height and habitat of this plant suggest hybridization with that species; the other features agree with vacillans. (No. 1119)

Utricularia intermedia Hayne. Listed by Dodge only as a quotation of Davis' record. There is, in the University Herbarium, however, a specimen collected by Dodge July 11, 1908, on Sand Point. Local in 1-2 dm. water (June 28) in a large swale in the northwestern portion of the tract (no standing water at this site in September). Not seen flowering. (No. 1212)

Galium tinctorium L. var. tinctorium. Not the G. tinctorium of Dodge's list, which is G. obtusum Bigel. The present species was formerly known as G. claytonii, and has not been previously reported from Huron County. Scarce, on a mossy log in wet woods. (No. 1253)

Viburnum cassinoides L. Occasional in swales. (No. 1116; 1473)

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A REVIEW OF "THE NEW BRITTON AND BROWN"*

Edward G. Voss

THE long-awaited "New Britton and Brown" came to the botanical public as a most welcome climax to the year 1952. A completely new work, connecting the names of Britton and Brown with it seems almost unnecessary. Not even identified as a third edition of its predecessor, the Flora has new illustrations, new keys, new descriptions, and much new philosophy.

With the 8th edition of Gray's Manual also off the press in recent years, the botanist in the northeastern states is now admirably equipped with floras. Should he have both available, except when a single-volume manual is inherently handier he will almost always find the New Britton and Brown the more useful, if only because of the illustrations, which are vastly superior to those of the previous edition or of any similar work. Both as works of art and as means of calling attention to important diagnostic characteristics, the figures are a joy to behold. Without implying that one is better than another, it can be noted that there is some variability in style, presumably of different artists , between such heavily stippled and shaded drawings as those of Verbena, Solanum, and Lobelia, and, in comparison, such relatively simple sketches as those of the Lemnaceae, the Chenopodiaceae, and Desmodium. The only serious complaint that one can make about the illustrations is that more care was not taken to associate drawings of small details with the main drawing or name of the species. Anyone not already familiar with the plants involved would have an extremely difficult time, to give only a few examples, on pages 89, 463, and 494 of volume 2 trying to connect the right leaf, fruit, or seed with the proper species.

The keys are plentiful, often a natural synopsis and an artificial key being provided, or keys both to plants with flowers and leaves and to those with fruits and leaves. The keys are of the indented type and, except for those to family, apparently strictly dichotomous. The family key is much expanded over the previous edition (21 instead of 8 pages), and presumably much more useful. Only time will tell how well the keys work; they look good.

A few comparisons in "facilities provided" can be made with Gray's Manual. Gleason does not restrict his list of botanical authors to those whose surnames happened to be abbreviated in citations. Instead, he includes the full names of all authors, with dates, when known, of birth and death. As in the Manual, an adequate glossary is provided. (Some

*The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada, by Henry A. Gleason, with the assistance of specialists in certain groups. 3 vols. 4to. 1952. [Published by The New York Botanical Garden.]
Available from The New York Botanical Garden, Bronx Park, New York 58, for $27.50 postpaid (after July 1, $30.50).

might differ with the assertion that "irregular" is "synonymous with zygomorphic".) The indices in volumes 1 and 2 are an improvement over those in the previous edition in that all common names, as well as scientific names of genera and higher categories and species in the case of large genera, are included. The index at the end of volume 3 places in a single listing all common and scientific names, including synonyms. This is much less frustrating to the user than the practice of Fernald (and the previous Britton and Brown) of placing the common names in a separate index — a duplication which only causes confusion (to this reviewer, at least, who almost invariably seems to open to the wrong index). The new Flora, like the 2nd edition, does not designate by distinctive typography (e. g., the small capitals of the Manual) the names of those species which are not considered to be indigenous in our area. Gleason does seem, however, to mention and illustrate more escapes from cultivation than does Fernald. No summary tabulation by families is provided. It is a pleasure to observe that the system of feet, inches, and lines, used for measurements in the 2nd edition, has been abandoned in favor of the metric system.

Taxonomically, the new Flora, as expected, gives a relatively conservative treatment. Although only 6 fewer species are included than in the previous edition, there are 92 fewer genera. (Altogether 4660 species are fully treated in the new Flora — 863 fewer than in the Manual.) Lest the failure to increase the number of species in this edition be attributed to over-zealous "lumping," it should be noted that in an effort to restrict the new Flora to a more homogeneous floristic area the range does not extend so far west as in the second edition or as in the Manual, nor does it include as much of British North America. Although no count is given, it is a safe assertion that there are far fewer infraspecific taxa recognized than in Fernald's Manual.

The Lobeliaceae are recognized as a distinct family from the Campanulaceae, and the Leguminosae are divided into the Mimosaceae, Caesalpiniaceae, and Fabaceae. The Pyrolaceae are not, however, maintained as distinct from the Ericaceae. Although the tendency is definitely not toward treating as of specific rank any taxa which Fernald places in lower categories or sinks in synonymy, there are exceptions: for example, Iris Shrevei, Betula cordifolia, Acer nigrum, and Aster lucidulus. Striking contrasts with the Manual treatment are seen in such genera as Amelanchier (where following Jones rather than Wiegand results in 8 instead of 19 species), Antennaria (6 instead of 32 species), and Taraxacum (3 instead of 11 species, some of the reduction due, to be sure, to omission of Newfoundland from the range). In Vaccinium, Sect. Cyanococcus, the work of Camp is followed, hybrids and all, with generally satisfactory results. On the other hand, although reported hybrid oaks are listed, no attempt is made to describe or adapt Trelease's keys to them. A usable treatment of Rubus is given, with 24 names provided, including 12 "collective species" in

Eubatus, under each of which many of the names of Bailey and others are distributed. This is a considerably condensed treatment in comparison with the 205 species listed by Fernald, to whose work, as well as that of Bailey, Gleason refers students interested in "the microspecies of their own region." The collective species of Eubatus are honestly presented as "intended for convenience only. There is seldom evidence that all the plants included under one are more closely related to each other than to some plants of a different collective species, but, in general, each of them has some degree of homogeneity." Suffice it to say that the collective species do not exactly correspond with the species groups of Fernald or Bailey.

Although Gleason's introduction is dated January, 1950, he discusses in it Fernald's 8th edition of Gray's Manual, which appeared six months later; but it is unfortunate that it was impossible to cite the names used in the Manual, when not accepted, in the synonymy of individual species. Correlation of the two works is thus difficult at times. References to the Manual were, however, included by Gleason in his list of changes of name in Phytologia, March, 1952. Apparently synonyms are pretty much restricted to names in Small, Rydberg, the 2nd edition of Britton and Brown, and the 7th edition of Gray's Manual. Even for these, authors are not indicated, the names only being identified as used in one of the other manuals. Thus, for example, "Carex scirpoides, Gray" in the synonymy of C. interior means only that "this species is listed under someone's name C. scirpoides in the 7th ed. of Gray's Manual." We might wish for more synonyms, or at least the authors of those which are included, but perhaps that matter was considered too much of a concession to the professional botanist when the Flora "has been prepared primarily for the interested laity." Such names as Pycnanthemum tenuifolium, Impatiens capensis, and Rudbeckia serotina, attributed to our plants in Rhodora in 1948, are neither accepted nor cited as synonyms. So although published two and a half years after the new Manual, the new Illustrated Flora gives the impression of having had the nomenclature settled earlier.

Quite up to date, however, is the indication of the nomenclaturally typical variety of a species by repetition, without author, of the specific epithet, as required by an article (now numbered 35) of the International Code adopted in the summer of 1950. It can be surmised that since this proposal was originally made by Gleason himself 10 years before the Stockholm Congress, text for the new Flora was written in anticipation of its adoption. Two recommendations accepted at Stockholm have not been followed: Specific epithets are not uniformly decapitalized. (In his introduction, Gleason ambiguously states that "The capitalization or decapitalization of specific epithets is rightly a recommendation. . .". Evidently allowance was made for whichever way the controversial recommendation might read by the time the Flora came out!). Neither have those genitives with only a single i after personal names ending in a consonant (other than er) been emended as orthographic errors. So we have in the Flora, for example, Arabis Drummondi and Carex Tuckermani rather than A. drummondii and C. tuckermanii. But these are matters of preference regardless of how the recommendations read. (A. Drummondii did sneak into the introduction on p. xxi.)

As long as botanists defend the double citation of authorities as a bibliographic aid, it would seem to make no difference as such an aid whether or not the person who reinterprets a taxon is the same as the one who originally described it. At any rate, the Code makes no allowance for an exception in such a case, and Gleason quite correctly cites, for example, Ribes hirtellum Michx. var. calcicola (Fern.) Fern., whereas in the Manual an author is cited but once in such a situation.

Following almost universal North American (but not European) practice (Marie-Victorin in his original edition was an exception), Gleason gives Hill, rather than Miller, as the authority for Linaria vulgaris, even though the Code (Art. 79; Art. 68 in ed. 3) specifically cites Hill's work as an example of one which must be rejected because the author did not consistently use binary nomenclature.

The continued use which it is certain to receive will determine whether the new Flora has as many of the seemingly inevitable typographical errors as has Gray's Manual (my list for the latter has climbed past 80). It is rather startling to note in the Araceae a large figure labelled S. foetidus above which, in bold capitals, is the name SYMPHORICARPUS.

The typography is attractive, and the paper and binding sturdy. It is unusual that the publishers did not have more confidence in this great work than to print an initial 2500 copies (6000 of the first edition of Britton and Brown had been printed). A run of at least twice that number would not have exceeded, it seems to me, the market which the set has every right to expect, and might have substantially reduced the unit cost to a point where the work would be more readily obtainable by the student for whom it is an obvious necessity.

MICHIGAN FORAY OF THE AMERICAN FERN SOCIETY--Those interested in ferns and fern-allies should keep in mind that the annual meetings of the American Institute of Biological Sciences are to be held in Madison, Wisconsin, on the campus of the University of Wisconsin, beginning Labor Day. The meeting will be preceded by a foray sponsored by the American Fern Society. Those participating in the foray will meet in Alpena, Michigan, on August 30, and go by automobile to various interesting fern-localities in both Lower and Upper Peninsulas before adjourning on September 5. We hope to have a more detailed note on the foray in the Spring number of AGB. — Eds.

ALONG THE TRAILS OF CHARLES WRIGHT IN EASTERN CUBA

Roy N. Jervis

BOTANICAL exploration in Cuba during the middle of the 19th century was dominated by Charles Wright, the same adventurous man who contributed so much to the botanical knowledge of the southwestern United States. Wright spent the better part of ten years between November 1856 and July 1867 exploring the forested mountain regions, seeking out the unfamiliar and unknown plants. The ten years of bloody revolution that began in 1868 account largely for his discontinuance of work in Cuba.

Despite a record of his itinerary reconstructed by L. M. Underwood (1), many stations where Wright collected have remained uncertain and doubtful. Herbarium sheets of Wright material give little aid. Although his specimens were distributed widely (there were 15 sets, varying from 560 to 2250 numbers), usually no more than one sheet for each number is annotated beyond the specific name, general area (i.e., "Cuba Orientali", "Cuba", etc.), and date, the latter often being merely the year. According to Asa Gray (2), the set at the Estación Agronómica at Santiago de las Vegas, Cuba, was the best annotated from Wright's field notes, although Gray considered the set at Harvard to be the most complete one. Madrid received one of the large sets also. The old method of numbering Wright's material prevents establishing a chronology from the labels. As was common a hundred years ago, the field collector did not number his specimens in the order in which they were collected. Rather, the entire collection was sorted to apparent species, and then numbers were assigned which did not follow the chronological order of collecting.

This appears clearly, for example in Grisebach's "Catalogus Plantarum Cubensium" (3) in the family Bixineae (now Flacourtiaceae) in which Wright's numbers 12 to 18 are all of the one genus Casearia as now understood. Number 12 included at least three species, from three widely separated and distinctive areas in the Province of Oriente. Yet this diversified assemblage was united as a single number, with the location given simply as "Cuba orientali"! An even worse mix-up occurs with Wright's collection of pines with the result that Pinus cubensis and Pinus caribaea were so confused that for years they were considered one and the same species. A chronology established from Wright's collection is virtually impossible.

Three areas in Oriente province, Cuba, received most of Wright's attention: the mountainous region surrounding the cafetales of Monte Verde and nearby La Perla, northeast of Guantánamo; the Gran Piedra range just east of Santiago de Cuba; and the eastern Sierra Maestra ranges in the vicinity of Hongolosongo. In ten years his total collection of vascular plants was only about 3900 numbers, but it should be noted that many of his specimen numbers were comprehensive, often including many field stations. Had his specimens been numbered by present-day practice, undoubtedly his collection would have reached 10,000 numbers or more. Also much of his work in Pinar del Río was nullified because one large shipment was almost totally destroyed when a cargo of wet sugar was piled on it aboard ship (2). His collection suffered again when the first set of his 1856-1857 collection, sent to Grisebach, was lost at sea (2). Gray made a duplicate set for Grisebach, but some material was irreplaceable.

Wright's collections in other provinces of Cuba rivals his work in Oriente. Pinar del Río was the focal point for his work in the west, but he collected extensively in Santa Clara and Matanzas. As in Oriente, Wright's facility for friendship with the owners of the large plantations and their reciprocating kindness and cooperation enabled him to do an amazing amount of work on very meager funds. Dr. Francisco Sauvalle, the botanist, and his brother-in-law, José Blain, helped Wright's work, particularly in Pinar del Río. John Gundlach, zoologist and father of Cuban ornithology, arrived in Cuba shortly before Wright, and the two joined forces on many expeditions. After this association, Wright devoted some of his time to the search for land snails and materials other than plants.

Wright's contribution to Cuban botany can be partially evaluated if one considers that Achille Richard's flora of Cuba (4) included only a little more than 1,000 species a decade before Wright made his collections and Grisebach's Catalogus Plantarum Cubensium of 1866 listed 2,948 flowering plants.

Wright, always handicapped in his work by lack of funds, could never have accomplished his task without the hospitality of the owners of several Cuban fincas. The names of these fincas, such as Monte Verde, La Perla, Filantropia, Madelina, Nouvelle Sopie, and Josephina, crop up often in botanical works connected with Wright, and because of the many changes of names in the past century, present-day botanists find it difficult to associate these finca names with localities on modern maps.

From Underwood's summary of Wright's itinerary it appears that the data for Wright's three trips to Cuba are: (1) Arrived at Santiago, 25 November, 1856; returned to New York, 9 September, 1857; (2) Arrived at Santiago, 30 November, 1858; left Havana, 28 July, 1861; (3) Arrived at Havana, May, 1865; returned to New York, July 1867.

He worked in the Monte Verde area as follows: 23 April to September, 1857; 3 December, 1858, to 17 September, 1859; 11-20 January, 1860; 25 February to 1 August, 1860; 15-19 September, 1860; 4-19 January, 1861; 4 February to 4 May, 1861; 24 June to 24 October, 1861;

5 May to sometime in July, 1867. The route to Monte Verde led through what is now Guantánamo city, which in Underwood's summary was confused with the port town of Caimanera. In the middle of the 19th century, Guantánamo was officially Santa Catalina del Saltadero del Guaso, Saltadero referring not to the salt works north of Caimanera along the bay but to the rapids in the Guaso River which passes through Guantánamo and enters Guantánamo Bay northeast of the salt works. On the old maps Guantánamo was usually Santa Catalina, or Santa Catalina del Guaso, but on some was merely Saltadero.

Caimanera was in 1857 a tiny unhealthful port built on a limestone outcrop in the mangroves at the edge of the muddy salt flats. It was connected to Guantánamo by a narrow-gauge railroad when Wright was there, but even those whose business required visits to the port lived in the more healthful inland town of Guantánamo, or Santa Catalina. Wright did collect in the vicinity of Caimanera and what is now Leeward Point of the U. S. Naval Station, but the Santa Catalina and Saltadero of his letters referred to Guantánamo city and not Caimanera.

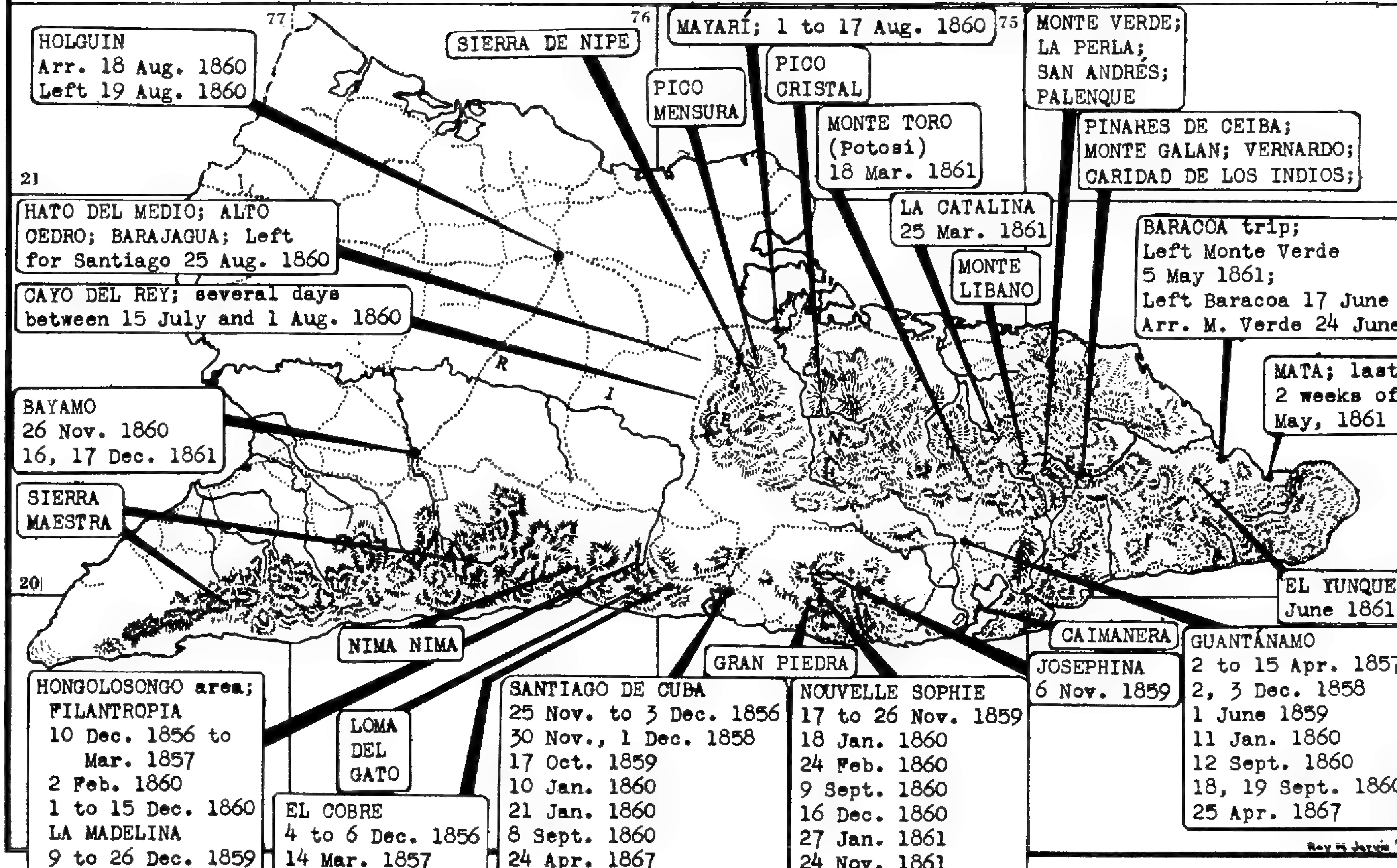
His other field stations with known dates of collecting are summarized on the accompanying map.

Wright found transportation always bad, a condition that has not changed much in the mountain areas of Cuba. Few roads existed. Instead, the routes were mostly narrow mule trails, muddy and slippery in the rainy season, and dusty and rough during the rest of the year. From Guantánamo northeast to Jamaica and then over a sharp "cuchillo", a knife-like mountain ridge, to Felicidad de Yateras, and thence up the steep range to the north to Monte Verde, was a narrow cobblestone pavement a few feet wide. Even today remnants of this road are still traversed by trucks, jeeps, and mules. But most of Wright's travel beyond Monte Verde and to many other places was afoot or astride one of the tough little Cuban mules which today are the chief means of travel in these regions. Where the trails are not worn into solid rock, the soil becomes mud in the slightest rain and the mules sink deep, leaving holes that are preserved in the dry season as honey-comb pathways that are avoided by both man and mule. Trucks and jeeps are slowed to a crawl in dry weather and are stopped altogether in the midst of the rainy seasons.

During my two stays in Cuba, from August 1950, to May 1951, and July through August, 1951, I was able to travel throughout the island, but particularly in Oriente where I drove a jeep more than 8,000 miles on more than 30 separate field trips. Many of the collecting stations of Charles Wright became more than nebular place names and from this experience plus some research on Wright and 19th century maps, I can throw a little more light on some of Wright's obscure field locations.

Before telling about these experiences, I would like to comment on the Spanish term, "monte". It should not be confused with the English

Fig. 1. Map showing the botanical localities of Charles Wright in the mountainous "Oriente" Province, Cuba.



mountain. To be sure, originally "monte" meant "wooded height" and Monte Verde, together with nearby Monte Toro and Monte Libano, were heights up to 3,000 feet covered by virgin forest in Wright's time. Today, however, the word "monte" is the equivalent of our word, countryside, and thus not every Cuban "monte" is wooded or even a hill.

With César Piña, a Cuban student now at the University of Michigan, I visited the area northeast of Monte Verde on the week-end of February 17, 1951. We drove from Guantánamo Bay north through the level cane fields of Guantánamo valley to the sugar central, San Antonio. From San Antonio the road climbed over rugged limestone hills into the Yateras valley at Vega Grande. Along the way many mahogany trees (Swietenia mahagoni Jacq.) dotted the landscape, but umbrella-shaped intruders, Samanea saman (Jacq.) Merr., were more common shade trees in the cleared pasture lands of the small valleys. In more rocky areas, where forests had been removed, Comocladia dentata Jacq., the "guao" of the Cubans, formed poisonous thickets. In the vicinity of Vega Grande we saw some sterile Jatropha tupifolia Grisebach, a shrubby member of the Euphorbiaceae, but it was not until we passed Caridad de los Indios that we collected specimens in flower with their deep red blossoms accentuated against the glossy green foliage.

As we left the Yateras River the jeep twisted and jolted upward over a fantastic road, not so much carved as eroded out of the steep cliffs, and we reached the somewhat rolling plateau stretching northward to Caridad de los Indios. Across the almost canyon-like Yateras valley the heights of Monte Verde rose in the blue distance to the northwest.

The plateau that we were on had been denuded of forests many years before. Little topsoil remained over much of it and the eroded dog-tooth limestone was exposed. Scrubby growth of Coccoloba, Croton, Lantana, Dipholis, Chrysophyllum, laurel-leaved shrubs and small trees formed scanty cover with a few patches of more fertile soil producing dense thickets and woods from which all usable trees had been removed. Some grassy areas of red soil with low scattered bushes had plants that were common to the pine forests. Inquiry disclosed, however, that, at least in the memory of the inhabitants, no pine forests had ever covered the area. Among the thickets we found shrubby Phyllanthus epiphyllanthus L., the first I had seen in Cuba. The leathery phyllodes edged with clusters of tiny scarlet flowers made the plants stand out from the other vegetation. We also became acquainted with the recurved thorns of Pisonia aculeata L., a woody clambering vine of the Nyctaginaceae, and with Platygyne hexandra (Jacq.) Mull. Arg., a slender "euphorb" vine armed with hairs that stung like fire.

We camped after dark near the road. The first tree (Bursera simaruba (L.) Sarg.) that I tried to use for a support for my jungle hammock collapsed with a crash. Termites had destroyed it from within, leaving a hollow shell. Before I found a solid support for the hammock, more Platygne seared my neck and arms. After cooking supper we tried to sleep, but several times the roar of trucks grinding their way over the rocks woke us. As the friendly Cubans saw our jeep, they stopped solicitously to see what was wrong. It was difficult to explain that we were merely crazy American botanists trying to sleep. I am sure that the ones who woke us at two a.m. probably thought us not only crazy, but even a bit impolite.

The next day we drove to Caridad de los Indios at a top speed of eight miles an hour. From the village, consisting of a coffee mill, a small school, and a few "bohios", we turned eastward and a few miles further on at a "tienda" (store), called Garrido, gave up trying to follow that road and returned to Caridad. From there driving northwestward ever higher to Pinares de Ceiba we found pine trees, as of course the name indicated we would. Although timbered out a few years earlier, there were still tall specimens of Pinus cubensis Grisebach stretching skyward around the tienda, dance-floor, and few houses that made up the village. The owner of the land told us that tremendous pines had been cut, the largest having a diameter of 64 inches, but we ourselves saw no stumps of more than 30 inches. Among the more outstanding plants was a very beautiful terrestrial orchid, Phaius tankervilliae (Banks) Blume, of which the very plant illustrated herewith is at the University of Michigan Botanical Gardens. Very common was a yellow flowered Lisianthus of the Gentianaceae. This area, only a few hours ride by mule from Monte Verde, may well be Wright's type location of Pinus cubensis.

Here we met Sr. Antonio Robas, a bulldozer operator, who was beginning to cut a lumber road over to the Toa valley. He was surveyor, engineer and "cat-skinner" rolled into one, and built roads by trial and error. From Pinares de Ceiba the land dropped away in breathtaking cliffs and ridges down to the Toa river. Robas's job was to pick a route down those precipices and cut a road for lumber and coffee trucks. Only a small section had been begun and we, foolhardy as we were, drove our jeep down the first series of hairpin turns, thinking that "if we have trouble, the bulldozer can always tow us back up!" At the first level stretch at the foot of the cliff stood the bulldozer ---- immobilized with engine trouble! We drove up the next hill so that we could boast that we were the first persons ever to drive into the Toa valley in the barrio of Vernardo. Returning to Pinares was a problem. After many tries, much digging away of loose rock, and with the assistance of several willing Cubans, the jeep finally climbed back to the top of the precipice. We drove back to the Navy Base, assured by Señor Robas that when we returned to Pinares de Ceiba a new road would stretch to Vernardo on the Toa river.

At Easter, a four day vacation gave us another chance to visit the valley. On the way, at a point just north of Caridad de los Indios, a flat tire stopped us. It was already dark, so we rolled up in our blankets on the ground beside the jeep. On the far off hills in every direction areas of flickering lights twinkled and flashed like the lights of distant cities. The dry season program of burning off the forests for garden plots was in full progress. Rich forests were being sacrificed for a few seasons of crops after which the land would revert to brushy forest, or become almost barren rock brushland.

The next morning we drove to Pinares de Ceiba where a building boom was on. A new tienda of solid mahogany, roofed with aromatic cedar (Cedrela mexicana M.Roem.) was under construction. The new road to the Toa was open! We found that the series of hairpin turns which had almost trapped the jeep in February, had been abandoned and a new route led circuitously down the precipice. To us was the honor of having been the only ones ever to drive over that earlier winding stretch of road! Thenceforth, it became a trail for mules only.

Along the road to Vernardo we gathered geological specimens of serpentine and talc, of tuffs and other volcanic rocks from the newly cut bedrock. When we reached the village on the north side of the tumbling, crystal-clear Toa, we stopped to hire a guide to lead us to the summit of Mt. Galan whose twin peaks towered over Vernardo. We had been told that a lake exists at the top of the peak and we hoped to collect in that unusual habitat. Guides there were, and in plenty. But, alas! it would require all day just to reach the top and mañana was Good Friday so that the guides could not leave until Saturday. We, however,

Fig. 2. Phaius tankervilliae (Banks) Blume, a terrestrial orchid growing in the cleared pinelands of Pinares de Ceiba east of Monte Verde. This plant and one from the Sierra de Nipe are now growing in the University of Michigan Botanical Gardens (No. 20226).

had to return to the Base on Sunday, so we could not work out a plan and had to give up the attempt to reach the peak of Mt. Galan.

Vernardo lies along the Toa on the route that Charles Wright must have taken on his trip by mule to Baracoa in 1861. Between Vernardo and Baracoa stretch range after range of cuchillos. We did not wonder that the trip by Wright required seven days and that both he and his mule were exhausted at the end of it.

Pine forests (Pinus cubensis) clothed the serpentine mountain-sides and broad-leafed forests covered the richer soils. The best land had been planted to coffee, mostly by Galicians who came to the valley about 1930. At the coffee mill of Sr. Raphael Sánchez we found that he had just purchased a jeep, the only one in the valley, and there we were able to repair the tire which had stopped us the night before. Señora Sánchez served us refreshing black coffee and we learned that Sr. Antonio Robas was at that moment working on a new road that led to the coffee finca of Magdalena. So we headed into the hills along the new road to the north of the Toa.

Along the way we picked up a passenger, Señor Juan García, alcalde (mayor) of the barrio (a municipal district) of Vernardo, who wished to inspect the new road. The further along the road we drove, the worse it became and finally we concluded that Sr. Antonio was late for lunch and was merely driving the bulldozer there, rather than making a new road. As we reached the ridge overlooking Magdalena, we found the bulldozer, but not Antonio Robas. We left the jeep and walked down the narrow trail to Magdalena where, as we had guessed, Antonio was having lunch. His honor, the mayor, delivered a telegram to the owner of the mill and they discussed business while we sat on the veranda and watched Antonio resume his bulldozing the road down the hillside to the mill. There should have been bands playing and flags waving, but instead a mere handful of men and boys ran alongside the big machine. (Afterwards we learned from friends in Guantánamo that the dance was held a month later at Magdalena and five jeep-loads of Guantánamans went to help celebrate the opening of the new road.)

We drove back to Vernardo, stopping now and then for plants. Once we admired some large prickly soursops or guanábanas (Anona muricata L.) in a grove and, by authority of being mayor, Sr. Juan García helped us pick two of the fruits. They were rather tart. The pulp is used to make a delicious drink and also is used in Cuban ice cream. Twice along the way we were stopped to have steaming black coffee, and at Sr. José Rodríguez's cafetal we were given a huge sack of green coffee beans.

That night we slept on a sand bar near the Toa and the next day we botanized along the river. In the evening we were guests of Señor and Señora José García for a dinner of fried chicken with all the trimmings including a dessert of home-made preserved oranges that were superb.

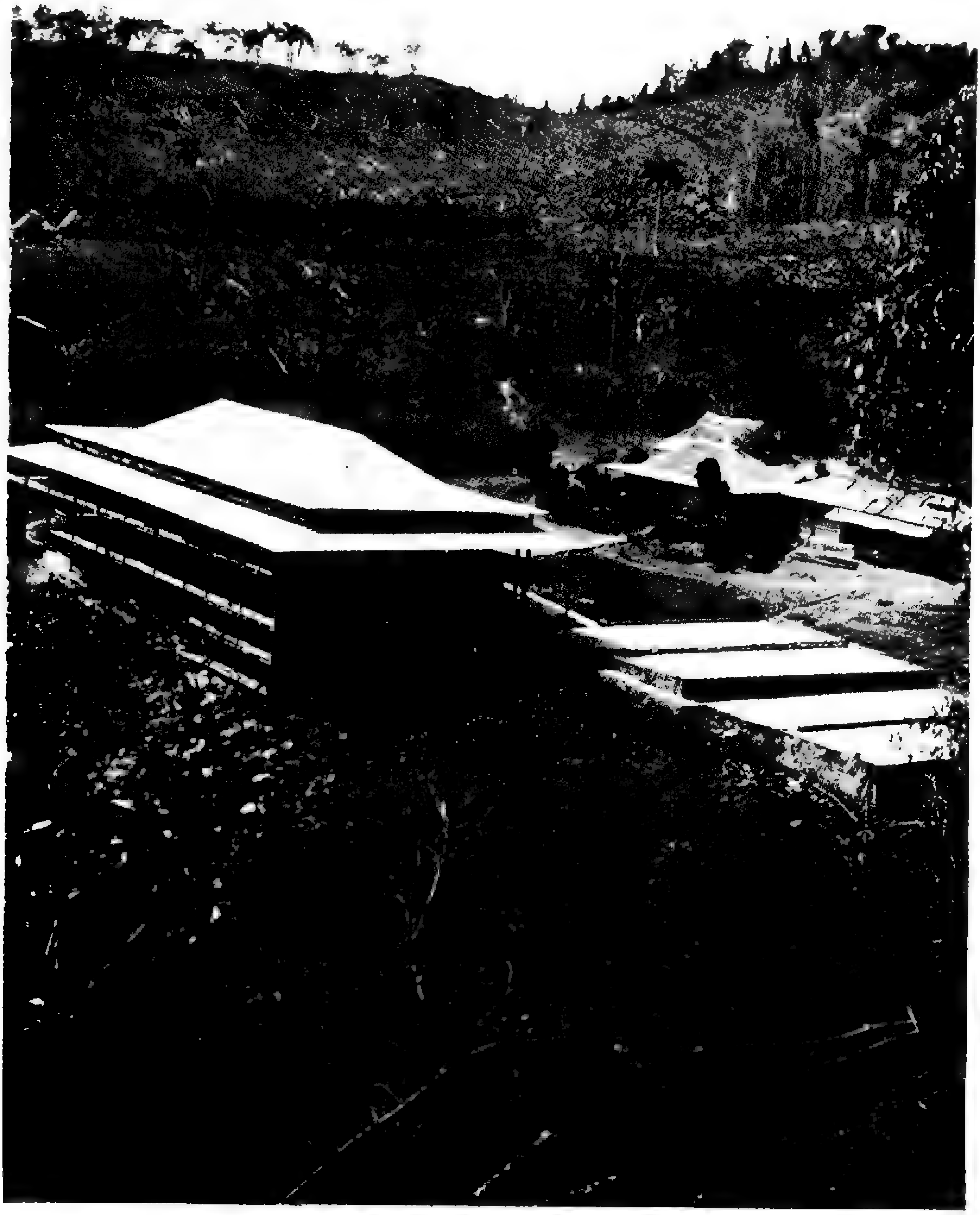


Fig. 3. Cafetal Magdalena in the Cuchillas de Toar, showing the hillsides denuded by the ancient practice of cutting and burning forests to make temporary garden lands, which has ruined much of Cuba and still continues.

José was very proud of the fact that the entire meal came from his own land except the salt and some beans. The García home and tienda, "La Alegria", had electric lights with current supplied by a small gasoline-powered generator.

That night, rain clouds covered the sky and a light shower gave us horrible visions of what a downpour would do to the new road and we left early Saturday morning, making only a few stops along the way, once to collect some very beautiful Exostema longiflora (Lam.) R. & S. along a tiny stream, and once to collect a striking maroon-leafed Epidendrum which was sterile. The plant has since bloomed here at the Botanical Gardens, but is still undetermined as to species.

At Pinares de Ceiba we were given directions about how to reach Monte Verde. We started out along a lumber road through a towering forest in which we collected very little, a few orchids, some Philodendron, and a tree fern. The road became worse and residents along the way assured us that we could not reach Monte Verde by that route. We turned around and shortly afterward met a pedestrian who very emphatically assured us that the road did lead to Monte Verde. So again we turned around and drove down out of the wooded heights into the valley of the Vega Grande, a tributary of the Yateras river. Without our guide we would never have found our way. Finally we arrived at San Andrés, nestling at the foot of Monte Verde. We entered the finca along a road bordered by "mil flores" (Clerodendron fragrans var. pleniflorum (Schau.) Standl.) This beautiful member of the Verbenaceae is naturalized in many parts of Cuba. At San Andrés, our guide left us after instructing us how to reach our goal, but not mentioning that it had been many seasons since wheeled vehicles had traveled the route.

Had we known what was in store, we would have returned to Caridad de los Indios along a road which followed the stream bed of the Vega Grande. Instead we bravely started scaling the rocks. After each particularly difficult ascent, we would say, "well, we might as well go on; — the road ahead can't be any worse!" But we were wrong! It could be, and was, worse! At one point we spent a half hour removing broken bottles from the rocks so that the jeep could climb ever higher. Then we hired a Cuban to dig us a path around a particularly difficult rock ledge.

Along the way, we passed haciendas apparently built by the French who fled here from Haiti early in the 19th century. Exotic palms and pandanus ornamented the yards. The houses were unpainted and in disrepair, but still imposing in their time-worn elegance. We arrived in Monte Verde six hours after leaving Pinares de Ceiba. We had covered exactly eight miles according to the jeep speedometer.

The road down from Monte Verde was easy and we reached the flat Guantánamo valley in short order.

The botanist today has little advantage over Wright in trying to collect in the mountains around Monte Verde. Except for the few jeep trails which we covered, all travel has to be on foot or mule-back. Monte Libano and Monte Toro can be reached only by those means. The route overland to Baracoa is the same. Although every year the area of virgin forest and native vegetation shrinks alarmingly, the amount of botanical exploration being done is still very greatly restricted by the inaccessibility of the mountain regions and dearth of botanists with the interest (and funds) to follow in the trail of Charles Wright.

Among the other areas in Oriente visited by Wright, the Sierra de Nipe has since his time proved to be a bonanza of new and interesting plants. In his day two routes led from Santiago north to Mayarí skirting the Nipe region. One led east of the mountains and followed the Mayarí river. The other, the "Royal highway", wound along the western flanks of the Sierra past Bayate, near Central Miranda, the Rio Canapú, Barajagua, Alto Cedro, crossed the Rio Bitirí over a natural bridge carved from bedrock by the river, and then proceeded past Pico Mensura into Mayarí. Nearby in the pinelands are Woodfred (also known as Los Pinares) and Piedra Gorda. In Wright's day, Alto Cedro was in a veritable jungle which became swampy in the rainy season. Today the area is a vast expanse of sugar-cane fields, one of the most productive areas in all Cuba. The roads have changed but little during the past century.

Deep in the mountains of the Sierra Maestra west of Santiago, lies the village of Hongolosongo. Wright spent much time on the fincas of friends in that area, collecting on the peaks of El Cobre, La Guinea, and on Loma del Gato. The late Brother Clemente, who taught in the Colegio de la Salle at Santiago, built up a marvelous fern collection, principally from the latter peak where his Order maintains a rest house near the summit. It is said that 300 species of ferns have been collected from one square mile on Loma del Gato. Such were the collecting grounds that invited Wright during his stays at the fincas "Filantropia" and "La Madelina."

East of Santiago in the northern hills of Gran Piedra, Wright stayed various times at Nouvelle Sophie, and made at least two collecting trips to the summits of the nearby mountains. Further east and north a few miles is the village of Ramón de las Yaguas on the Bacanao River. To Wright it was known as "Josephina", and he used it as a headquarters and collecting station in the Bacanao valley.

Much remains to be done before all the field stations of Wright can be located exactly. Some of his collecting locations will never be more definitely known than the general district where they were. But scattered throughout North America and Europe are the thousands of sheets that were in the original 15 sets of plants that were distributed

Fig. 4. A brush-covered area of the Bacanao Valley with the peaks of the Sierra de Cañada rising in the distance. The Sigua manganese mine is located in the Bacanao Valley near here. Light-barked trees in the foreground are Bursera simaruba.

and from them much information still remains to be reassembled. Perhaps in the years to come, this information will become available to help all botanists who are interested in the Cuban flora.

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FICTITIOUS BOTANISTS OF LATIN AMERICA

Roy N. Jervis

EXAMINING the literature on the flora of Cuba, I ran across several references to botanical explorations and voluminous publications of several Europeans who reputedly had visited Latin America, but whose publications I could not find. A total of 13 volumes on the Cuban flora supposedly were published by the following six 18th and 19th century botanists: Lorenz Wenceslas Kerckhove, Olaus Kjoiping, Friedrich Wilhelm Nascher, Stanislas Henri de la Ramée, Gaston Louis Thibaudin, and Charles Louis Auguste Wallerton.

All these are included in Appleton's Cyclopaedia of American Biography (1) and also in Trelles' Biblioteca Cientifica Cubana (2). Pritzel, however, and other bibliographers failed to list them.

After fruitless search I was shocked to find that not only were the books non-existent, but also that the botanists had never existed either. In 1919 John H. Barnhart (3), bibliographer of the New York Botanical Gardens, published an article entitled "Some Fictitious Botanists". He listed 14 names of fictitious botanists of Latin-America, who apparently first saw the light of day in Appleton's Cyclopaedia and among them were the six to whom I have referred.

Such a reference as "Historia Plantarum circa Havana sponte crescentium, Kerckhove, Lorenz Wenceslas (1785-1839), 3 vols., Amsterdam, 1839," would certainly look authentic (aside from a slip in grammar) especially if it appeared in an otherwise scholarly work of a recognized botanist. However, this is just one of many created from thin air to round out the pages of Appleton's Cyclopaedia, for the work of Barnhart and later of Margaret Schindler (4) and others disclosed at least 84 of these fictitious biographies in the Appleton publication, but no amount of research has disclosed their creator.

The perpetrator of this fraud may have been an unknown Frenchman who wrote under the pen-name, William Christian Tenner. He contributed eight valid biographies to the Cyclopaedia and it is believed that he was responsible for the false ones. However, the real identity of W. C. Tenner has never been made public.

An editorial comment in the short-lived publication, Letters, (5) in 1936 summarized what is known of this biographical hoax. After Barnhart unearthed the first group, the staff preparing Sabin's Dictionary of Books Relating to America found 16 more imaginary scientists. Schindler listed 18 and Joseph Cantillon, working at Woodstock College, Maryland, found an additional 32. Then Barnhart added 15 more botanists to the list. Eleven names were duplicated in the several lists leaving a total of 84 fictional scientists. Barnhart estimated that the final figure might pass 200 when the research is complete.

This hoax has been perpetuated by unsuspecting writers who have admitted these ghosts to their second-hand summaries of Latin American botany. I do not know that anyone has actually written that he has "seen" any of the mythical books, but there are instances of the imaginary authors and their botanical explorations having been accepted as real, with such valid botanists as Jacquin, Sloane, Hamilton, Swartz, etc.

Various libraries today have stamped into their copies of Appleton's "Cyclopaedia" the word, "fictitious", beside the biography of each of these mythical characters, but there is still a great chance that the unsuspecting copiest may not see those particular warnings.

So, the botanist who is working with Latin American literature must beware of a ghost whenever he sees a reference to any one of the following: Guiseppe Igolino, Gustav Herman Kehr, Lorenz Wenceslas Kerckhove, Olaus Kjoeping, Alexander Daniel Koehler, Frederick August Lotter, Edouard Louis Martier, Friedrick Wilhelm Nascher, Isidore Charles Sigismund Née, Stanislas Henri de la Ramée, Edouard Sylvie, Gaston Louis Thibaudin, Jacques du Vivier, and Charles Louis Auguste Wallerton; or simply the surnames: Goicoechea, Ingenhous, Herbette, Hjorn, Huan de Penaster, Jugler, Jansen, Jungmann, Keisár, Loot, Martin de Mayville, Mondédir, Montaigne de Nogaret, Monteil, or Montrevill. What a roster of imaginary botanists! Others have been detected.

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A BOTANIST'S GLIMPSE OF THE GRAN PIEDRA REGION OF CUBA

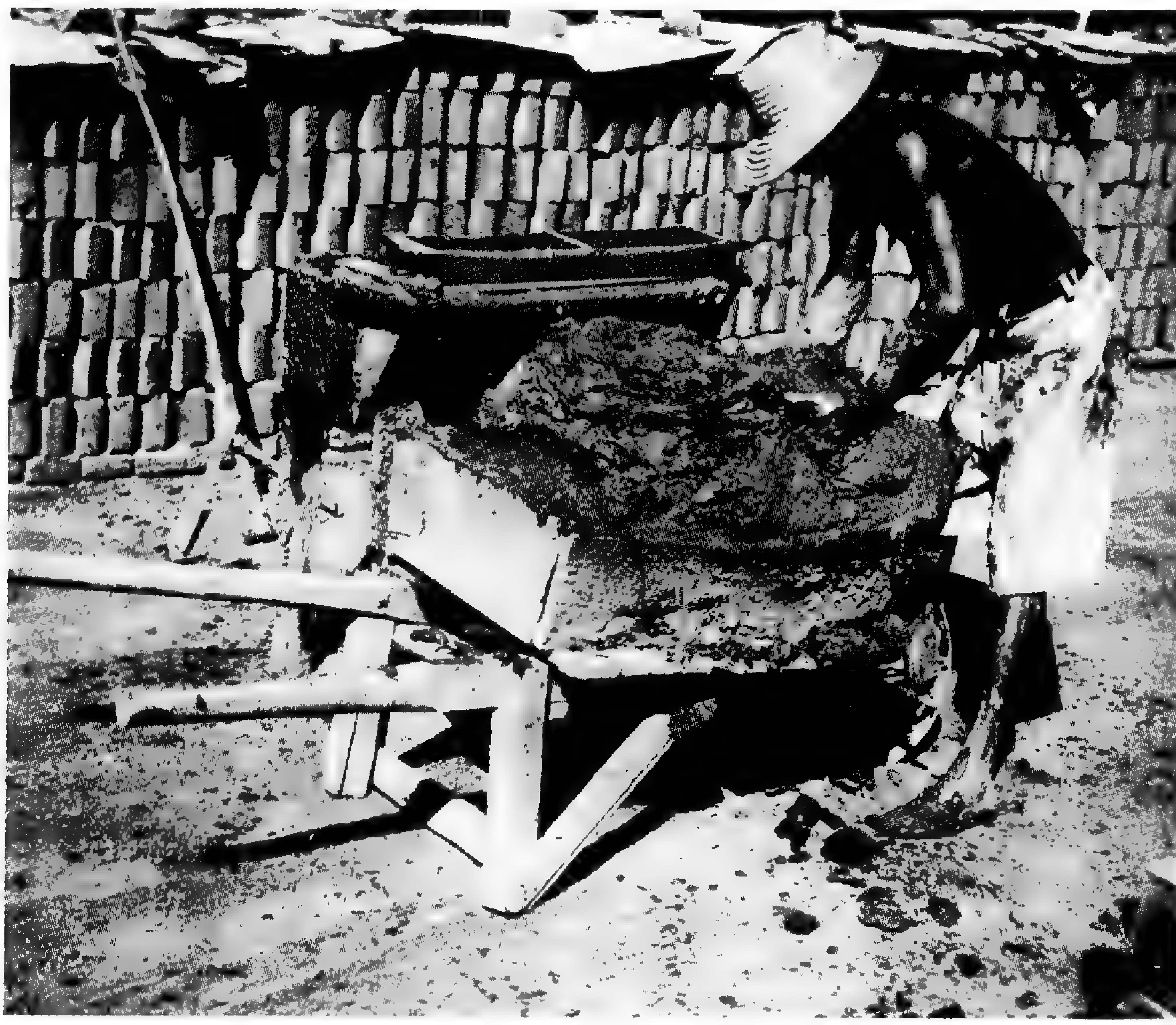
Roy N. Jervis

IN PREVIOUS issues of the Asa Gray Bulletin articles concerning botanical trips in Oriente Province, Cuba, have included a preliminary account of botanizing done under the auspices of the Botanical Gardens, an account of Grady Webster's trip into the Sierra Maestra, and also a summary of the trip to Moa. These articles represented the beginning and end of a year's work. In between were several trips of general interest.

Hurricane season with its torrential rains ended late in 1950 and it was December before the roads of Oriente became passable, but sporadic downpours continued to hinder botanizing until the middle of February. One trip to the Rio Jojô was described in the first article (Vol. I, p. 87). A second and somewhat more successful trip was made during the week between Christmas and New Year's, but this was cut short by rains. On January 27 and 28 another trip was made north of Guantánamo to Monte Verde and thence to Palenque, but again rain drove us out of the mountains before much botanizing could be done.

Despite the continuing threat of rain, I decided to try to reach the Gran Piedra range of mountains that lay tantalizingly to the west of Guantánamo Bay. All fall and winter I had watched the jagged peaks of the Sierra de Cañada as I went to and from the high school where I taught, all the time knowing that no botanists other than a few Cubans, one American, Charles Wright, and the great Swedish collector, Dr. Erik Ekman, had ever collected in the region. But day after day, black swirling storm clouds bathed the peaks until late in January when dry weather seemed back for a while and Gran Piedra stood out in relief against the clear blue Caribbean sky.

So on February 4, 1951, I set out alone to drive by jeep to Filipinas, a spot on the map to which a tortuous black line led, indicating that some kind of road led up to the foot of the mountains. From there I hoped to find a way into the mountains which rise to over 4,000 feet midway between Guantánamo and Santiago. The trip to Guantánamo City from the Naval Base was uneventful, except for a short stop at Novaliche where I made a series of pictures of the primitive brick works owned by Señor Domingo Sanchez and operated by a crew of three husky men. Nearby is the site of the broad-leafed tree cactus, Pereskia cubensis Britton & Rose, made immortal by Brother Marie-Victorin's description of the area and its flora which appeared in the first volume of his Itinéraires Botaniques dans l'Ile de Cuba. A week earlier, César Piña and I had visited Novaliche after we were driven out of the mountains near Monte Verde by a torrential downpour in the middle of the night. We had collected the endemic Pereskia as well as a few photographs and then continued on to Guantánamo to inquire about the condition of the road to Filipinas. No one to whom I talked



Simple manufacturing methods are used in the brick works of Domingo Sánchez at Novaliche, Oriente, Cuba. After being fired, the bricks, which are made from the fine alluvium around Guantánamo Bay, become extremely hard. The somewhat irregular shape adds a character to masonry that is lacking in uniform machine-made bricks.

knew a thing about the road and so, after fortifying myself with an extra large dish of "helado" (Cuban sherbet), I headed southwest hoping for the best. (For a map of the route, see Asa Gray Bulletin, Vol. I, No. 1, page 88. 1952.) For a short distance I followed the "highway" to Caimanera which is usable throughout most of the year and is traversed mostly by taxis with loads of sailors and other employees who catch a launch at Caimanera for the half hour boat trip across the bay to the U. S. Naval Station.

The road to Filipinas cut quickly from the Caimanera road downward through a mass of half dried mud-holes to the ford across the Rio Jaibo. There I disconnected the fan, drove across the rocky stream bed with the river washing through the jeep and then, on the opposite shore, reconnected the fan and resumed my journey.

The southwest section of Guantánamo Valley is dry, in fact, so dry throughout most of the year that sugar cane which grows so luxuriantly in most of the northern part of the valley gives way to cattle ranches. The herds of cattle, the windmills, and the long stretches of grasslands resemble areas in cattle country of the United States except that the feathery heads of the Royal Palm, Roystonea regia (H.B.K.) Cook, occasionally dot the landscape and the Flambouyant, Delonix regia, brightens almost every dooryard with its masses of brilliant red flowers. Two other trees are characteristic of the cattle land. The umbrella-like legume, Samanea saman (Jacq.) Merrill, with thick short trunk and low spreading branches and the much more common elm-like Guazuma tomentosa H.B.K. provide shade for the cattle. The rough fruit of the "guasima", a member of the Sterculiaceae, is eaten readily by livestock and though not as good shade for the cattle as the Samanea, the "guasima" is usually left standing in the pastures.

Midway across the valley I reached the Rio Guantánamo and again found the water deep. Despite the precaution of disconnecting the fan, the engine shipped a little water and died a few feet from the west shore of the stream. When I opened the distributor to dry out the moisture, I found nothing wrong, stepped on the starter and, to my surprise, away we went.

Here and there along the roadway the living fence posts of Gliricidium sepium (Jacq.) Steud. were covered with their white and pink flowers like clusters of sweet peas. Over on the east side of the valley, Bursera simaruba is more commonly used for fence posts than the Gliricidium. In many other areas Erythrina berteroana Urban predominates. All are alike in that the posts take root, put out new branches and soon become small trees. However, termites attack these before long and new posts have to be planted. Actually, the new posts consist of slender wand-like branches cut from the tops of the old posts and stuck into the ground in between the old ones. In a few weeks they are growing luxuriantly. It is a convenient and never-ending cycle in the struggle against the invasion of fungi and termites.

As I left the cattle country I began to follow the Rio Liguana which curves southward in a semicircle and then into the hills of the Sierra de Cañada. At one point, the river had cut across tilted layers of shale and sandstone which underlie the thin soil. All the young rocks tilt about the same 20 degrees upward toward the crest of the Sierra. I stopped long enough to make a photograph of the formation. After cutting back and forth across the Rio I finally arrived at Filipinas, a settlement of a few unpainted buildings, not enough to merit the appellation, village. At the lone "tienda" (store) along the road, I inquired about trails into the mountains. The storekeeper looked at me in amazement.

"But, of course," he said with a grand sweep of his hand, "derecho (straight ahead)." And then he added, "The road continues across to the sea and then to Cuba." Here for the first time I heard the term,

A "charcoal" pile near the Rio Bacanao shows how even small brushwood is used in the manufacture of this essential fuel. The demand for charcoal has caused vast areas of Cuba to be stripped of its original luxuriant forests.

"Cuba", applied to Santiago de Cuba. In past generations, Santiago to residents in Oriente was simply "Cuba", and as I found out a few miles further into the mountains, it still is "Cuba" and the name, Santiago, is seldom used.

To a casual observer, there was no road. Instead, a small stream, still the Rio Liguana although here called the Casimba rushed across bed rock, around gravel bars and through mud, and allowed mere man to use the same path as a highway. The road led steadily upward through coffee fincas and this combination highway and river was the route for delivery of bags of coffee by truck and muleback down to Filipinas. Along the way were trees, both native and foreign. Mangoes from India and Erythrina from Brazil grew as tall and seemed as much at home as the Cuban Ocatea and Ficus. A common fern along the rocks was Anemia hirsuta (L.) Sw. The native forest was cleared away a century ago to make room for the coffee, and now the Podocarpus, Swietenia, Cedrela, Juniperus, Lysiloma, and other valuable trees which once forested these mountains are but scattered individuals.

As I reached the crest of the Sierra de Cañada before descending into the Bacanao Valley, I drove over bed rock of bright blue slate which tilted down to the northeast about 25 degrees. Its jagged upper edge seemed faulted in a northwest to southeast direction at this point and the break is apparently part of the great Bacanao fault which has given rise to the Sierra de Cañada and the huge conglomerate rock pile that is the Gran Piedra.

The road began a precipitous descent through more coffee lands and finally began to level out in the broader valley below. At one point where it was necessary to open a barbed wire "gate" which hung across the road, I collected a mango in full flower. These mangoes yield small yellow fruits of variable edibility most of which are eaten by the mules and half wild pigs. A nearby smaller tree yielded fruiting specimens of Chrysophyllum oliviforme L., one of the most striking members of the Sapotaceae of Cuba. The leaves are brilliant glossy green above and underneath are clothed with burnished golden satin. The fruit, about the size of a small olive, purplish-black in color, is very juicy, having a sticky, milky white sap. Cubans call them Caimitillo and eat them freely. I ate a few and found them agreeable though not delicious.

The Bacanao River was high when I reached its bank. The ford was much too deep for the jeep and at first I was tempted to go back. But behind me black clouds threatened a downpour, and according to my Cuban information bureau back at Filipinas I was closer to the Caribbean seacoast and safe roads than I was to Filipinas. I did not relish retracing my way down that narrow Rio Liguana road with a flash flood sweeping along behind me. Neither did I relish having to cross the Bacanao which was deeper than the jeep could navigate. Search disclosed a shallow ford downstream, across which I found myself on a road bed of solid red conglomerate rock made of stones of all sizes from gravel to enormous boulders all bound together by a finer matrix. The road led along the river and then through a series of rocky, deep fords as the trail wound upstream. The cliff walls were of the same coarse conglomerate rock and were adorned with scores of Agave rosettes. According to members of the Humboldt Group who have climbed Gran Piedra, that mountain is topped by a 75-foot boulder of the same kind of conglomerate rock.

Thunder began to roll out of the mountains and I could begin to see the clouds swirl and toss in the distant peaks to the north. So after stopping once to collect some river sediments to study later for diatoms, I began a hurried effort to get beyond these narrow canyons before the rains struck. Finally I saw the road ahead stretch away from the river up over cut-over scrub-covered hills. As the jeep splashed through this last ford, the engine gasped and then as the front wheels climbed onto dry land the jeep stopped. Just a month before, we had been caught in a flash flood on the Rio Jojó and I anticipated another such debacle. On the Jojó it had taken three days to dry out the jeep so that it would run. With that in mind, I busied myself trying to rouse the sleeping engine, but again I could find nothing wrong with it. A woodcutter came along and offered to get help to pull the jeep up to high ground, but we waited a few minutes longer, I stepped on the starter, the engine roared to life, and as the muffler gurgled and sputtered in the rushing stream, we drove up onto dry land again. (Later, back at the Base, I found that a wire leading to the distributor was almost broken in two and the resulting poor connection had caused all the trouble.)

I would like to have stopped to collect from the very interesting vegetation along the river bank, but the storm to the north prodded me along. The woodcutter rode along with me as far as his "bohio" with its surrounding tiny banana and sweet potato patch and then I continued the climb from the valley. About a thousand feet higher the road became much better and wound through the mountains of desolate cut-over wasteland.

Many years ago all the area was covered with a rich mixed forest. But about 1900, under the impetus of the United States occupation of Cuba, most of the finest hardwoods were removed. Then later the remaining hardwoods were cut out. The demand for charcoal for cooking and heating caused the remaining large trees to go. Just before World War I, Dr. Ekman collected *Pinus cubensis* and *Podocarpus* in the nearby hills, but today the charcoal burners have removed even the larger scrub. Fires periodically rage through the region and burn off what man has not been able to destroy. There are reputedly some stands of pine still remaining in the Gran Piedra area, but Brother Marie-Victorin could not find them in 1940 nor could I in 1951. (Later, Señor Pedro Cañas, President of the Humboldt Group in Santiago, told me that as recently as 1949 there were good stands of pine on Gran Piedra, but lumbering and fire had removed anything that was at all accessible.)

The trip through the mountains from the Bacanao Valley over into the Sigua Valley was uneventful, except that at one point I had to back the jeep for a nerve-tingling half mile up the steep mountain trail because I met a loaded truck and the road was much too narrow for both of us.

As I came down into Sigua Valley, I stopped once to collect a striking asclepiad, Calotropis procera (Ait.) R. Br., a small tree about eight feet high growing with several others in the upper edge of a steep pasture. This giant milkweed with its fleshy purplish-red and white flowers is a distinct shock to one whose sole acquaintance with the family is the small plants of temperate North America. Later I saw the same plant as a low shrubby weed on the approaches of Morro Castle at the entrance of Santiago Bay. There it is called "Old Woman's Flower". Near Imias on the southcoast near the Rio Jojó, I saw a tree of the same species about fifteen feet high which served as a shade tree in the yard of a bohio. Actually the plant is an immigrant from the Old World tropics, but it is making itself at home in Cuba.

After crossing a section of road interlaced with ruts and mudholes, memories of the last rain, I entered the fantastic dry limestone region on the coast. Near Sigua there are limestone blocks fifty feet high that have been tumbled at right angles to the parent rocks. Everywhere in the area are evidences that recent seismic action has upset the terrace formations carved by Pleistocene seas.

The storm clouds by now had reached low on the mountains and I could see in the distance rains pouring down on the roads which I had just left. There in the rain-soaked Bacanao Valley were two abandoned mines which I had hoped to reach. One was once operated for manganese. The other is a relic from the old Sigua Mining Company which raised $1,500,000 in capital and in 1892 proceeded to build docks and a railroad before thoroughly exploring for iron ore. A few thousand tons of float ore were removed before the company discovered that there was no more ore and quietly closed its doors. Today some evidences of the docks and railroad remain, but only two or three buildings down on the coast are the port of Sigua now.

The area along the coast between Sigua and Santiago is a dry limestone terrace in many ways similar to the coast from Guantánamo to Maisi. However, there is much more dog-tooth limestone with its sharp jagged edges and the vegatation is decidedly different. Unlike the area to the east, the Sigua coast has few large cacti. Instead, there is a more luxuriant and taller thorn scrub. There are several species of Jacquina which I have not found east of Guantánamo. But the most beautiful plant which I found there was the linear-leaved Frangi-pani, Plumeria filifolia of Grisebach. It is endemic to Oriente and is common only along this narrow coastal limestone near Sigua. I was able to collect some seeds so that the plant is now also growing in our Botanical Garden collection of Cuban plants.

Rain stopped my botanizing and I resumed my trip to Santiago. At the Playa de Verraco, the road turns inland up the valley of the Rio Verraco. There I stopped long enough to collect the white flowers of a 30 foot tree, Cordia alliodora, known as "capa prieta" in parts of

Cuba, and in the same area, Cleome spinosa Jacq., a three-foot shrub with white flowers. In the growing darkness I did not notice a giant Pereskia cubensis tree more than a foot in diameter which grew very near the road. In the following summer Grady Webster and I collected from Santiago to Sigua and found this enormous tree cactus together with a smaller tree nearby. These were the only specimens that I saw outside the alluvial flats around the north side of Guantânamo Bay.

Darkness found me in Verraco Valley; lightning flashed in the nearby mountains, thunder rolled out across the valley and occasionally a short shower whipped the jeep, but fortunately the heavy rains stayed behind me. Soon I passed the road to Daiquiri where I picked up three Cuban hitch-hikers. Then we reached Siboney and within a few miles came onto the paved road leading into Santiago. Our route led past historic San Juan Hill and the famed Ceiba tree (Ceiba pentandra) where the treaty ending Cuba's war for independence was signed. Finally we drove into a modern gasoline station, gleaming in white and blue, and I was able to wash off layer upon layer of dust and grime.

The return trip was made by the regular road to La Maya and Guantânamo City and I spent the next day collecting in Guantânamo Valley before returning to my headquarters at the Naval Base.

A full schedule of other trips prevented a return trip to the Bacanao. When Grady and I returned to Sigua the following summer, the rains which were forerunners of the heavy downpours of hurricane season had already made it impossible to reach the Bacanao. So I am hoping to return to Cuba again in the near future and spend considerable time collecting in the Bacanao Valley and along the peaks to its north where apparently few botanists have worked. Gran Piedra undoubtedly has not yielded all of its botanical secrets either. Although most of the original vegetation is gone, enough remains in the rugged ravines, on the steep cliffs and other regions where man and fire have not reached in their quest for fuel, to lure me back.

EIGHTH INTERNATIONAL BOTANICAL CONGRESS—This congress will be held in Paris in 1954. A great many field-excursions have been arranged in connection with the Congress, including some to tropical French Africa and the Ivory Coast. The General Secretary will be Professor P. Chouard, whose visit to Ann Arbor last spring will be remembered by some of our readers. Applications or communications in regard to the Congress should be sent to: The General Secretary, VIIIth International Botanical Congress, Conservatoire National des Arts et Mêtiers, 292, Rue St. Martin, Paris (3^o^), France.

BOTANICAL REVIEWS OF BOOKS ON THE ANTARCTIC, THE HIMALAYAS, AND TIBET

H. H. Bartlett

BOOKS of travel, with or without intentional botanical content, are likely to be attractive reading for botanists. Very young botanists, of course, haven't yet been to distant places, at least with an understanding eye, but they would like to go, and are interested in descriptions of what the general surroundings as well as the natural history would be like. When I was a boy in Indianapolis I borrowed William T. Hornaday's "Two Years in the Jungle" from that naturalist's sister, Mrs. Miller, the lady who lived next door to my uncle. She passed the precious book over the backyard fence with the admonition to take good care of it, and I did, although it was already quite tatterdemalian. Before I reluctantly returned it several readings had so endeared it to me that it was a red-letter day when many years later I found my own copy in a second-hand book store. It was less the part on India than that on Borneo which appealed to my imagination but the wheel of fortune eventually took me to Sumatra instead of Borneo, and never to India.

The moral of this little tale prefaced to these reviews is that one who becomes addicted to reading travel books never seems to get over it. I am sure that after visiting a place that a book is about, a travelling naturalist's interest in what someone else has written is only intensified. If he hasn't been to the places that he reads about, he compares his own experiences somewhere else with the author's. If a book gives only little glimpses of the natural history, his imagination will build them into full pictures of what might be. The books reviewed in this article are on the extreme fringe of botanical literature. Maybe they should not be reviewed even in this very atypical journal, but then again, maybe they should, for the simple reason that they all have a little for the botanist and they aren't likely to be noticed in the more formal scientific journals.

I intended to start with that amazing book "Kon-Tiki",[1] not related to the others, but my "review" of that grew so long that is has had to be omitted. Anyway, Kon-Tiki has been so popular that probably nearly all naturalists have now read it or know about it. The other books that I write about are just as interesting in their own respective ways and are highly recommended to those who share the reviewer's taste for travels that touch, lightly at least, upon natural history, whether it be

[1]Heyerdahl, Thor, Kon-Tiki: across the Pacific by Raft. Translated by F. H. Lyon. Chicago (Rand McNally & Co.), 1950.

botany, or, as is rather more usual, zoology or anthropology. All but one or two of them are remotely related, after a fashion, in that their authors have followed in the footsteps of Sir Joseph Dalton Hooker, one of the most eminent of botanical travellers.

As a young man Hooker accompanied the Antarctic Voyage of H. M. discovery ships "Erebus", and "Terror" in the years 1839 to 1843. His early reputation was based upon his voluminous reports on the botany of the Antarctic and other parts of the Southern Hemisphere visited by that exploring expedition. The elaborate publications were issued, however, in such inadequately small editions that most of the few copies have long since been procured by institutional libraries, so that individual botanists can never hope to have them. Anyway, they hardly belong to the literature of travel but rather to technical systematic botany.

From the Antarctic Hooker turned his attention to Himalayan India and the borderlands of Tibet. His explorations (1848-1850) largely centered in Sikkim, because Dr. Falconer, Superintendent of the Botanic Garden at Calcutta, had directed his attention to the almost complete ignorance, a hundred years ago, of the geography of that region. Furthermore, "all to the north [i. e., Tibet] was involved in a mystery equally attractive to the traveller and the naturalist."

In one of his Sikkim journeys Hooker and his companion Dr. Campbell, Superintendent of the Health Station maintained by the British Indian Government at Darjiling, were held as prisoners in order to extort political concessions, and Dr. Campbell was maltreated because of the ill-will of certain Sikkimese who had been punished by him in India for various crimes. Hooker wrote: "The circumstances of this outrage were misunderstood at the time; its instigators were supposed to be Chinese; its perpetrators Tibetans; and we, the offenders, were assumed to have thrust ourselves into the country, without authority from our own government, and contrary to the will of the Sikkim Rajah; who was imagined to be a tributary of China, and protected by that nation, and to be under no obligation to the East Indian government."

All this was just over a century ago. Hooker's explorations laid the basis for his great "Flora of British India" (1872-1897) but that was preceded by many contributions to Indian botany, including a never completed "Flora Indica" by himself and Dr. J. Thomson, in 1855. Dr. Thomson had joined Hooker late in 1849 after working in the northwestern Himalayas and Tibet. They then spent the year 1850 collecting together in the Khasia mountains, and returned to England in 1851. These travels were all described in Hooker's "Himalayan Journals,"[2]

[2] Hooker, J. D., Himalayan Journals: Notes of a Naturalist in Bengal, the Sikkim and Nepal Himalayas, the Khasia Mountains, &c. A new [i. e., 2d] edition. London, 1855. (1st ed., 1854; 3d, 1891; 4th, 1905.)

which, having had four editions, the last in 1905, is easily available as the very basis (at least for a botanist) of a bookshelf devoted to travel in India. Also it belongs appropriately to a collection on Tibet as well.

The Australian Antarctic Expedition of 1947-48 to Heard Island[3]

The Australian National Antarctic Research Expedition of 1947, under Group-Captain S. A. Campbell, Leader, consisted of a voyage along the coast of the Antarctic Continent in Lincoln Ellsworth's exploration ship the "Wyatt Earp", and the relatively intensive work of scientific parties ashore on Heard Island and Macquarie Island. The task of the Heard Island party during 15 months was to build a weather station and to make not only the more usual meteorological observations, but also to record cosmic radiation, auroral and magnetic phenomena and to make a geological and topographic survey. There was no provision for biological study except in spare time by the medical officer, Dr. A. R. Gilchrist, whose interests appear to have been mainly zoological. Consequently the popular account by W. A. Scholes, the radio operator, has only the slightest allusion to the botany. The flora is almost as meagre as possible, and the old published records by Hooker[4] and Hemsley[5] are not easily accessible to most readers.

Heard Island, an isolated speck of land rising to an elevation of about 9000 ft., lying in the Antarctic 2500 miles southwest of Australia, is especially interesting to Americans because it was discovered by Captain Heard of the American ship "Oriental" about 1853. The first landing was by the American sealer Captain Darwin Rogers of the ship "Corinthian", in 1856. In 1857 an American sealers' camp was established by Captain Henry Rogers of the ship "Zoe", with twenty-five men, and some of them spent the winter there.

Hooker wrote: "The three small archipelagos of Kerguelen Island (including the Heard Islands), Marion and Prince Edward's Islands, and the Crozets, are individually and collectively the most barren tracts on the globe, whether in their own latitude or in any higher one, except such as lie within the Antarctic Circle itself; for no land, even within the North Polar area, presents so impoverished a vegetation."[6]

[3]Scholes, Arthur, Fourteen Men: the Story of the Antarctic Expedition to Heard Island. New York (E. P. Dutton and Co., Inc.) 1952.

[4]Hooker, J. D., Enumeration of the Plants hitherto collected in Kerguelen Island by the "Antarctic", "Challenger" and "British Transit of Venus" Expeditions. Philosoph. Trans. Roy. Soc. Lond. 168 (Extra Volume): 17-23. 1879. (Includes Heard Island records.)

[5]Hemsley, W. B., Report on the Botany of the Bermudas and various other Islands of the Atlantic and Southern Oceans. Part 2. The Voyage of H.M.S. Challenger. Botany. Vol. 1, Sect. III. 1885.

[6]Hooker, J. D., Observations on the Botany of Kerguelen Island. Philos. Trans. Roy. Soc. Lond. 168 (Extra Volume): 9-16. 1879.

His letters[7] on Kerguelen Id. are as interesting now as when written. Yet the latitude of Heard Island is only about 53° 10' South, corresponding about to Lincoln in the middle of England or Edmonton, Alberta.

The Challenger Expedition made a stop in 1874 when Heard Island was still inhabited by a fluctuating group of American sealers who were then reported to number about forty. Hemsley made a report on the botanical collection made by Moseley in a short three hours ashore, and was able to list only five species of flowering plants, 3 mosses, 1 liverwort, and 8 marine Algae. There was not a single lichen to be found. This was especially remarked by botanist Moseley[8], who said: "I searched in vain for lichens of any kind." His general account of the vegetation was excellent indeed. From Hooker, Hemsley and Moseley we can interpret some observations made by Scholes. It is a pity that the scientists of the recent Australian Expedition could not have had with them photostats of the few pages written by Hooker and Hemsley referring to Heard Island, but they did have Moseley's book and seemed intensely interested in it.

Additional botanical information would be exceedingly welcome in view of the slight extent of land toward the Antarctic limits of vegetation, and it is hoped (although hardly expected) that the scientific reports of the Australian Expedition, which will doubtless appear in due time will give more information. In the meantime there are a few gleanings for the botanist in the pages of Mr. Scholes's interesting book, which, however, has a great deal more about the birds and mammals than the plants. It condenses into two or three hours the experience of twelve men living 15 months with sometimes companionable and always interesting penguins and a few other birds and beasts that were also interesting even when utterly uncompanionable.

When the reviewer saw in the newspapers in 1947 that a scientific expedition was about to go to Heard Island he felt impelled to write post-haste, with some suggestions of things that might be done in behalf of botany, even if the objectives were to be almost entirely non-botanical. The letter was never acknowledged, but the reason why can now be well understood. The plans of the expedition had been so well publicized that the leader had received over four thousand letters just from philatelists who wanted mail postmarked by the Expedition at Heard Island. "All told, nine thousand letters were to be returned with the ship." No wonder a letter from a botanist (even though also a stamp collector) got lost in the shuffle! For days we are told, "wardroom tables were littered with mail."

The Heard Island party was more or less constantly in touch with

[7]Huxley, Leonard, Life and Letters of Sir Joseph Dalton Hooker. 2 vols. London, 1918.

[8]Moseley, Henry Nottidge, Notes by a Naturalist on the "Challenger" . . . London (Macmillan & Co.) 1879.

Australia by wireless and messages were received about bringing back young penguins of several species, whose assembly and care took much of the medical officer's time, after which trouble they had to be liberated because no food was provided for them from Australia for the trip home, and fish were too scarce and hard to get at Heard Island. There is no mention anywhere in Scholes's book, however, of a belated letter from a botanist being transmitted by wireless, or of getting seaweeds, or individual-plant seed collections of the grasses, which might have thrown interesting light on the genetic constitution of Poa Cookii, after thousands of years of rigorous natural selection. Scholes's book gives no hint that anybody did any botanizing, but one can't help hoping that the Algae were periodically collected and rough-dried in quantity and that big bulk collections were made of the "mosses" under all conditions and in various spots!

Scholes said of his first impression: "As you looked from the white penguins lining the shore to the bright yellow plane straddling the deck, you bridged the gulf of centuries from the Ice Age to the twentieth century." And the grass tussocks that he saw may, as individual clones, have bridged many centuries of that interval! Has anyone ever tried to find out how old a big slow-growing tussock may be? Is it a rival in age to a great Sequoia? Nobody knows. Has the survaval and growth of individual tussocks separated out only infinitesmally few of the possible individual clones with different genetic constitutions capable of withstanding the Antarctic gales and cold? Have they bred out by seed to true, stable types? Or would they show evidence of hybridity if many seedlings were grown? Again, nobody knows. Maybe seeds are produced without fertilization, if the plants have become polyploid. Hooker defined three different but unnamed forms of Poa Cookii from Kerguelen Island, and considered one of them to be the same that grew on Heard Island. Gray, reporting on the Kerguelen plants collected by the naturalist of the American Transit of Venus Expedition, had said that one specimen was apparently only staminate. It would really be interesting to know about the genetic composition of that or any other Antarctic species. If Hooker was right in his report of Agrostis magellanica from Heard Island, that species would probably have formed the grass tussocks referred to in Scholes's book, for Hooker specifically states that Poa Cookii never forms tussocks, and Hemsley, writing later than Hooker, reports only one grass, Poa Cookii, from the island. There must be at least two grasses.

This speculation assumes that the tussocks and hummocks have been built by vegetation, but maybe they have not been. The botanist Moseley was on Heard Island only three hours, but he saw plenty of Antarctic tussocks elsewhere. He observed that at Marion Island the mounds formed by Azorella Selago evidently retain a considerable amount of sun heat, which probably explained, he thought, the peculiar mode and form of growth and that of many otherwise widely different

Antarctic plants. He found that a thermometer plunged into the heart of an Azorella hummock rose to 50° when the temperature of the air was 45°. On Heard Island, Moseley said the hummocks were made of sand or mud. But are they? An important job for a botanist would be to take some of them to pieces and find out from the preserved pollen and other debris how they were made. Moseley[8] said: "A stretch of land on the northwest side of the plain was covered pretty thickly with green, which was on closer view seen to be composed of patches of Azorella, growing on the summits of mud or sand hummocks, which were separated from one another by ditches or cavities of usually bare brown mud. Some of these patches of Azorella were of considerable extent, and the plant was evidently flourishing and in full fruit. On some hummocks grew tufts of Poa Cookii in full flower, and with the anthers fully developed; and on the sheltered banks of the hummocks Pringlea antiscorbutica grew in considerable quantity, but dwarfed in comparison with Kerguelen specimens, both in foliage and in length of the fruiting stems. Most of it was in fruit, but some still in flower, as at Kerguelen Island. Around pools of water in the hollows grew a variety of Callitriche verna in quantity, and it occurred also in abundance in company with a Conferva. In the same sheltered spots grew Colobanthus kerguelensis [Caryophyllaceae], in greater abundance even than at Kerguelen Island. These five flowering plants, all occurring also in Kerguelen Island, were the only ones found in the island, and it is improbable that any others grow there. Heard Island has thus a miserably poor flora, even for the higher latitudes of the southern hemisphere."

Now we may quote sentences to indicate by direct quotation how the vegetation impressed radio-operator Arthur Scholes. There are two references to seaweeds, the first as follows: "Taking a day off from science, Jo Jelbert went fishing . . . . Returning by S. W. Bay, he slipped on the rocks and fell into the water . . . . Grabbing some seaweed, he held on until another wave bore him to safety." This isn't very satisfying to a botanist, but it indicates a rather substantial dense growth of at least one rather large firmly attached type in shallow water, and will give a phycologist, if one should ever have a chance to go there, assurance that something collectable would be there to reward his efforts aside from what was cast up by the sea. It was discovered, however, that the high winds, arising suddenly, made it very dangerous to attempt working along the shore in a row boat, and that a collector would have to keep uppermost on his mind.

Another allusion is more rewarding: "Winter went with the passing of October . . . . Life teemed along the foreshores, in small rock ponds and creeks, and in the ocean. Long leathery fronds of kelp, fifty feet long or more, were washed up on the beach. A fringe of the brown thick coils festooned the coast . . . . The sea was the provider of all life for the island . . . . Some days russet-colored kelp, thick and soft like moss, was washed ashore. For several feet the sand would be covered with the vegetation. On these occasions the whole bird population gathered to pick the kelp. They ate small white particles in the stringy vegetation." This observation of giant kelps 50 feet long may nullify one remark of Moseley's. He said: "At Corinthian Bay, large masses of sea-weeds were banked up on the sandy shore, where I collected eight species . . . . The main mass appeared considerably different from the masses of algae found on the Kerguelen shore. Durvillea utilis grew attached to the rocks under the cliffs, but the kelp (Macrocystis pyrifera) does not grow at all about this group of islands, according to the sealers, which is a remarkable fact, considering its great abundance at Kerguelen Island."

We now turn to what he has to say of land vegetation in general. At first view, on 11 December, his impression was as follows: "A break in the glacial cliffs proved to be Fairchild Beach, the only landing beach up the coast visible through glasses. The shore was very stony . . . . Higher up were green mounds, which might be mud swamps. The background was low hills, covered with green vegetation . . . . In the infrequent sunshine green hills looked rich and bright, in marked contrast to the snow slopes and bleak grey cliffs."

Observations during the months ashore indicated that there was an abundance of Azorella "moss", forming "hummocks", that there were coarse tussocks (? Agrostis magellanica) and grass that one could lie upon, presumably the only grass, Poa Cookii, that Hemsley reported as growing at Heard Island. The references follow: "Another Sunday I remember well, before winter came, was one when the temperature nodded on freezing, but absence of wind made it feel warmer. The bright sun made an enchanting day and I sat down on a hummock of soft azorella, enjoying the unfamiliar warmth. I lay on the grass . . . . The lower mountain slopes showed patches of bright green where the snow had thawed."

How big were the hummocks? The description of the first and only athletic meeting on the island gives an answer of a sort. "Doc Gilchrist was an early failure. Stumbling over a hummock, he measured his length in a pool of doubtful looking liquid." (Their neighbors the elephant-seals were very unsanitary creatures) . . . . "Last was Norm Jones. 'My legs are too short' he panted, 'I had to go all the way round the hummocks'". So the hummocks could be hurdled by a long-legged but not by a short-legged man. Are we justified in thinking they were two feet high or so?

"Tussocks" as distinguished from "hummocks" were definitely stated to be grass. Near Admiralty hut, where they first landed at Atlas Cove on the northeast extremity of the island and where the Mawson Expedition had stayed in 1929: "Some of the party wandered into the tussock grass to look at the seals and penguins". Here they made their base camp, and "Not a single tree or shrub was visible in the dreary landscape ahead . . . . The only relief came from the green tussocks ringing the camp area." The tussocks must have been large and firm. "The gentoo rookery . . . was in full swing again . . . . The early nest-builders had wandered into the grass clumps in August . . . . It was like a puppet show when you sat in the tussock and watched their antics . . . . Tirelessly they waddled back and forth, bringing grass for the nests." At Spit Bay, "A belt of swampy tussock stretched for three-quarters of a mile between the men and the main lagoon in the middle of the Spit.

There is no indication of what the bog vegetation was, but we read that from the west side of Cape Laurens (the northernmost point of the island)" . . . bog and swampy tussock led to N W Cape." We know from Moseley, however, that Callitriche and Colobanthus grew in the ditches between tussocks.

One passage, giving an impression that the grass was not all a coarse tussock-forming species, occurs in the account of a trip to West Bay, when, on their second Christmas Eve on Heard Island, they "camped on a flat grassy patch above the beach." On the same trip they found that "atop the razorback [between Mt. de la Rue and Mt. Olsen] they approached a broad platform two acres in extent, partly moss-covered", and at the foot of the main snowdrifts, which ended at 500 feet above sea level, along Cape Laurens, "the moss was dotted with holes of the burrowing petrels . . . . The rookery [of black-browed albatrosses] stood on top of cliffs which fell sheer for eight hundred feet . . . . The rookery itself, covered with azorella moss [sic] and poacookii [i. e., Poa Cookii], provided a firm footing." (Of course Azorella is not a moss, but an umbellifer. We are left wondering whether the "azorella" was truly such or perhaps really a moss.) The description of vegetation at 800 feet is very definite and reliable, for a topographic survey had been made. Moseley had said that on Heard Island vegetation appeared to cease at 300 or 400 feet altitude.

There is possibly a bit of evidence that the moss habitats were diverse enough so that several species should have been found. For instance: " 'Doc,' Lambeth, and Campbell-Drury took time off to visit Cape Gazert [at the center of the west shore] . . . . Pulpit Rock was a small volcanic island, its green moss-covered top lit by the sunshine . . . . 'Doc' had a busy afternoon searching for shellfish. Sea slugs, leeches and worms lived in the pools. On the beaches 'Doc' found a variety of life, sea-cucumbers and sea squirts. Unfortunately he could not collect many specimens as he had no suitable preservative." Again, on a trip from Saddle Point, to Fairchild Beach (northeast shore of the island): "Each night when possible, they camped on mossy flats, soft and warm." This would seem to be a different moss habitat from the "hummocks." Could some of the "hummocks" have been just dead, moss-covered grass "tussocks"? Moseley had described tussocks with three species of moss growing on their bases. Or were any of the "moss hummocks" actually moss at all? As Spring came on, Scholes noted that the snow was thawing and exposing "the green-topped azorella hummocks." The vagueness of it all is perplexing, but Mr. Scholes was not, after all, a botanist.

There is a reference to one other of the five flowering plants collected by Moseley, namely, the "Kerguelen cabbage", Pringlea antiscorbutica of the Cruciferae, as follows: "Fried elephant-seal kidney and native Kerguelen cabbage, almost a cross between Brussels sprouts and spinach, made a tasty meal." We are not told how or where it grew.

To the very end of this admirable tale of scientific adventure on Heard Island the botanist is left in doubt about whether any botanical collections were made or not. It doesn't seem too likely, for in the final scramble to pack and sail away: "Expedition members began collecting their specimens and writing up their book work. Lambeth's rocks were crated in wooden boxes; 'Doc's' bird skulls, fishes, animal intestines and shell collections were boxed; others assembled their personal collections of eggs, stones, sealer's harpoons and knives, and other paraphernalia ready for return." This failure to mention plants doesn't sound encouraging for botany! The other study party of the Expedition, at Macquarie Island, had a marine biologist, Ron Kennie, as a member. An account of what he may have done or stimulated others to do will be awaited with interest. Even a "marine" biologist may have taken more than a casual look at "hummocks" and "tussocks", and must surely have collected the seaweeds!

"Fourteen Men" will be enjoyed by all who enjoy vicarious adventure.

Justice Douglas's Trip to Ladakh[9]

The names Kulu, Lahul and Ladakh are very familiar to those of us at Ann Arbor who have followed the extensive travels of the Michigan Botanical Gardens' Associates in Asiatic Research, Doctor Walter Koelz and Thakur Rup Chand. At the beginning of their Asiatic work, which has ranged through many years from Iran and Afghanistan to Nepal and Assam, they worked in the same region of which part was traversed by Associate Justice William O. Douglas in 1951, on foot and by pack train, from Kulu and Manali to Leh, in the Indian Himalayas. Rup Chand is a native of Ladakh, the son of Thakur Jai Chand, the first British Trade Commissioner to Western Tibet, and grandnephew of a

[9]Douglas, William O. Beyond the High Himalayas. Garden City, N. Y. (Doubleday & Co.) 1952. (Price, $5.00.)

Thakur of Lahul. Years ago he visited Michigan with Dr. Koelz and the two have been associated with the University for many years, part of the time, however, connected with the office of Plant Introduction of the U. S. Department of Agriculture and the American Museum of Natural History. Their extensive botanical collections are largely at the University of Michigan, the New York Botanical Gardens, and the Beltsville Herbarium of the U. S. Department of Agriculture.

So a modern and well illustrated book about the country and people from which so much of our Indian botanical collection has come is of no little interest to us, especially since its author is himself an enthusiastic amateur botanist, especially interested in alpine plants. Mr. Douglas made a collection of several hundred botanical specimens which will go to the U. S. National Herbarium after identification. He also collected seeds of some eighty species of Himalayan wild flowers.

Justice Douglas's journey was of necessity a rapid one, occupying the time from 25 July to 19 August, 1951, and the return trip from Leh, Ladakh, to Srinagar, Kashmir, was accomplished on the 20th, indicating travel by air. In this brief period had to be gained the factual information about the country as well as the feeling for it which he shows. An earlier author on some of the overlapping and adjoining country to the eastward, Sherring[10], wrote in 1906 about his Western Tibetan exploration in extenuation of what he seemed to fear might be an insufficient amount of new information in his book: "It is therefore to a more highly enlightened and more exacting reader that an author has nowadays to address himself, and year by year the task will become more difficult. What has been the charm of the past is not to the same extent the charm of the present: what was once novel in the paucity of literature has now become familiar owing to the numerous books lately published which have become the classics of Tibetan research." Yet he hoped that his book would "find favor with the geographer and the lover of tales of travel. For there is a portion of Western Tibet and the British Borderland . . . where quaint customs and manners appeal to the poetry that runs in all men's veins." It overlaps the country that Douglas writes about, but the point of view of the two travellers, separated in time by forty-six years is very similar. Sherring maintained that he was entirely ignorant of mountaineering, himself, but his interest showed in many places, as well as in his incorporation of a chapter (and dozens of photographs) by Doctor T. G. Longstaff describing the attempt to climb Gurla Mandhata. This was the first occasion on which a Tibetan mountain had been attacked according to the approved "modern" methods of that time.

Douglas's former books have indicated his enthusiasm for mountains.

[10]Sherring, Charles A., Western Tibet and the British Borderland . . . with a chapter by T. G. Longstaff . . . describing an Attempt to climb Gurla Mandhata. London, 1906.

In this one he commends the Himalayas to American mountaineers as the superlative among all mountains, "with untold peaks to climb, fauna and flora to discover, geological formations to explore, and high trails to traverse. The immediate rewards are exciting and untold; and there are rewards beyond the mountains themselves. One who goes to the Himalayas must first traverse the plains of Pakistan and India. He cannot do that without coming into contact with problems and people that will reach his heart and his mind." This last sentence is the keynote of the present book. He tells of things that can stand retelling time and again, for to a new generation of readers they are never old. Neither needed Sherring to have worried about his book's appeal, then and in the future, for it too was full of human interest. He wrote the bulk of it about people, not geography, and said: " . . . I have been often thrown in close contact with the interesting people who live in these grand mountains, and have been able to study some of their ways, and to get an intimate knowledge of the life and problems of the frontier."

I have intentionally compared the books of Sherring and Douglas because the former's expedition immediately followed the temporary set-back of Russia's relentless move to absorb Asia. The outcome of the Russo-Japanese war only temporarily halted the progress of Russian political conquest, just as the Korean war may prove only to hinder rather than halt a policy and movement centuries old, which Soviet Russia inherited from the Czars. Sherring felt that too much about politics from a non-political officer of the Indian Civil Service (he was Deputy Commissioner of Almora, in the Himalayas) would not be in good taste. Although he said: "The object of this book is entirely non-political, and most carefully have all matters controversial been omitted, as is befitting a Government servant whose appointment and duties preclude him from entering upon such subjects", nevertheless, he could not forbear to point out that "geographically, this portion [of Western Tibet and the British Borderland which adjoins it] is the nearest to Russian territory, and although separated from Russian Turkistan by chains of the most forbidding mountain ranges, still the fact of its position gives it great political importance."

Douglas had arranged in 1950 to visit Tibet in 1951. He expected then to enter through Almora, Sherring's old stamping ground, and to make a long trek to Kailas, a famous place of pilgrimage across the Himalayas. By the Spring of 1951, however, "Tibet was no longer hospitable to Americans" although less than a year had passed since the Lowell Thomas's, as invited and honored guests, had visited Lhasa. He had to change his plans, and witnessed from not too far away one of the most dramatic and important political events of the century, the Red conquest of Tibet, which the Chinese Communists euphemistically call "the peaceful liberation of Tibet."

Even so, his mountain expedition had been originally decided upon after a reading of Frank Smythe's book "The Valley of Flowers" and was to result in the sort of a book that had been planned in the beginning, "about glaciers, high passes, blue poppies, rhododendrons, snow leopards, geology, Himalayan sunsets, and the folk songs of the trails."

Some of these topics seem to have been a bit neglected, but not the alpine flowers. Still, botanical incentives are so strong in guiding Justice Douglas's non-juristic activities that there would seem to be no need for gleanings from his book at the present time. He has specimens to vouch for his observations, and we shall look forward to a following publication after his collaborators shall have identified the species. He has entrusted the critical study of his collection to William A. Dayton and Miss Doris W. Hayes of Washington, D. C., and the growing of the seeds to the Finch Arboretum, Spokane, Washington, and the Wind River Forest Experiment Station.

Only about two-thirds of the present book is on the journey to Leh. This came later in time than a visit to Pakistan, Afghanistan, and the Kingdom of Swat, which occupied only twelve days, and is dealt with in a third of the volume in which allusions to vegetation are few. It is interesting to know, however, that Swat, politically independent but acknowledging "loyalty" to Pakistan, is a pleasant well watered little border country which seemed to Douglas to be as fertile and pleasant as our Connecticut River Valley. With a population of less than 600,000, it is one of the few areas of the general Indian region which regularly produces a crop surplus for export. The time there was probably too short for much botanizing. Like the book of Lowell Thomas[11], this volume is liberally and interestingly illustrated by its author's colored and black photographs.

Visit of the Lowell Thomas's to Tibet

The Lowell Thomas's, father and son, were guests of the Tibetan government at Lhasa in the summer of 1949, and the remarkable book, "Out of this World"[11], recounting their journey and visit appeared in 1950. They seem to have been the only Americans who ever went to Lhasa by invitation, and perhaps the only Westerners whose Tibetan passport and guarantee of safe conduct bore the seal of the Dalai Lama. Since the "peaceful conquest" of Tibet by the Chinese Reds and the incorporation of Tibet into the Red realm, it may be taken for certain that there have been many Russians there, but on suffrance, not welcomed. Already in 1949, we read, ". . . ominous reports have reached the West of direct Russian activity in Tibet. The rumor is that teams

[11] Thomas, Lowell, Jr., Out of This World: Across the Himalayas to Forbidden Tibet. New York, The Greystone Press, n. d. [Copyright 1950]. (Price $3.75.)

of Soviet scientists, disguised as Mongol pilgrims, have penetrated the "Roof of the World" for the purpose of geological survey and map making. Their activity is reported in southwestern Tibet, in the Lake Manasarowar region near the borders of Nepal and India. The word is that the Russians have discovered large deposits of radioactive ores, and, at the same time, determined sites for air bases that will be aimed at overpowering India, Pakistan, and adjacent countries once Tibet has been absorbed into the Red orbit . . . . Will this be the site for a great Soviet Tibetan base?"

The invitation to the Thomas's was given in the forlorn hope that immediate, favorable and sympathetic publicity for Tibet about the Red menace to that defenseless country's independence would lead to help of some sort from the Free Nations. It was already too late. The Red subjugation of China left no access to Tibet except through pussy-footing India, itself wavering towards the Reds in sympathy, or in a state of intimidation. As a record of one of the last Western contacts with Tibet until the inevitable world revolution against Red slavery shall end that reign of despotism, "Out of this World" is of prime interest to all, including botanists, who are concerned with world affairs. As would be expected, it contains a minimum of botany, but a vast amount of information that will interest botanical as well as other travellers in a generation to come. The publishers have made lavish use of photographs, reproduced in color as well as in black and white. The author must still have scores that would be more than welcomed by naturalists; if so, maybe the travellers and their publishers might be induced to produce an album of pictures with good descriptive legends as a volume following the one under review. As for the latter, any arm-chair traveller who neglects to read it will miss one of the important popular travel books of our time.

The botanist learns that an altitude of 9000 feet is comparable in Tibetan thinking almost to sea level with us, for at that level there are trees. The pictures, indeed, show trees at Lhasa, and the author quotes Abbe Huc's comment of over a century ago (1846) that Lhasa was surrounded by a multitude of aged trees like a verdant wall. One of the best features of the Lowell Thomas book is a resume of previous first-hand accounts of travel in Tibet by earlier travellers. Their observations are freshly and interestingly incorporated with the new material!

Of course the botanical notes were made on the way in, for a serious accident to Lowell Thomas, Sr., on the way out rather eclipsed consideration of other matters.

The little botanical gleanings follow, partly as direct quotations:

Starting from Gangtok, the capital of Sikkim, "On the morning of August 5 we hit the trail on the three-hundred-mile jaunt, first through the rain-soaked forests of Sikkim, then over the towering Himalayas, and finally across the wind-swept Tibetan table-land." . . . "As we entered the bamboo forest . . . monsoon rains poured down incessantly as we ambled up the stony trail. Clouds of steam rose from the bamboo jungle and at times made it impossible to see from one end of our procession to the other. These Himalayan foothills have an annual rainfall of 250 inches, second only to the rains of the hills of nearby Assam in volume . . . . What a contrast between the south and the north side of that Himalayan wall! Jungle on one side: barren mountains and bleak plateau on the other -- all because those water-laden clouds, rolling across India from the Bay of Bengal, strike the five-mile-high Himalayas and drop most of their moisture on Sikkim. Since few rain clouds drift beyond the great divide, Tibet has to manage with an average annual rainfall of about twelve inches. A labyrinth of bamboo and creepers rose straight up over our heads on one side of the narrow trail. On the other side was a sheer drop of thousands of feet."

The next day they reached the dak bungalow (government rest house) at 12,000 feet, located above Lake Changu, "a calm dark sheet of water hemmed in by steep slopes covered with rhododendron." They had gradually left the bamboo forest with its steam and leeches, and had come into a region that reminded them of the American Rockies, with scattered pines. Here they picked purple, not red, wild strawberries from the rocky cliffs, which were much larger than ours but far less sweet. There were multitudes of flowers, a beardless purple iris, flat yellow poppies, two inches in diameter, primulas, orchids, and endless varieties of rhododendrons, the latter mostly trees up to thirty or forty feet tall, with trunks four feet thick, but one of them a red-flowered dwarf.

"Here and there we came upon a rather sinister flower, the blue Himalayan monkshood. Into the essence brewed from this poisonous plant, the Sikkimese and Bhutanese, who used to war with each other, would dip their arrows and spears, so that a mere scratch from a weapon caused death . . . . Toward the end of this second day's march, we passed acres of yellow daisies that give off a strange pungent odor. Encountering a Sikkimese on the trail we were told that any headaches we might have -- and we had them -- came not from the altitude but from these daisies."

The exuberent flora led to Lowell Thomas Senior's reminiscences of Kingdon-Ward, and to speculation about where Mr. and Mrs. Kingdon-Ward were then and later. This page or two may lead botanical readers to read or reread "The Land of the Blue Poppy" and other books of an indomitable explorer of the Himalayas and the borderlands of China.

A digression, written months later, told of violent earthquakes which had diverted the great Brahmaputra from its recent course into an anciently abandoned bed, displacing a considerable population, and causing great loss of human life by floods, as well as drowning thousands of wild animals and transforming the face of nature along the wild mountains where the Brahmaputra turns south for its prodigious descent through 12,000 vertical feet of rapids to the Bay of Bengal. Kingdon-Ward and his wife were reported to have been in this convulsed region at the time of the disaster, and not to have been heard from afterward. (They were actually almost at the center of the disturbance, but eventually got back to England.)

Nathu-La, at 14,800 feet, was the point where the Thomas's passed over into Tibet, and their botanical observations became few, for they were not, like Kingdon-Ward, "more interested in living plants than in living gods." Up over the moss-carpeted rocks, through the rhododendrons, they headed into the Forbidden Land, "The Roof of the World."

The trail now led through a forest of pine and fir and past great gay patches of alpine flowers.

Down through the Chumbi Valley bound for Yatung they descended through forest where every tree was gracefully draped with a delicate "golden moss".

Climbing upward from Yatung, keeping close to the rushing Amo River, they rode through a similar sort of a pine forest to that in the mountains west of Banff in the Canadian Rockies. On the sixth day of travel they climbed up and up for seven miles along a mountain wall, and then another seven miles across a plain at an altitude of 14,000 feet, higher than the highest peaks of the American Rockies. Here there was "sparse grass and coarse thorny herbage."

At Gyantse they were half way to Lhasa. "The first two marches out of Gyantse took us winding upward through a deep gorge. All around us were barren mountains. No trees or flowers grew at this high altitude."

Thus ends the botany of the expedition! Nevertheless, "Out of this World" is highly recommended to all botanists who have the sort of a bookshelf that might be labelled "On the Fringes of Botany."

Ekvall's "Tibetan Sky Lines"

It has a minimum of botany, but botanists will nevertheless be entranced by Ekvall's "Tibetan Sky Lines".[12] The author, a missionary by choice, who is described by Professor Fred Eggan of the University of Chicago as an anthropologist by natural interest and training, was born on the Kansu-Tibetan border, of missionary parents, and grew

[12]Ekvall, Robert B., Tibetan Sky Lines. Travel Book Club, New York. 1952. (Price, $3.50.)

up to speak Chinese at first and then Tibetan. In 1939 the University of Chicago Press published his work "Cultural Relations on the Kansu-Tibetan Border". He had been in Tibet in 1935 when Chu Teh and Mao Tse-Tung were fended away from that country in the flight of their armies toward what became their stronghold in Yenan, and he was a again there in 1951 when the overwhelming strength of the Communists made it impossible for the Tibetans to withstand them longer. Much of such little light as the general reader is likely to get on the "peaceful" liberation" of Tibet by the Reds will be found in Ekvall's book.

Such a vivid picture of Tibetan folk ways as Ekvall presents, might, in the days before the Red deluge overwhelmed China, have enticed botanical wayfarers in that direction, and would perhaps have taught them how to make friendly contact with one of the most interesting cultures in the world. That would have been its practical utility to a roving botanist. But now that Tibet has been "liberated", as the Communists say when they mean vanquished, for they never mean what they say, or say what they mean, it may be many years before another American sees Ekvall's lamaland. Even so, his book will appeal to the sort of people that botanists naturally are, and they will miss a treat if they do not read it. It conveys a feeling all its own.

In the summer of 1929 Ekvall arranged to live (with his wife and small son) at Taksang Lhamo, an important gathering place for all the tribes in the region up near the 12,000 foot level of grass country in Amdo, the northeastern district of Tibet, about one hundred miles from the Chinese border. There is just a hint of botany here and there in his volume of sketches.

On the two-mile-high grassland he tells us of riding over the flower-strewn open steppe in early summer. On the side of the valley toward Gurdu from Samtsa, Gurdu being one of the twin lamaseries that comprise the trade and religions center of the cult of Taktsang Lhamo, Goddess of Tiger's Den, they were shadowed by peaks rising behind a sacred spruce forest. Botanists have superstition and religion to thank for the preservation of many interesting plants and bits of native vegetation! The other lamasery near which he lived was Sechu, and the site of each was marked by a limestone peak rising above the rounded contours of the grass steppe.

At the edge of the Sechu lamasery was a shrine of the mother goddess, Tengri, especially visited by the women, on a slope with its face to the winter sun, and surrounded by sheltering junipers.

Pilgrims on the way to Lhasa from down near the Chinese borderland passed up through wooded country and then through the last of the brush-filled and sparsely-wooded upper valleys into the grass steppe, where there was no fuel except dried dung and where, between the encampments of the nomad black-tent tribes, there were stretches of no-man's land, where no traveller was safe from robbers.

Of one narrow valley in Jangtsa, leading down from the open steppe to the farming land, he says that dark spruces came down one wall all the way to the stream, but the other wall was bare of timber but had one or two levels of narrow terraced fields. Elsewhere he speaks of looking "far down the main valley where the first spruce forests mark the beginning of the wooded country".

Transitional from grass steppe to mountain were marshy foothills. Ekvall speaks of following a yak caravan, when the alpines bloomed triumphant, through a maze of treacherous bogs, where the cattle extricated their feet from the mire with sturdy assurance, but the horses snorted and lunged in panic when the spongy carpet quivered and broke through.

It was 50 miles from Sechu, in a northerly direction, to Hwargan. On the way the mountain Amni Hwargan arose steeply as broken cliffs of gray limestone out of the steep meadows. Down and up, down again and still higher up, the trail climbed until finally, far above the cliffs and ridges, crowning the highest peak, appeared "the fantastic quiver shrine of the robbers' god, stacked with giant arrows". The upper end of the valley was a great half-circle of rock slides ringing alpine meadows where the deep green rhododendron thickets appeared like dark shadows.

This is all the botany there is in Ekvall's book, if we add the little ethnobotanical item that he ate out of a "private bowl, made of grapevine root figured like birdseye maple".

By way of Hammarby, the Home of Linnaeus to the Garden of Shalimar.

One expects at least a little natural history in a book by Carveth Wells, and the reader of his latest book will not be disappointed. He will find interesting observations in "The Road to Shalimar"[13] on a migration of the arctic lemming which Wells saw back in 1924 when he and Dr. Clyde Fisher travelled with a family of Lapps who were following their reindeer across Lapland. Lowell Thomas says in the introduction that to Wells there is nothing incongruous about taking his readers to Lapland on their way to the Vale of Kashmir. At any rate, that is the way Wells went himself in 1950, via Gothenburg, Stockholm, arctic Lapland, and Hammerfest, the most northerly town in Europe. He wanted to relive and share with his wife some of his cherished experiences of long ago in Scandinavia. As for visiting Shalimar, in the Happy Vale of Kashmir, that he had looked forward to ever since, as a boy, he had heard his father read Thomas Moore's

[13]Wells, Carveth. The Road to Shalimar . . . with a Foreword by Lowell Thomas. Doubleday & Co., Inc., Garden City, N. Y., 1952.

"Lalla Rookh" aloud to his mother. On the trip of 1950 he wasn't able to show his wife the arctic lemmings, but he told her about them anyway. In the book they also serve to introduce an amusing anecdote about our naturalist-president, Theodore Roosevelt, his boys, and the French ambassador. There is only a little natural history, however, in this wholly satisfactory travel book, and that is mostly zoological. Wells mentions Linnaeus, as everyone should in writing of Lapland, and we learn that the Laplanders have gone modern, and nowadays use a field glass to find lost reindeer instead of the magic drum of Linnaeus's time.

He made a pious pilgrimage to "Hammarby, the home of Linnaeus, the father of botany" and found it just the same as in 1932, "as far as the garden was concerned, but the interior of the house itself had an air of neglect." He gathered seeds in the garden and sent them to the agricultural station in Bermuda, so that a Linnaean garden could be started there for the benefit of garden lovers. "Even the large gray snails whose ancestors Linnaeus used to eat were still crawling about the garden, where they are treated with becoming reverence."

Mr. and Mrs. Wells and their Burmudan friend, Mr. Sam Tatem, flew as though on a magic carpet to live for a few days in a house-boat on Lake Dal in the Vale of Kashmir, and to visit one of the most famous and romantic gardens of the world, Shalimar. This was the garden of "Nur Jahan, Light of the World, beloved wife of Emperor Jehangir, whose son, Shah Jehan, built the Taj Mahal for the remains of his own beloved Queen, Mumtaz Mahal, Glory of the Palace." What Mr. Wells finally tells of Shalimar is brief (and almost strictly non-botanical) but even to a botanist is quite entrancing. His description is of "a lovely shady park with velvety lawns under enormous trees, of long straight flower beds filled with brightly colored blossoms and bordered by some low-lying plant of vivid yellow." The trees were "chinars", which resemble, our author says, gigantic maples, with leaves much like those of maple not only in shape but also in changing to brilliant colors in autumn.

Mr. Tatem was obviously much taken with the walnuts that grew about Lake Dal, and now has seedlings of them growing in Bermuda, living souvenirs of Shalimar. What success they may have had in Bermuda with the projected "Linnaean Garden" does not appear. Perhaps there will be a report later, but a botanist would not be too hopeful of the outcome, for conditions in Sweden are far from being matched in almost subtropical Bermuda.

THE WORLD'S HERBARIA: A review of "Index Herbariorum"*

Harley H. Bartlett

THERE has finally appeared the first part of a long awaited "Index Herbariorum" giving basic data about the world's public herbaria, a work which Professor J. Lanjouw has had in preparation since 1936 and which he has finally completed with the aid of Dr. F. A. Stafleu. An installment of the second part is to be published this coming winter. It will begin a list of the main plant collectors, deceased and living, of all countries, and indicate where their collections are to be found.

When the task of indexing world herbaria was started in 1936 it did not seem to Professor Lanjouw to present great difficulties, but of course the data had to be assembled by a vast amount of correspondence. Some persons in official position are always averse to answering questionnaires, others will not go to the bother of doing so fully, and some are slow. Also, there are many institutions that have fallen into what Herbert Spencer would have characterized as a state of innocuous desuetude, and from which no answers could be obtained, at all, or only too late to be used.

With the World War and an interval of fifteen years intervening between the dates of the first and last questionnaires, it can readily be understood why all of the desired information could not be uniformly obtained or presented as of the publication date. Many institutions of the Soviet sphere no longer wish to associate themselves in world enterprises. Lanjouw politely says: "It is a pity that owing to the present political circumstances the data with regard to the Eastern European and to some of the Asiatic herbaria remain very incomplete." At any rate we have at last a very useful compendium of general information about the world's herbaria, which, now that it has actually appeared, the authors hope to keep up to date by promptly revised editions. That it will be of great utility goes without saying.

It is coming more and more to be true that a specialist in any group of plants does not confine himself to utilizing the resources of a single herbarium no matter how large, but makes use of several or many. A system of loans has grown up among botanical institutions which corresponds to the more generally known interlibrary loans. The student of a particular genus may now readily assemble in one place the specimens from all institutions whose curators wish to have their collections studied and expertly identified, and this procedure is sure to

*Lanjouw, J., and Stafleu, F. A., Index Herbariorum. Part 1. The Herbaria of The World. Regnum Vegetabile, Vol. 2. Utrecht, Netherlands, 1952. (Agent: The Chronica Botanica Co., Waltham, Mass. Price $3.50.)

give much more adequate information about geographic distribution and range of variation of plants than could possibly be obtained if less material were studied. This is truly an age of unprecedented cooperation in systematic research, in those parts of the world that are not closed off by the Iron Curtain.

The student of regional floras has a harder time to advance his work by borrowing than the monographer of a group, but the Index Herbariorum will indicate where important regional collections are located and if they could be seen if visited. An interesting feature of the "Index" is a list by countries of the herbaria in which regional floras are best represented. One learns from this some interesting things, as, for instance, that the flora of British Colombia is a specialty of the Botanical Museum of Helsinki, and that of Alaska a specialty of Stockholm. It is not so organized as to tell us, however, that Dr. E. Hultén of Sweden is the leading authority on the flora of Alaska! This part of the Index, however, can only be considered an intimation of what it may come to be, for the part on Geographical Specialization may be greatly expanded in future editions, to account more fully for the expeditionary activities of various institutions.

Almost every country, or colony, it appears, has from one to many public herbaria. Often they are associated with Botanical Gardens, with Natural History Museums, or with Universities. They have most often been important in the preparation of regional floras, and preserve the evidence for the identifications, or part of it. Many also contain material that has been critically studied and cited in geographically wider monographic work. Many or perhaps most contain types or duplicate types. The utility of knowing the location not only of types but of duplicate types, and of their continuing to be distributed in the future as in the past among various herbaria has been demonstrated by sad events of World War II, which brought about the destruction of most of the Berlin Herbarium and all of the Herbarium of the Bureau of Science, in Manila.

Just the lamented destruction of one of the greatest herbaria, that of Berlin, destroyed a multitude of type specimens, but of the more recent ones it is probable that a majority are represented in duplicate in one or several other herbaria. A clue to finding them will be presented in Part 2 of the Index Herbariorum when that account of the collectors appears. In the destruction at Manila of the great herbarium of the Philippine Bureau of Science a vast number of types were destroyed. This herbarium was established by E. D. Merrill and contained the great majority of the type specimens upon which his own Far Eastern species had been based, as well as those of many collaborators. Fortunately, however, many of the original collections had been abundantly duplicated, and the duplicates are to be found in the United States at the U. S. National Herbarium, the Arnold Arboretum and Gray Herbarium of Harvard University, the University of

California, and elsewhere, and at several institutions in Europe and Asia. Long resident in Manila was that extraordinarily active botanist A. D. E. Elmer, who through most of his career operated independently. His types, however, were on deposit at the Herbarium of the Bureau of Science, and were also destroyed. His collections were among the most widely distributed, however, and good sets are to be found in many herbaria. Some undistributed residues of his sets, moreover, survived the war and have come into the possession of the Botanical Gardens of the University of Michigan, through the kindness of Mrs. Elmer. A selection of these, when returned to Manila, as they will be, will restore a very small proportion of what was lost of the Elmer Collection. A new National Herbarium for the Philippines is being created through the indomitable efforts of Dr. Eduardo Quisumbing. One wonders if some genera of the old herbarium may not have been out on loan, and still retrievable!

The Index Herbariorum records the bare facts of other lamentable losses by war and fire. The Herbarium of the University of the Philippines was almost entirely destroyed. It has been said, in fact, to have been totally destroyed, but thereby hangs a tale. A very little of it, according to rumor, escaped. Certain marine Algae had been loaned to the well known specialist F. S. Collins. He died before the specimens had been studied and returned and his widow, as the story goes, unwittingly included them with other material that was sold to the New York Botanical Garden. From there they are said to have been loaned to the late Dr. W. A. Setchell of Berkeley for study. He in turn died, and the long wandering specimens, their status as a loan forgotten, are supposed to have remained at the University of California. When I was Visiting Professor of Botany at the University of the Philippines in 1935 I found empty genus covers for marine Algae with annotations regarding the loan which had been made through Professor Shaw to Mr. Collins. This tale indicates how, without any culpable intentions on the part of anyone, specimens may change their habitats!

The University of the Philippines has moved from Manila to Quezon City, and a new Herbarium has been started by Drs. José V. Santos and Gregorio Velasquez.

It must be expected that future editions of the "Index Herbariorum" will be much more detailed and complete than the present one, which represents, nevertheless, a highly commendable job. Lanjouw says that since Alphonse De Candolle made the first list of herbaria in 1880 (the last chapter of his "Phytography") there has not been another, until this one, that was intended to be as complete as circumstances permitted. During the last century private herbaria in the main went out of style. Some of the larger ones served as the foundations of public herbaria, and the smaller ones were absorbed by the larger. Some small or even fairly large public herbaria sometimes ceased to be used and naturally enough then ceased to grow. The tendency has been for little ones to be static and non-functional, except by preserving valuable material. The big ones have become centers of botanical study and increasingly useful. Only time will tell how many may ultimately persist as useful entities, but it is a safe surmise that as the small ones become increasingly specialized they will come into greater utility. General herbaria, except by pooling of resources, have little research value unless they are very large. Small but highly specialized herbaria (for restricted groups or regions) may well be the very best and most useful in their fields even if small.

Lanjouw's "Index" verifies approximately but not exactly what all botanists think they know about the chief herbaria. Most of us would have ventured a guess that Kew or the British Museum had the largest. The former indicates that it has 6,000,000 specimens. The latter gives no information. The other giants are Paris (total about 5,500,000), Leningrad (5,000,000), Calcutta (about 5,000,000), Geneva (4,000,000), Stockholm (total of two institutions somewhat under 4,000,000), Florence (3,500,000), Harvard (total over 3,000,000), New York (about 3,000,000), Stockholm (somewhat less than 3,000,000), Washington (total of U. S. National and other government herbaria about 3,000,000), Chicago (about 2,400,000), Prague (two institutions, 2,300,000), Jena (2,000,000), Budapest (2,000,000), Vienna (2,000,000), Leiden (1,500,000), Brussels (1,500,000), St. Louis (1,500,000), Melbourne (1,500,000), Munich (1,500,000), Copenhagen (1,200,000), Edinburgh (1,175,000), Manchester (1,000,000), Philadelphia Academy (about 1,000,000), Helsinki (1,000,000), Berkeley (under 1,000,000), Buitenzorg (750,000). Of course Berlin would have been very high in the list if much of the herbarium had not been destroyed during the war.

It is interesting to observe that many of the more active American herbaria have less than a million specimens each, and most of them many less. The group with less than a million is led by Berkeley (930,000), followed by Cornell (total over 600,000), Michigan (600,000), Stanford (535,000), Beltsville (510,000), Albany (430,000), Minnesota (417,000), Urbana, Illinois (2 collections, total 411,000), Notre Dame (400,000), San Francisco (370,000), Pomona (310,000), Wisconsin (300,000), Pittsburgh (275,000), Seattle (260,000), Ames (250,000), Lincoln (250,000), University of Pennsylvania (250,000), Laramie (247,000), Brooklyn (215,000), Pullman (210,000), Bishop Museum, Honolulu (150,000), Los Angeles (150,000). Some of the more useful are smaller, as for example, Butler University (Indianapolis), Catholic University of America (Washington), University of Arizona (Tucson), and University of Oklahoma (Norman).

The chief herbaria of Canada are, as would be expected, in Ottawa, where the aggregate of three national collections is about 600,000 specimens. Montreal is not far behind, with 500,000.

The herbaria of Latin America are numerous and becoming increasingly active and scientifically productive. The largest, one might expect, would be that of Rio de Janeiro, for which data are not given. There are several that are large and important in Argentina, those at Tucumán (400,000), La Plata (total of two institutions, 400,000), San Isidro (the "Darwinion", 250,000), Cordoba (110,000), and Buenos Aires (100,000).

The recent growth of important herbaria in China was phenomenal, and it is a pity that we are cut off from exchange relations with them. The "Index" does not indicate their size.

A valuable feature of the Index Herbariorum is that a large number of institutions indicate their preferences for future accessions, both by regions and by groups. These trends are likely, at least for the herbaria of teaching institutions, to depend upon the transitory interests of present staff and students, and may be expected to change. On the contrary, some of the herbaria of the future, if connected with research institutes of restricted scope, are likely to become increasingly specialized, and to develop in coordination with neighboring institutions. This may be expected especially of institutions that have few foreign students and visiting scientists. The present splitting of the world into highly antagonistic groupings is evidence of the great utility of maintaining a reasonable number of world-wide herbaria, for what we of the free nations cannot learn from our past herbarium accessions about the floras of the Soviet slave nations we may not know for decades or generations.

Lanjouw and Stafleu have presented botanists who try to have a non-provincial outlook with classified material for much thought. On the whole, there would seem to be a strong trend toward growing interest in the broad field of systematic botany. In order to encourage wider cooperation among botanists, they should have their attention called to the International Association for Plant Taxonomy. It sponsors the Index Herbariorum and related publications of general usefulness. Its bimonthly bulletin, "Taxon", contains all sorts of news, short articles on important cooperative botanical projects, reports of committees, etc. For Regular membership the dues are $3.00 a year: for associate membership $1.00, which includes the subscription to "Taxon" but not the right to vote or a discount. Application and fee may be sent to Professor Reed C. Rollins, Gray Herbarium of Harvard University, 79 Garden St., Cambridge 38, Mass.

PUBLICATION DATES OF THE ASA GRAY BULLETIN—The October number (New Series, Volume I, number 4) was published on March 23, 1953. This January number was almost ready. That for April should be published on time, and thereafter undated Winter, Spring, Summer and Fall numbers will appear as nearly as possible in January, April, July and October. The irregularity of publication has thus far made no difference, because we have included no article for which the exact date of publication was of any moment. We always indicate in each issue the publication date of the preceding one.—Eds.

CURRENT STATUS OF THE GRAY MEMORIAL BOTANICAL ASSOCIATION

DURING the academic year 1951-52 Professor R. Lee Walp, the Permanent Secretary of the G. M. B. A., was on leave of absence from Marietta College and in residence at Stanford University. He did not have access to his correspondence files during the year, but issued the call for an election of officers, as required by the Constitution, which resulted in the election of H. H. Bartlett as President of the Association, and of Edward G. Voss as Secretary of Division C. Professor Walp of course carries on as Permanent Secretary.

Both he and the new President conducted considerable correspondence aimed at reactivating the interest of the mostly elderly membership. This took the form of an initial questionnaire on policy followed by a number of letters to those who replied. There were few answers, and recommendations based upon them could hardly be considered as a real expression of the wishes of the Association without confirmation by a formal vote of those persons who wished to retain membership, as well as those who had just joined. It was therefore decided to let matters rest for a year, during which it was hoped that some additional former members who had not answered our communications could be contacted and heard from. By then there would also be some indication of whether or not the Asa Gray Bulletin could gain enough support to justify its continuation. The publication experiment has not been brilliantly successful, but the results nevertheless encourage going ahead with a second volume.

Most of the older members of the Gray Memorial Association never replied to our letters. In some instances mail was returned with the indication that the post office had no forwarding address, or that the addressee had died. Other letters did not come back, and so must have been received, but since they were never answered, it became obvious that not a few former members, presumably because of old age, no longer cared to retain membership. The reason became clear from several replies by relatives or friends, who indicated that the addressees had become too infirm because of age to continue.

The obvious faults of the organization of the G. M. B. A. in the past, from the standpoint of keeping up its membership, have been these: (1) its too insistent requirement of impracticably frequent communications designed for round-robin circulation or publication, and (2) its failure to recruit younger members steadily enough to keep the greater part of the membership from suffering the effects of simultaneous old age.

There will apparently be few if any further comments from older members or former members on matters of policy, for those who adhere will do so regardless of how matters are adjusted, and the correspondence may be summarized in a series of policy recommendations which are herewith presented to the active members for consideration before formal action is called for by the Permanent Secretary. Some of them, if adopted, will require amending our constitution, which may well be redrafted by the officers (since the Association holds no meetings) and acceptability to the membership determined by a mail ballot. This cannot be done through the Asa Gray Bulletin for there is no requirement that members shall subscribe to it. Needless to say, the support of all who can subscribe is urgently requested.

Recommendations are as follows:

(1) Members of the Association at large shall not be required to make periodic reports for publication or round-robin circulation.

(2) Members need not join any particular division but may be members at large.

(3) Divisions shall be retained and shall make their own requirements about periodic communications to their Secretaries and members.

(4) Division Secretaries are urged to make annual reports of any divisional activity for publication in the Asa Gray Bulletin.

(5) All members whether or not affiliated with a Division are urged to subscribe to the Asa Gray Bulletin which will enable them to utilize the facilities for publication which it offers.

(6) Divisions need not be, but may be, organized on a geographic basis. Any congenial group of members of any size with a project or interests in common may organize a Division with its own Secretary. This will especially encourage group effort in local flora study, and in the utilization of special techniques (such as pollen analysis, chromosome counting, etc.). Divisions have been suggested for concerted study of difficult plant genera, such as *Rubus*, *Crataegus*, *Oenothera*, etc. It has likewise been suggested that local botanical societies, such as those at many educational institutions, might well organize as Divisions, some of them to be made up of young people in the same state of beginning activity and enthusiasm as the original members of the Association back in 1887.

(7) The Asa Gray Bulletin shall be the official publication of the Association, but subscription by individual members shall be voluntary. Each Division or its Divisional Secretary, however, must be a subscriber, and separates of his published reports in the A. G. B. shall be distributed by each Secretary to members of his Division.

(8) Members of the Association who subscribe to the Asa Gray Bulletin shall pay no additional dues.

(9) Non-subscribers to the A. G. B. who wish membership in the Association shall pay such nominal dues as may be assessed by the Association.

(10) It is suggested that Divisions be named in some distinctive manner, and that if they have an independent name as a local botanical society, that name or an abbreviated modification of it shall be retained as the name of the Division.

(11) Any treasury surpluses accumulated by the Association may be assigned by the Permanent Secretary to the support of the Asa Gray Bulletin, as payment for separates of the reports of Divisional Secretaries, or for other purposes, at his discretion.

(12) The bequest of Miss Pauline Kaufman might well be used to aid in the publication of some more lengthy and especially worthy article or group of related articles that could not otherwise be accepted in or as a supplement to the Asa Gray Bulletin, and its use for that purpose should be appropriately indicated in such a way that the publication would serve as a memorial of her interest in and generosity to the Association.

All of these suggestions would seem eminently well adapted to perpetuating and maintaining the welfare of the Association. The failure of any Division to keep up its activity would not invalidate the membership at large of its members. Younger members, such as college students, as well as elderly members who are no longer active, could have membership at negligible expense and with no obligation to write reports of any kind.

The list of subscribers to the Asa Gray Bulletin indicates most but not all of those who are considered to have retained membership in the Association. We shall shortly try to reach all with a ballot asking for their reaction to the foregoing recommendations. -- H. H. Bartlett

MEDICINAL AND CULINARY HERBS OF IRAQ TO BE STUDIED—Mr. Sadiq Al-Khafaji is starting an inventory of the cultivated and wild plants of Iraq. This will be a long-continuing project and so he is starting by growing from commercial packets of seeds, obtained in Bagdad and labelled in Arabic, those medicinal, culinary and ornamental herbs that have traditionally been grown in home gardens in the Arab lands. From the garden plants herbarium specimens will be prepared in duplicate, sets of which will constitute a sort of *Herbarium Normale* for institutions in Iraq that may be interested. The seeds are being received under Arabic names and an effort will be made to identify them not only botanically but horticulturally. The plants will be grown at the Botanical Gardens of the University of Michigan. It is believed that work such as Mr. Al-Khafaji contemplates may have immediate value in giving greater precision to the scientific definitions in Arabic dictionaries and that this will enable renderings to be made in the translation of Arabic into English and other European languages, or *vice versa*.

A COMPARISON OF DIRCA PALUSTRIS AND DIRCA OCCIDENTALIS (THYMELAEACEAE)

Hubert Vogelmann

THE two North American leatherwoods, Dirca palustris L. and Dirca occidentalis A. Gray, form an interesting pair of very closely related species which are strikingly similar in all morphological features but whose ranges are separated by the width of the continent. The eastern species, D. palustris, is a characteristic shrub of the deciduous forest in eastern North America. It has a broad geographical distribution, ranging from New Brunswick to Ontario and Minnesota, south to northern Florida and Louisiana. Its western relative, D. occidentalis, is restricted to the wooded hills of the region of San Francisco Bay, California.

The two plants are so similar that upon superficial comparison they appear to be conspecific. This view has been expressed by McVaugh[1] who questions whether they are "distinct except in their own limited geographical ranges". Sharp[2] also notes their similarity.

In spite of the very strong resemblance between Dirca palustris and D. occidentalis, however, the two are apparently best regarded as distinct species because of several individually trivial, but perfectly constant, and collectively significant characters which separate them. At least 3 of these characters were noted by Gray[3], and others are noted below.

Key for separating Dirca palustris and Dirca occidentalis:

Bud scales with dark-brown pubescence; flowers and fruits pedunculate; calyx with wavy, obscurely toothed margin, not cleft; stamens usually inserted in distal half of calyx-tube; mature leaves and young twigs glabrous .... D. palustris

Bud scales with whitish pubescence; flowers and fruits sessile; calyx distinctly 4-lobed, sinus 1-2 mm. deep; stamens inserted in proximal half of calyx-tube; mature leaves sparsely covered with whitish pubescence on lower surface, current year's twig growth often with whitish pubescence .... D. occidentalis

[1] McVaugh, Rogers. 1952. Suggested phylogeny of Prunus serotina and other wide-ranging phylads in North America. Brittonia 7: 317-346.

[2] Sharp, Aaron J. 1951. Relationships between the floras of California and Southeastern United States. Contrib. Dudley Herb. 4: 59-61.

[3] Gray, Asa. 1873. Dirca occidentalis. Proc. Amer. Acad. 8: 631.

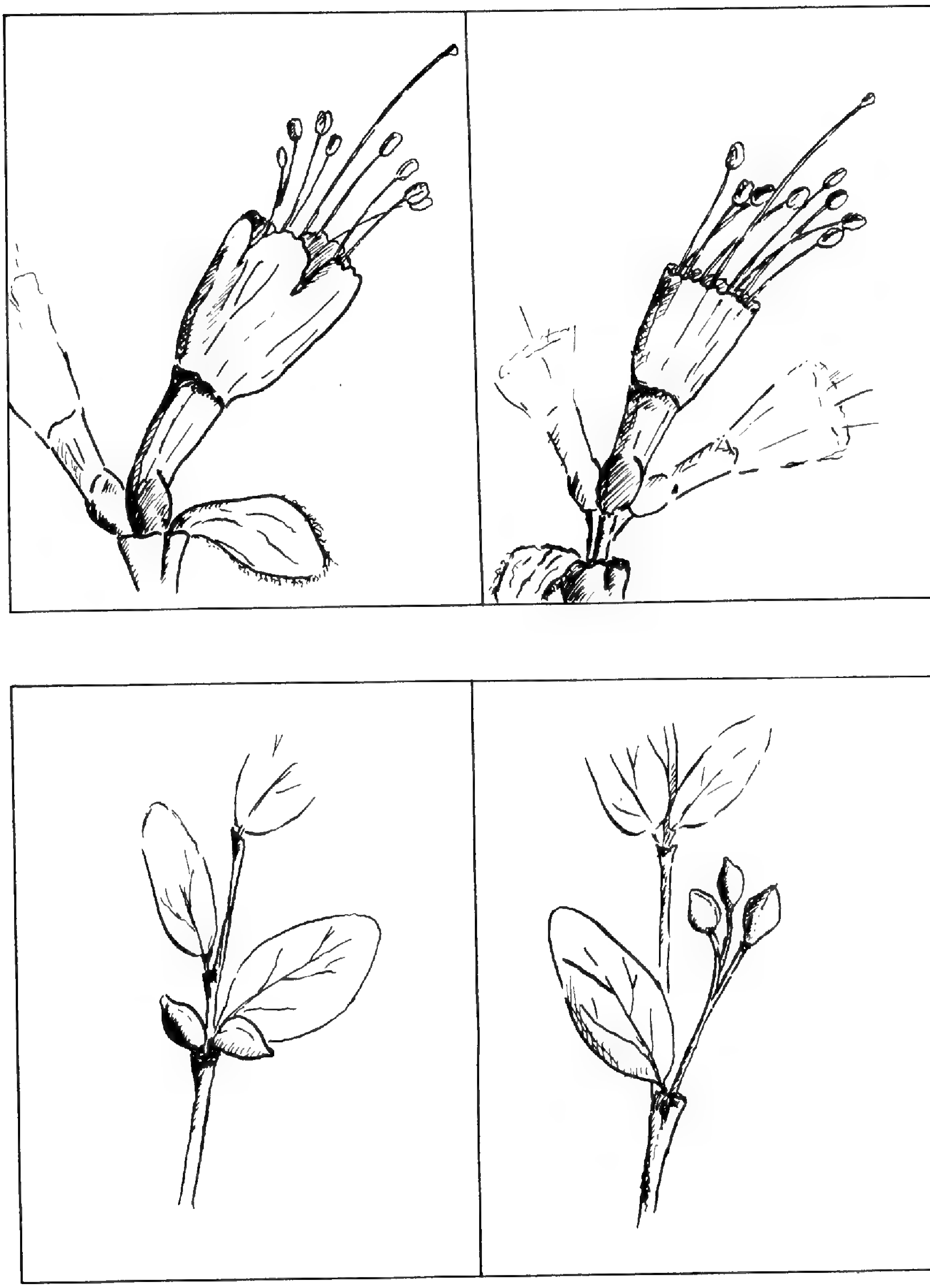


Fig. 1. Flowers and fruits of Dirca occidentalis (at left) and D. palustris (at right). The flowers are shown about 7 times natural size, and the fruits about two-thirds natural size.

Gray noted the dark-brown pubescence on the bud scales of D. palustris opposed to the whitish colored pubescence on the bud scales of D. occidentalis. He also observed that while the flowers and fruits of D. palustris were pedicelled and the calyx margin was wavy, the flowers and fruits of D. occidentalis were sessile and the calyx margin was distinctly 4-lobed.

The pedicel of D. palustris is so short at anthesis that it can easily escape detection at a casual glance. However, after the fruit has set, the pedicel and peduncle elongate considerably (up to 20 mm.), becoming very obvious. The matured fruits of D. occidentalis are almost completely sessile.

The 4-lobed character of the calyx-tube of D. occidentalis is hard to see on herbarium specimens for the dried flowers are shrivelled and the calyx-tube is flattened and pressed together. It is only after soaking and softening the flowers and then slitting them open that the individual lobes become apparent.

Gray also noted that the leaves of D. palustris are narrow at the base while those of D. occidentalis are oval with a rounded base; actually the leaf shape of both species varies considerably and therefore does not appear to be useful in distinguishing one from the other.

A total of 68 herbarium sheets of Dirca were examined in the present study. Of these 23 were of D. occidentalis[4] and 45 were of D. palustris. Branches in different stages of development were included on a number of herbarium specimens. In D. occidentalis 17 specimens were in flower, 8 fruiting, and 11 with mature leaves. In D. palustris 22 were in flower, 10 in fruit and 29 with mature leaves.

The flower of Dirca consists of a yellow, tubular-infundibuliform corolla-like calyx with the 8 stamens alternately long and short, inserted inside the tube. The style is filiform and elongates considerably as the flower matures. At the base of the flower are 3 or 4 hairy bud scales which form an involucre.

Measurements of flower parts were made of the calyx (length and width when pressed), filaments (length), and calyx-tube (distance from the mouth of the tube, or tips of the lobes in D. occidentalis, to the point of attachment of the filament). The ratio of this last distance to the total length of the calyx-tube was also computed. Leaf measurements were made by determining the length and width of 2 mature leaves selected from each specimen. These were always the endmost leaves of a twig. A summary of the results of all the measurements is presented in Tables 1 and 2. These tables seem to show consistent trends in both species, but for statistically significant results more measurements would be desirable.

[4]Through the courtesy of Dr. H. L. Mason, 17 specimens of Dirca occidentalis were loaned for study by the University of California, at Berkeley.

The number of leaves measured was in each case twice the number of specimens (2 from each specimen). The table indicates that the leaves of D. palustris tend to be larger than those of the western species (Average, 72.7 mm. long by 43.5 mm. wide, to 50.5 mm. long by 31.8 mm. wide).

Table 1. Flower and leaf measurements of Dirca palustris and D. occidentalis

	DIRCA PALUSTRIS			DIRCA OCCIDENTALIS		
	Number of Specimens	Average (mm.)	Extremes (mm.)	Number of Specimens	Average (mm.)	Extremes (mm.)
1. Calyx-tube:						
a. length	22	6.63	5-10	17	8.23	6-10
b. width	22	2.22	1.5- 3	17	3.88	1.5- 5.5
c. insertion of filament from distal end	22	3.09	2- 4	17	5.08	4- 6
2. Filaments:						
a. long	22	5.15	3- 7.5	17	8.08	6.5-11
b. short	22	4.56	2.5- 6.5	17	7.34	4.5-11
3. Leaf						
a. length	29	72.7	45-100	11	50.5	40-69
b. width	29	43.5	25- 65	11	31.8	25-42

Table 2. Depth of attachment of filaments relative to whole length of calyx (1c/1a)

Number of Specimens	Average	Extremes	Number of Specimens	Average	Extremes
22	0.46	0.37-0.60	17	0.62	0.55-0.85

On the other hand it can be seen that the flower of D. occidentalis tends to be larger than that of D. palustris. (Average 6.63 mm. long by 2.22 mm. wide to 8.23 mm. long by 3.88 mm. wide).

On all specimens of D. occidentalis examined the filaments were found to be inserted in the lower half of the calyx-tube (Table 2) while the filaments of D. palustris were generally found to be inserted in the upper half of the calyx-tube.[5] In most instances this character alone is sufficient to distinguish the two species.

The filaments are longer in D. occidentalis than in D. palustris, the longer ones averaging 8.08 mm. as against 7.34 mm. and the shorter

[5] In L. H. Bailey's Standard Cyclopedia of Horticulture (1928), Vol. 1, p. 1020, A. Phelps Wyman notes the lower insertion of the stamens in D. occidentalis.

ones averaging 5.15 mm. as against 4.56 mm. This is to be expected since the flower of the former species is larger and the stamens are more deeply inserted.

The leaves of both Dircas are pubescent on unfolding, but those of D. palustris soon become glabrous. Though the upper surface of the leaves of D. occidentalis is finally glabrous, the lower surface, even of maturity, is generally slightly covered with whitish hairs. This pubescence is most conspicuous along the petiole and midrib. Also the current year's twig growth in D. occidentalis tends to be pubescent in varying degrees while the young twigs of the eastern species are entirely glabrous.

There is an apparent trend in the western Dirca toward greater variation of certain characters which appear to be perfectly constant in the eastern species. Usually, in both species, there are 3 flowers in a fascicle. However, of 17 flowering specimens of D. occidentalis examined, 4 showed a variation of from 2 to 3 flowers in a cluster while another specimen was noted to have 3 and 4 flowers in a cluster. On this latter specimen each flower had 10 stamens instead of the usual 8. Of the 22 flowering specimens of D. palustris all had 3 flowers in a fascicle and the stamen number was consistently 8.

Fruit of Dirca palustris

The fruit of D. palustris has been the subject of some controversy. McVaugh[6] describes it as "a drupe, soft and slightly fleshy but not juicy. It is bilaterally symmetrical and somewhat spindle-shaped, pale green and not at all lustrous at maturity, with a slight yellowish (not reddish) tinge . . . length was found to vary from 12.5-15 mm. . . . about 7 mm. in diameter". Deam's[7] description is similar to that of McVaugh. He states it is "about 12 mm. long, spindle-shaped, light green, on pedicels 3-5 mm. long, the peduncle in fruit reaching a length of about 10 mm. . . . the fruit is rarely seen because it drops off early".

Fernald[8] describes the fruit as "reddish or purplish" and cites an array of authors who have reported this. Its shape is said by him to vary "from slenderly rhomboid, with tapering tips, to thick-ellipsoid, with rounded ends, or obovoid, with broadly rounded summit or even subglobose, with summit and base strongly rounded". He also notes that though the shape of the fruit seems to have no special geographical localization the color possibly may have geographical significance.

[6]McVaugh, Rogers. 1941. The fruit of the Eastern Leatherwood. Castanea 6: 83-86.

[7]Deam, Charles C. 1924. Shrubs of Indiana. Department of Conservation, State of Indiana Pub. No. 44. 351 pp.

[8]Fernald, M. L. 1943. Fruit of Dirca palustris. Rhodora 45: 117-119.

On the fruiting herbarium specimens of D. palustris that I have examined, about half have green fruits and the other half purplish or reddish fruits. McVaugh[6] has suggested that the reddish color of the fruit on herbarium specimens is brought about as a result of the drying process and that this might well have been the basis for early reports of red or reddish fruits for this species. He has informed me (since his published note on the fruit of Dirca) that he has never seen a red fruit of Dirca in the field. He has noted, however, a colony of green-fruited Dircas at Douglas Lake, Cheboygan County, Michigan (a specimen of this has been collected and placed in the herbarium of the University of Michigan).

This past summer I kept close watch on a colony of D. palustris in western New York. Although the shrubs bore a large number of fruits, they all remained green until dropping. On Oct. 2, 1952 I noted a shrub of D. palustris in full fruit at the Nichols Arboretum, Ann Arbor, Michigan. All the fruits on this shrub were green or yellowish. (This was an unusually late date to find Dirca fruiting for most plants in this locality have finished fruiting by the middle of June.)

Various reports of green- (or yellowish -) and red-fruited D. palustris seem to indicate that there are two forms of this species. Since only the green fruit (on living plants) has been reported from western New York, northern Michigan, southern Michigan and Indiana (by Deam) there is some indication that this is the widespread form. Fernald, who noted the fruit color of D. palustris to be "reddish or purplish" (in Maine), appears to be one of the few persons who has based his findings of red fruit on actual field observation. It would be interesting to receive more observations on the fruit color of D. palustris.

Concerning the color of the fruit of D. occidentalis, Jepson,[9] McMinn,[10] and Abrams[11] all note it to be red. McMinn also states, "The fruit is rarely found in this species." I should like to know if these reports of red fruits have been based on actual field observation or whether they have been based on a few early reports which have never been rechecked. It would be interesting to note the color of the mature fruits of this species as they are found on living plants. Of the 8 fruiting herbarium specimens I have examined, all bore green fruits and most of these fruits appeared to be mature.

Department of Botany
University of Michigan

[9] Jepson, Willis Linn. 1923-25. A Manual of the Flowering Plants of California, Sather Gate Bookshop, Berkeley, Calif. 1238 pp.

[10] McMinn, Howard E. 1939 An Illustrated Manual of California Shrubs, J. W. Stacey, Inc., San Francisco, Calif. 689 pp.

[11] Abrams, Leroy. 1951. Illustrated Flora of the Pacific States, Vol. III, Stanford University Press, Stanford, Calif. 866 pp.

A WINTER JOURNEY TO POINT BARROW, WITH SUMMER PICTURES OF THE TUNDRA VEGETATION *

Dorothy and Ira Loren Wiggins

Point Barrow, Alaska
March 4, 1951

Dear Folks:--

Just before Christmas we decided that we could bring more pleasure to our friends and relatives by writing a letter about our first month in the Arctic and sending a copy to those whom we slighted in December than we could by sending cards . . . . We began knowing something about the Arctic Research Laboratory at Point Barrow, Alaska, when Loren spent 10 days there in September, 1949. In mid-June, 1950, he and two Stanford students, John Thomas and Harry Thompson, returned to the ARL to do botanical research until early Sept. They found this locality offered many opportunities for further work. The students went back to the University, but Loren had already arranged for a year's leave from Stanford and remained as Scientific Director of the ARL. When he returned to Palo Alto in November it was with the definite plan that I accompany him to Pt. Barrow on his return. He spent some weeks visiting mid-western and eastern Universities to recruit investigators for the 1951 summer research projects. He could tell them that the lab is run by Johns Hopkins University under a contract with the Office of Naval Research of the U. S. Navy. The research work is not concerned with military problems but with numerous phases of the biological sciences, geophysics, geology, and a few others, on problems that can be approached best or solely in the arctic. The lab is 71° 20' N. . . . . In the meantime Grandmother and I prepared the house for rental. That seemed a big task, but by January things were in order. Grandmother moved to Shirley's in Oakland before Christmas and Donnalie went to Lagunita at Stanford to finish her last quarter in the University.

Loren flew east again on Jan. 25 and returned in time for us to

* This glimpse of the way the scientific colony winters at Point Barrow seemed altogether too interesting to remain unpublished. So we asked the authors for photographs of botanical interest to illustrate it, and a fine lot were sent from Stanford just before Professor Wiggins started for another visit to Point Barrow on 27 Dec. 1952. (The article by Professor Gustafson in our first number gave a picture of how things go in the summer.)

Fig. 1. Sand dune area along Meade River 50 miles south of Point Barrow. Salix alaxensis and Elymus arenarius subsp. mollis constitute the main cover over the semi-stabilized dunes.

Fig. 2. Tundra near Barrow camp in a "high polygon" area. Main cover on tops of hummocks is Potentilla emarginata, Arctagrostis latifolia, Luzula confusa and Petasites frigidus. Eriophorum scheuchzeri and Dupontia fischeri grow in the low areas between hummocks.

Fig. 3. High center polygonal ground along margin of flat marsh near Point Barrow. Main cover on flats is made up of Carex aquatilis and Dupontia fischeri with Saxifraga punctata subsp. nelsoniana prominent on the hummocks.

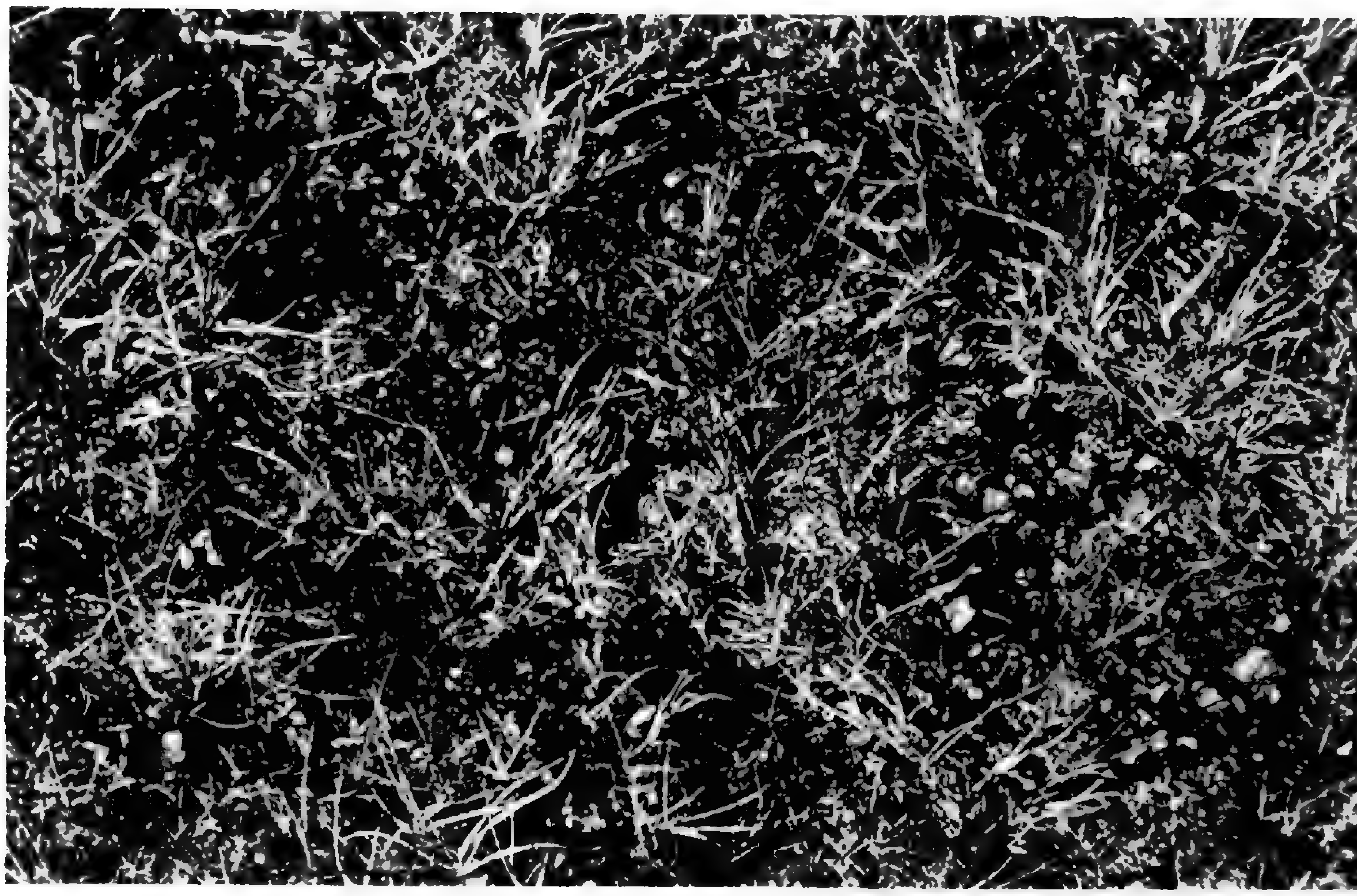


Fig. 4. Nest of Baird Sandpiper (center of picture) surrounded by Carex aquatilis and Petasites frigidus.

Fig. 5. Nest of Arctic Tern at edge of one of two small clumps of Elymus arenarius subsp. mollis on Deadman's Island near Point Barrow.

leave Mills Field, San Francisco, Feb. 4. Several relatives and friends assembled to say "bon voyage" that rainy Sunday night. Then we really became excited about the trip. Scheduled to leave at 7:30, the flight was delayed until 9 p.m. - a long time to say "Good bye." When we got aboard it seemed we were unlucky in getting a non-reclining seat. Later, it proved a blessing for Loren took a good seat & I had the whole double seat to lie down on. It was doubtful that we would get to Seattle that night because of a fogged-in area, but we went straight through and the Portland passengers had to back-track from Seattle by bus & train.

Tuesday we left Boeing Airfield on Panamerican Flight 905 at 7:28 a.m. It was a bright day with good visibility all the way to Annette Island, where we landed so passengers for Ketchikan could change planes. The flight over the Inland Passage & snow-covered peaks was beautiful. There was some trouble with a generator at this stop and a short delay before we flew on to Juneau. There we had our longest delay, with 2 "dry runs", getting on and off the plane, before a new generator was installed and we got into the air on the 3rd trial for Whitehorse, Canada. But the Juneau terminal was a pleasant one and the Panam company treated everyone on the flight to sandwiches and coffee.

CAA regulations require planes to be airborne before 6 p.m. at that time of the year, and we got off at 5:50. However, in the twilight we saw less of the area north of Juneau than we had hoped. At Whitehorse we stayed on the plane while immigration inspectors checked our names. It was -30°F. outside so we were happy to remain inside. The stewardess had donned mukluks at Juneau and they looked very comfortable. Right here we might say that we thoroughly enjoyed all the service she and the steward gave us. The meals were delicious. (Every seat was occupied, and several men carried parkas.)

It was 10:10 P.S.T. the 6th when we landed at Fairbanks (8:10 p.m. A.S.T.) We got in a bus that deposited 3 airmen at their barracks on Ladd Field and took the rest of us into town, dropping us at our doors. Ours was the Fairbanks Hotel. I was very ready for bed, but was no little surprised to see ice 2 inches thick at the bottom of each pane on our window and thinning to about 3 inches of clear glass at the top. The windows were frozen shut and I wondered if we would smother!

The next day we had breakfast at the Model Restaurant where the food was good and not very expensive. We got my parka at the Contractors' headquarters. Loren had brought his out with him. So we were wearing heavy leather boots, with felt inner soles and 2 pairs of sox, woolen trousers, parka, and heavy gloves. I bought a fur cap like Loren's, with ear tabs, to wear under the parka hood. Then we were ready to tramp over town where the temperature was 32 below zero. Loren took my picture in front of a building recently gutted by fire, but now heavily encased in snow and ice. We also got a snap of a little house festooned with snow and icicles. It all looked like cake frosting to me — a California Bay Area resident for so many years. This was my first view of the far north where there seem to be fifty men to every woman, where everyone in parka and heavy boots looks somewhat like everyone else, and one's gait is a bit of shuffle and waddle. More than once I had to look deep into a parka hood as we came out of a store to be sure I accompanied the right man! (Dorothy still blushes when she mentions it. — L.)

There is no sales tax in Alaska. Some prices are the same as at home; others, especially clothing, canned goods, and dairy products, are much higher. There were few nice Eskimo parkas in the stores, but we saw some gorgeous ones being worn.

That evening, Wednesday, we met Mrs. Anne Severin, formerly of Palo Alto, with whom we have mutual friends. She graciously took us to dinner at "The Pines" and we went to church services with her. The little, attractive church, set close between business buildings, houses the reading room and library upstairs. It was a treat to be there.

The next morning, the 8th, a contractor employee took us to Ladd Field where we boarded a DC-3 plane flown under contract with the Navy by Transocean Airlines. This flight service is known as the "line haul" and goes only between Fairbanks and Pt. Barrow. One gets aboard by climbing a narrow metal ladder let down from the plane. Seats were along one side only, and cargo was lashed down forward. There were 3 crew men, 11 men passengers and myself aboard. Once again we had wonderful visibility. There had been early morning ice fog but it disappeared about 9 a.m. and we took off in soft sunshine. The country is sparsely wooded around Fairbanks, then, farther on, the rolling hills become barren. The streams run on a very low gradient, meander widely, and oxbows are frequently cut off to form lakes as the stream's course changes. Bogs and countless lakes are difficult to differentiate when frozen and snow-covered About an hour out of Fairbanks we flew over the Yukon River, much less spectacular from the air than it must be afloat on it in summer. Just north of the Yukon the Brooks Range rises to an elevation of nearly 9,000 feet and its steeply sloping, rocky, snow-covered peaks reminded us that emergency landing fields weren't very near. Beyond the Brooks Range we felt that we truly had slipped back to the Ice Age. The flat, ice covered surface is marked by wind-blown ridges and riffles. Thousands of lake shores appear as shadowed outlines on the ice. Miles upon miles of frozen land — and we felt more detached from the old earth than at any other time on the trip. We seemed to be suspended without progressing. Then we spotted Umiat (a Contractors' camp) off to the right and were a little disappointed we didn't land there but skirted it to go direct to Pt. Barrow. As we approached

Fig. 6. Timbers of old Eskimo house long buried in gravel being undermined and exposed by wave action at old (abandoned) village of Nuwuk at northernmost tip of Alaska.

Fig. 7. Slumping of tundra along south margin of Elson Lagoon as waves erode bank at rate of about 15 feet per year. Vegetation mainly Carex aquatilis, Alopecurus alpinus and Petasites frigidus.

Fig. 8. Valeriana capitata in bud. Common in wet soil a few miles south of Point Barrow.

Fig. 9. Densely crowded plants of Saxifraga caespitosa subsp. sileniflora.

Fig. 10. Details of leaves and bases of flowering scapes of the same Saxifraga.

Fig. 11. Flower in late anthesis Fig. 12. Young capsules.
Heavy glandular indument is characteristic of Saxifraga caespitosa subsp. sileniflora.

the Arctic Ocean, marked mostly by solid, rough ice near the shore line, we spotted the Eskimo village of Barrow, four miles south of the Pt. Barrow camp. We were quite low and after flying over Barrow we swung south, awaiting landing clearance. We went within sight of the Will Rogers-Wiley Post monument, which Loren pointed out. He camped near there last summer. We returned to Barrow and landed at 12:10 p.m. We weren't cold, but I was a bit stiff from sitting. Loren had moved about to get pictures from each side of the plane. I didn't have time to think how to turn around to back down that narrow ladder. Just as I backed down one step my purse slipped from a heavily gloved hand and fell to the ground. When I got down my first view was a furry-framed, beaming Eskimo face and a hand extending my purse. I didn't arrive gracefully, but we received a gracious welcome. The camp Commander, the CDR in charge of Air Operations and his wife, and lab personnel were there to greet us. The Commander took us to the officer's mess for lunch. After that we rode in a jeep about three blocks to our 3-room apartment in a quonset hut duplex. Loren had had the Eskimos paint the floors a dark brick red, the living room cream & light green, the bedroom peach, & the bathroom blue & ivory. The apartment is simply but comfortably furnished and has a fuel-oil heater that burns continuously. The entrance involves an outside door opening into a 3 by 4 ft. vestibule and another door into a larger hall where parkas are hung and where there is a closet for a water heater and another closet for storage. From this hall a door leads left into our apartment, and another right, into the other apartment, vacant at present. Heat and lights are on all the time, with that of each apartment individually controlled. It is a cheery, attractive place to return to each night after dinner, & some stormy mornings we think it would be nice to play hookey and stay there all day. But we climb out at 6:45 to walk to the married couples' mess hall by 7:30. Meals are at regular hours and one gets there on time or goes without! There are about 10 married couples here now. Wives of lab personnel are permitted on the base only if they are employed, while the wives of Contractors' foremen are not allowed to work. They rather envy Mrs. Wickham and me, who are the "working gals". The Plant Manager of the lab, Harry Balvin, is to bring in his bride in a week or so and Ruth will be the lab secretary, taking the place of a man who recently returned to college. Now & then the ladies have a Sunday tea in one of the apartments. They wear dresses, nylons, and dress shoes, donning fur gloves, overshoes and parka before dashing to the party quonset as well as one can over snow & ice & against the wind. The rest of the time the women wear heavy "kersey" pants (woolen trousers with heavy drill covering the inner woolen part to break the wind). We who work at the lab wear "longies", mukluks over 2 or 3 pairs of sox, kersey pants, wool OD shirts.

It has been down to 54 below, but it was calm at the time and did not seem as cold as it does at -22 when the wind blows. The wind sometimes knocks one down unless one braces himself well on going around a quonset corner! We could use a jeep or weasel more often, but Loren would have to return it to the heated garage. If it is to be outside the motor has to be left running. Some jeeps are equipped with an electric motor-heating device to keep the oil warm and they can be left outside all night. Ours doesn't have it! We rather enjoy the short walks which at times involve "battling with the elements"— a phrase used by a friend from Honolulu who once drove along our peninsula Skyline Highway during a very mild flurry of snow. He thought people were crazy who lived where they had to "battle with the elements." Could he but see us now!

Navy mess is excellent. We have a variety of fresh vegetable salads, delicious soup, meat at least twice a day (roast, steak, ham, chicken, turkey). Vitamin A tablets are in jars on the tables along with the assortment of condiments. Reconstituted milk is quite good [(says Dorothy) and I prefer it to too much coffee. —L.] My work is as varied as the meals. First there was a job cataloguing medical reprints. Then followed a sorting-cleanup job of a large lab, running soil tests on samples Loren took last summer, darkroom work on photography, and microtechnique which will run along with various odd jobs. The labs are illuminated with fluorescent lights throughout. . . . . Loren has a small convenient office just off of the 36 by 45 foot library of the lab. As Scientific Director, he has general supervision of all investigations carried out at ARL.

One day we walked out on the ice on the Arctic Ocean, following Jack Wickham, an oceanographer, and his Eskimo assistant. They were pulling a small sled loaded with instruments. For this jaunt Loren wore a pair of knee high caribou fur mukluks with felt inner soles over 4 pairs of sox. The soles of those mukluks are 13 inches long! I wore his regular mukluks, of the same type but 3 1/2 inches shorter, over 3 pairs of sox. We were comfortably warm as we trudged over the ice, but when I sank above my ankles in drifts or slipped and sat down, my feet seemed heavy. There are spaces a few yards wide that are comparatively flat, like valley floors, with now & then long narrow cracks or occasionally a strip 4 or 5 feet wide of darker ice where leads had opened up and then refrozen. Over a mile out one finds 20-foot-high masses of upended blocks of ice, the blocks being 2 inches to a foot thick or more. The sunlight and shadows on these ice ridges form beautiful patterns. Three camp dogs had been with us until the going got rough. Suddenly Max stopped, stood with raised paw, and slowly retraced his steps as if to say, "There's no sense in going any farther; it's just like this for miles." The other dogs followed him. We continued for a quarter of mile to a larger ridge. Returning, as we circled our former tracks, we came upon 8-inch-long tracks of a polar bear leading across a flat area. However, they were not fresh tracks, for Miles (Jack's assistant) had seen them a week earlier.

Last week an Eskimo went hunting out on the ice with his dog team, sled, and carrying his kayak on the sled. When he started back toward the village he found himself on the wrong side of a wide lead. He released his dogs from the sled but left them on the floe, while he paddled across the lead in his kayak. He hoped that the dogs would get ashore in a day or two if the wind carried the floe landward when it changed direction. Two of his dogs were back in the village the next day and the others likely landed also, but knowing they would have to work if caught, they probably were hiding out! It is reported that the Eskimos are very cruel to their dogs, which is hard to understand, for the natives depend on their dogs as their chief means of transportation, and yet they don't seem to appreciate the animals' worth. A few dogs, raised in camp, are quite friendly. One has 5 puppies 10 days old. The father, Muk, is the boss of the canine world here in Barrow and is a fine big fellow. One dark evening he jumped at my back, put his paws on my shoulders, and began "yow-yow-yowing" in my ear! Then he dropped down on all fours again, wriggled around in front of me and continued to "talk" and jump about! The camp favorite, however, is Abercrombie, a dog that looks like no other dog in the world. His ancestry is hopelessly mixed, but probably involves dachshund, husky, beagle, and numerous others. He is squat and definitely elongated. His legs are bowed, his tail about half as long as a husky's and only faintly curled. He is white with a black spot around one eye and ear. But he has the run of the headquarters building, with his own "chow table" (no other dog in camp is allowed inside that building). He was slightly hurt by being hit by a weasel a few weeks ago and was even sent to Fairbanks on the line-haul to see the Vet. He is the doggiest dog in camp!

We are enjoying every minute of our venture in the Arctic! It has been a pleasure to give you a slight glimpse of the many fascinating facets of life in a far northern construction camp. We hope you will write to us when you have time.

Most sincerely

Dorothy and Ira Wiggins

P.S. All incoming and outgoing mail must be sent by air mail. Although we live at Point Barrow (171 20' N., 156 40' W.) in the Arctic Contractors' camp, our mail address is: ---

Arctic Research Laboratory
Box 1310
Fairbanks, Alaska

PRELIMINARY REPORT ON THE BRYOLOGY OF THE SEFTON-STANFORD EXPEDITION TO THE GULF OF CALIFORNIA, 1952

William C. Steere

ALTHOUGH I was a member of the Sefton-Stanford Expedition for only a relatively short time, joining the "Orca" in San Diego on March 23, and leaving La Paz, Baja California, on April 10, I nevertheless had the opportunity to carry on field work at those points touched by the Expedition that were richest in bryophytes. After several years spent in the wetter parts of the American tropics, in the West Indies, and in Central and South America, I was especially anxious to see the dryer, so-called desert areas of western Mexico, since in these xeric regions plants tend to develop special adaptations to their environment. In the dry coastal areas of Peru and Ecuador, for example, the mosses and hepatics have become highly modified, and although by no means abundant, are represented by interesting endemic species and genera. Quite naturally, it was my hope to discover similar or even related endemic types in Baja California, since this area had never been studied by a professional bryologist. In spite of the short time available to me in the areas that promised to be most interesting, the results are well worth the time and energy expended, in large part through the generous help and cooperation of my botanical friends who collected bryophytes in areas on Cedros Island that I did not reach. Although a final report on the collections has not yet been completed, it is safe to say that at least 10% of the species collected are new to science, a very clear indication of a reasonably high degree of endemism, as well as of the success of this and of future bryological work in Baja California.

The first collecting station of the Expedition was Cedros Island, reached early on March 27. Of course, since the major emphasis of the expedition was to be placed on the several islands of the Gulf of California, not much time could be spared for the study of areas en route. Consequently, I was grateful for the opportunity to be able to spend even a single day on Cedros Island, although the collections made in this brief time show clearly that a week or more could profitably be spent there in bryological pursuits. Thanks to the kindness of George Lindsay, who gathered mosses from the margins of water holes along the upper reaches of a deep arroyo, and to the superhuman efforts of Reid Moran, who was the only one of us to reach the zone of bishop pines, more than 30 species of bryophytes were collected on Cedros Island, including several species new to Baja California, as well as several others new to science. My own collections on Cedros

Island were made primarily along the edges of arroyos where fine silt had settled out in pools following rains and the resultant run-off. In this special and ephemeral habitat many mosses and liverworts had flourished and were still in excellent condition at the time of our visit, although the silt was completely dry and hardened into a crust, so that I spent much of my time on my hands and knees searching for them. Then I followed a precipitous ridge upward to the backbone of the island, to an altitude of perhaps 1500 feet. Surprisingly enough, some bryophytes were found on soil sheltered by shrubs on this dry and insolated slope, perhaps helped in their struggle for existence by the occasional fogs.

A brief visit to the shore at Punta San Juanico late in the afternoon of March 29 and two landings at Bahía Santa María, Isla Santa Magdalena (March 30 and 31) were completely unsuccessful from a bryological viewpoint. A combination of climatic and edaphic factors seems to prevent the development of mosses, at least in the areas I examined carefully. An exploratory visit to a large arroyo on the west side of Bahía de los Muertos, at our very first stop in the Gulf of California, resulted in the discovery of a small hepatic, a Riccia, although other arroyos in the area, and slopes near the end of the highway seemed to lack bryophytes altogether.

On April 2, we reached Cerralvo I., the first of the islands we had come to visit, and I spent a day and a half at the very south end of the island in exhaustive but completely unsuccessful search for bryophytes. On April 4, the "Orca" moved to a new anchorage near the mouth of a very large arroyo. I followed this arroyo, which seems to head near the center of the island, for at least 5 miles, partly in the company of my fellow botanists, Lindsay and Moran. This trip was crowned with some success, as three species of mosses and two species of hepatics were found in quantity, both on fine silt at the edges of the broad arroyo and on banks and cliffs where seepage occurs after rains. The discovery of these bryophytes was welcome indeed, for varied reasons, partly because most of them looked different from anything I knew, giving some immediate evidence for endemism; partly because my failure to find any bryophytes for several days previously made me worry that my old luck in collecting had run out; and partly because Professor G. F. Ferris of Stanford University had wagered me a bottle of champagne that there would be no mosses on the gulf islands! I spent the afternoon of April 5 in an unsuccessful attempt to find bryophytes on the west slope of Espiritu Santo I., but the next day (April 6), in a deep canyon on Partida I., on the other side of our anchorage, I found small quantities of two species of mosses, quite apparently the same ones discovered on Cerralvo I.

The "Orca" arrived in La Paz on April 7, and as our route planned for the next two weeks would lead to progressively dryer and hotter areas, and since a substantial reduction in bryophytes was obvious just from Cerralvo I. to Partida I., it seemed wise for me to call a halt to further bryological exploration, at least during the dry season. This decision finally turned out to be reasonably sound, because although Lindsay and Moran kept up the search for bryophytes, no further collections were made. I left La Paz the morning of April 10, and was back at Stanford the same night, quite disoriented from so profound and sudden a change of scene.

In closing this report, I want to express my deep gratitude to Mr. Sefton for making possible the first visit of a bryologist to Baja California, and to George Lindsay for his many courtesies and experienced helpfulness. In view of the importance of the bryological collections, made in so short a time in terms of actual hours in the field, and yet which are well worth a published report, the necessity for further exploration for mosses and liverworts in this fascinating region is abundantly demonstrated.

Stanford University

NORMAN TAYLOR JOINS PUTNAM'S AS ADVISOR IN NATURE FIELD--G.P. Putnam's Sons of New York and London have announced the appointment of Norman Taylor, formerly on the staff of the New York Botanical Garden, and editor of Taylor's Encyclopedia of Gardening, as chief advisor in the nature field, as of 11 September 1952. He will undertake the revision of certain titles in Putnam's Nature Field Book Series, and will also work out arrangements, in conjunction with the Putnam Editorial Department, for additions to this series and to the Putnam's "Beginner's Guides to Nature" Series. These books cover natural history and related subjects, and have had a large circulation with the general public and in the academic field since the series was started over fifty years ago. Taylor has recently been the Director of the Cinchona Products Institute. He is well known to botanists as the author of the "Flora of the Vicinity of New York" (1915), "A Guide to the Wild Flowers east of the Mississippi and north of Virginia" (1928; ed. 2, 1936), and "Flight from Reality" (1949). The last is an account of the history of the discovery, use, and anthropological relations of narcotic plants, not only the common ones, about which whole bookshelves if not libraries have been written, but also those that are little known. He also has an impressive record as an editor, having edited "Torreya" and "Ecology" and having been editor for botany and certain related subjects of Webster's "New International Dictionary." He has travelled widely for botanical study and collecting in Mexico, Guatemala, Peru, Bolivia and Brazil. We wish him further successes in his new field of work!

ETHNOBOTANICAL NOTES FROM LIBERIA

Thomas J. Muzik

DURING five years as a botanist on the Firestone Plantations in Liberia, West Africa, I had contacts with natives of several groups, namely the Kpessi or Kpelle, Mendi, Gola, Buzi, Gio, Mano, Vai, Kru and Mandingo tribes.

From my diary I have extracted several notes, mainly ethnobotanical, which are sufficiently precise to be placed on record. There was no time for systematic ethnological inquiries, but these isolated brevities may happen to fall in place with the observations of others.

Liberia offers many fine opportunities to the anthropologist, especially at the present time, because it is now possible to travel over much of the country by car, since many new roads have recently been built. Previously, it has been necessary to walk by bush trail and to "head-load" all supplies, a procedure which has handicapped scientific investigation. The Liberian tribes present an interesting diversity of customs, languages, and adaptations to habitat, and should be studied before they are diluted and lose their identity.

Sarcocephalus for Stomach-Ache

One of the most interesting uses which certain natives, especially the Mohammedan groups, make of plants is the use of leaves of *Sarcocephalus* sp. (probably *S. esculentus*) (Bassa, *doe-yah*; Mendi, "*golli-nyum*", "*buy-ambei*") in the treatment of stomach-ache.

The leaves of the tree are boiled in water to make an ink. Certain verses of the Koran are written with this ink on a slab of wood, which is washed off, and the liquid drunk by the patient. He almost invariably gets well. It is said that the verses are varied according to the exact nature and location of the ailment.

Dental Fillings with Coagulated Latex of Voacanga

In the course of some experiments with the latex of *Voacanga obtusa*, (Mendi, "*zhe-ray-kren*") I was interested to learn that the natives (Mendi, Bassa, Buzi and Kpessi tribes) use the gum from this tree to fill dental cavities much as our dentists use gutta percha. The gum is white, hard and very resilient. The latex is obtained by making long incisions in the bark of the trunk, although the latex is present in all parts of the tree, including the fruit. It is usually allowed to coagulate partially on the tree in long strips and moulded in the hands when it has reached the right consistency. Although not a permanent filling, it does suffice for months without renewal.

Fish-poisoning with Raphia Fruits

One day, while walking along a little-frequented path near a large swamp, I happened upon a native (Buzi or possibly Gio), with a basket of Raphia fruits, which he was going to use as a fish poison. The process, he told me, is very simple. The fruits are well mashed in a mortar and then thrown into the water. So far as I know, this use for fruits of the Raphia palm has never been reported. There is considerable secrecy about it because fish poisoning is frowned upon by the Liberian government.

Palm Wine from Elaeis

Palm wine is made from the oil palm Elaeis guineensis, which is indigenous throughout Liberia. The top of a young palm is cut off and a cavity hollowed out in the stem. The sap collects in the cavity and is allowed to ferment for a short period. The flavor is not particularly good, but the wine is used otherwise than as a beverage, when yeast is unavailable, to leaven bread. European women in Liberia found it particularly useful during the last war, when shipments of yeast from the United States and Europe were much delayed and often no yeast could be obtained at all.

This oil-palm wine should not be confused with "toddy" or the wine obtained from the coconut palm, Cocos nucifera, which is gathered by tapping the flowering spathe. This practice is quite common in the Eastern tropics but is apparently never used in Liberia, or other parts of West Tropical Africa.

Tooth Sticks from Androsiphonia

The young twigs of Androsiphonia adenostegia are used to clean the teeth. The stick is chewed until the bark is removed and then rubbed vigorously against the teeth until they are clean. The process sometimes takes half an hour or more.

Lightning Protection from Jatropha

The "lightning tree", Jatropha gossypifolia, a small, rather attractive shrub, is often planted in native villages. It is said to prevent lightning damage. This belief is very common among the Gola tribesmen, but other tribes will also plant it for the same kind of "magic".

Trial by Ordeal with Erythrophloeum

The bark of the "sasswood" tree, Erythrophloeum guineense, is widely used as "medicine" to ferret out criminals. It is exceedingly poisonous. If several people are suspected of a crime, the suspects are lined up in a row and forced to drink a decoction made from the bark. The "innocent" men promptly vomit up the liquid, thus proving their innocence. If the liquid stays down, the man dies, and is therefore "guilty".

Apparently this test may be partly psychological in nature, for the innocent man gulps the liquid down without hesitation, whereas the guilty one tends to sip it slowly and the poison remains in the stomach.

It is said that if the guilty man's relatives are present, they may rush him to the nearest river and force enough water into him to save his life. If they are able to save him, the culprit is treated as if he were dead, or non-existent. His name is never spoken again and he is no longer accepted into tribal life. In fact, he may even be sold into slavery!

Ceremonial Use of Connarus

Some of the native medicine is apparently entirely magical. One interesting instance is that of a small, shrubby Connarus which I noticed planted in very close proximity to a banana plant. I interrogated a native (Kpessi) woman living nearby and she informed me that this was a "sacrifice". Neither she nor any members of her family could eat bananas without becoming ill. When the new moon came, she would sacrifice a chicken to the banana plant and thereafter the rest of her family would be able to eat bananas, although she, herself, never could. The sacrifice is made at night. The chicken is killed in front of the banana plant and offered to it ceremonially. Then the chicken is cooked and eaten by all those present at the ceremony. The significance of the Connarus is rather obscure and I could obtain no idea of its significance other than it was "medicine" and necessary for the sacrifice to be successful.

The Killing of a Twin Baby

When twins are born, (Bassa, Gola, Kpessi, Buzi tribes) one is always killed. This is said to be done to insure that one will survive, since there is not likely to be enough food available for two children, especially since they are seldom weaned before five years of age or more, and twins would therefore be difficult to raise. In times of famine, both might be lost. However, another reason is given by the natives. They say that twins are "one spirit in two bodies", this spirit thus being twice as strong as an ordinary spirit or soul. Such a spirit would be so powerful that it would be a menace to the community and to insure the peace of the tribe, one of the twins must be killed. If one of the twins is female and the other male, the female is always killed. Although I have been told by some of the natives that this is "old time palaver" and is not done at the present time, I failed to discover any twins among the native population, although I was carefully on the watch for almost five years!

TO BE EXPECTED IN FORTHCOMING ISSUES

Ethnobotany of popcorn, by Volney H. Jones

A short account of the development of the Natural Areas Council in Michigan

Botanical description of the Haven Hill Tract, by Paul W. Thompson

Botanizing in the Tahquamenon area of Upper Michigan, by Alexander H. Smith

Geography of Tradescantia ohiensis in the region of the Great Lakes, by Donald S. Dean

The Allen walnut of Middleville, Michigan, by H. H. Bartlett

Biographical Sketches of Douglas Houghton Campbell, Louis H. Jordal, W. G. Waterman, Ray C. Friesner

An autobiography for his family and friends, by C. L. Shear

Botanists of early years in the Bureau of Plant Industry, by David Fairchild

Letters from Assam, by Walter N. Koelz

Ekman, botanical explorer in the West Indies, by Siri Von Reis

Review of the Flora of Cuba, by Grady L. Webster

Letters from Okinawa, by Robin Drews

A round robin from Alaska, by Gertrude Frohne

Himalayan botanizing as experienced by botanists' wives (Review), by H. H. Bartlett

Observations on Oenothera in the Northwest, by H. H. Bartlett

English names of East Indian plants and plant products, by H. H. Bartlett

Botanical names derived from Malayan, by H. H. Bartlett

Correspondence on oaks and birches

Botanical news from the Philippines

Glimpses of the natural history of Koror, by Peter J. and Alma Hill

THE ASA GRAY BULLETIN, NEW SERIES. -- A quarterly publication devoted to more or less informal communication among the members of the Gray Memorial Botanical Association and the Michigan Botanical Gardens Association. Appropriate contributions from members of either group or from subscribers will be accepted. For the present, progress reports of current field, garden, and herbarium work, with readable and relatively nontechnical articles in the fields related to systematics, botanical history, biography, and bibliography, will be preferred. There will be special emphasis upon preparatory work for a new "Flora of Michigan". Free use will be made of letters to the Editors (if released for publication by their writers) and of current news notes regarding botanists.

Items for publication should be addressed to either of the Editors at the Department of Botany, University of Michigan, Ann Arbor, Michigan. Contributors of major articles may secure 150 copies of their contributions, at a cost of $1.25 per page or fraction thereof. Covers furnished without additional charge.

Address subscriptions to Dr. Ruth B. McVaugh, Business Manager, 403 Arbana Drive, Ann Arbor, Michigan. Subscription price for Volume I is $3.25 ($1.00 for Vol. I, No. 1 separately, other numbers $0.75 each). Vol. II, $3.00.

THE GRAY MEMORIAL BOTANICAL ASSOCIATION, FOUNDED 1887. — This organization sponsored publication of early volumes of the Asa Gray Bulletin. Later it issued a mimeographed "Bulletin". Its object is to commemorate the life and botanical work of Asa Gray and to assist its members in botanical activity by furthering friendly correspondence and cooperation among them. Interested persons are invited to communicate with the Permanent Secretary, Professor R. Lee Walp, Department of Biology, Marietta College, Marietta, Ohio.

MICHIGAN BOTANICAL GARDENS ASSOCIATION. — Founded in 1925 to include persons interested in promoting the development and current activities of the Botanical Gardens of the University of Michigan. There are no dues, but subscription to the Asa Gray Bulletin is invited. For further information, communicate with Dr. Frieda Cobb Blanchard, Secretary, 2014 Geddes Avenue, Ann Arbor, Michigan.

MICHIGAN BOTANICAL CLUB. —— The membership is about 350, made up of persons interested in the Michigan flora, nature-study, wild-flower protection, preservation of natural areas, and conservation. It has members at large and the following chapters: Southeastern, Bay County, Marquette, Wild-Life (Houghton). For information address the President, Mr. Paul W. Thompson, 17503 Kirkshire, Birmingham, Mich.

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THE MICHIGAN BOTANICAL CLUB

by

Harley H. Bartlett and Rogers McVaugh

C O N T E N T S

(Continued over)

ANN ARBOR, MICHIGAN

CONTENTS
(Continued)

Vol. II, No. 1, of the Asa Gray Bulletin was issued 27 April, 1953.

AN AUTOBIOGRAPHICAL FRAGMENT AND LETTERS ADDRESSED TO DR. H. B. HUMPHREY

Douglas Houghton Campbell

ONE of Douglas Houghton Campbell's early students was Dr. Harry Baker Humphry, who, since before his retirement from the Bureau of Plant Industry at Washington (1946) and subsequently, has been interested in botanical biography. Learning from Dr. W. C. Steere that Dr. Humphrey had requested and received an autobiographical fragment which Campbell wrote in his 90th year, we asked permission to publish it, together with any related material, with the group of articles which is herewith presented as a memorial to Campbell. Dr. Humphrey has very graciously sent not only the autobiographical sketch, but also the letter with which it was transmitted, and a second letter which followed acknowledgment of receipt. We had hoped to publish the autobiographical sketch in facsimile, but the script proved to be not readily legible. Only the first page, therefore, is reproduced as an illustration.

Dr. Humphrey was a graduate student and instructor at Stanford from 1905 to 1909, and received his doctoral degree under Campbell in 1907, having specialized in the life-history, morphology and physiology of the Hepaticae, the group in which Campbell was then most enthusiastically interested. — H. H. B.

Stanford, May 3, '49

Dear Dr. Humphrey

I am enclosing a brief sketch of my career, which I hope may be of use to you — if you can read it! I am afraid my writing has not improved with age!

I am pretty well — but I don't get much done.

We have had a very severe winter with much hard freezing weather which has done much mischief.

It is pleasant enough just now, but the season is very backward and we need more rain.

I hope you may be able to get out to California. With the tremendous migration here, the problem of finding living quarters has become very acute.

Biography

My interest in Natural history was always very marked. As a small boy I collected insects and flowers and read such scientific books as were ~~accountable~~ available in the home library. One book I remember had a real effect upon my development—Wallace's Malay Archipelago—which aroused a great interest in the tropics and the career of a ~~Natur~~ Naturalist. My parents encouraged my scientific efforts and I cannot remember when I thought of any other career.

My first ~~[illegible]~~ teaching was at home—but when about ten years old I went to the Detroit Public Schools and in the High School prepared for the University of Michigan, which I entered in 1878.

First page of the autobiographical sketch written by Douglas Houghton Campbell in his 90th year.

Hoping that my biography may be of use to you

Very sincerely ys
Douglas Houghton Campbell

Biography

My interest in natural history was always very marked. As a small boy I collected insects and flowers and read such scientific books as were available in the home library. One book I remember had a real effect upon my development — Wallace's Malay Archipelago — which aroused a great interest in the tropics and the career of a Naturalist. My parents encouraged my scientific efforts and I cannot remember when I thought of any other career.

My first teaching was at home, but when about ten years old I went to the Detroit public schools and in the high school prepared for the University of Michigan which I entered in 1878.

I kept up my botanical studies during my school years and at the University entered the excellent beginning course in botany. For the first time I used a microscope & studied various types of the lower plants. I then decided to make botany my major work, which continued throughout my four college years. My special interest in the archegoniates was due to an English translation of Hofmeister's work, which decided me to carry on this line of investigation. Finally I planned to work for a Ph.D. — not a very common thing in those days.

My work was done under Professor Volney Spalding.

After my graduation in 1882 I taught Zoology and Botany in the Detroit High School where I spent four years trying to develop more modern teaching in biology.

At this time Johns Hopkins had a great influence in the teaching of biology in the schools. It was also the time that the work of the great German botanists became available to American botanists.

During the four years in Detroit I carried on my work for the Ph. D. and in 1886 I received my degree, and went to Germany.

My first semester was with Strasburger at Bonn, where I studied the technique of nuclear staining and completed a study of spermatogenesis.

The second semester was with Pfeffer in Tübingen. Here I worked with the staining of living nuclei and completed a paper on the subject.

The second year was spent in Berlin. I worked in the laboratory of Professor L. Kny, and made a study of the development of Pilularia.

This involved the new technique of paraffin embedding and the use of a microtome which Professor Kny ordered for me from England (Cambridge Rocking Microtome) — I think the first used in any German botanical laboratory. I finished a paper which was published in the 2nd volume of the Annals of Botany.

On my return to America Dr. Jordan invited me to develop the Dept. of Botany in the University of Indiana, and when three years later he was called to the new University at Stanford he invited me to go with him.

This move to California was a very important event in my life, and undoubtedly greatly influenced my future career. The extraordinary development of the Hepaticae at Stanford started my work in the Mosses & Ferns. In order to have access to the necessary literature Dr. Jordan gave me a semester's leave & I went to London where the book was completed and published (Macmillan).

The move to California also gave opportunity for travel — and I have done much more travelling than I should otherwise have done.

Books

Mosses & Ferns, University Textbook, Eusporangiatae, Plant Geography, Evolution of Land Plants, Continental Drift & Plant Distribution.

Stanford University
July 23, '49

Dear Dr. Humphrey

Your letter and the paper from the Montreal Botanical Garden came promptly. I was very glad to get the paper, which I had not seen. I have for a long time corresponded with the University of Montreal but have not received papers from the botanical garden. I have read the paper with great interest as the flora of Quebec is especially interesting. I am sorry you are not going to be here this summer but I am sure you will find your trip to Canada satisfactory.

I had a very pleasant visit not long ago from your nephew Borthwick whom I had not seen in a long time — and made me feel how time flies. I am pretty well — considering my 90 years — but feel pretty superfluous. I know I shall never see a really peaceful world, and the prospect for the future is not promising.

Our new president Dr. Sterling is making a most favorable impression.

Hoping this finds you well

Sincerely ys
Douglas H. Campbell

DOUGLAS HOUGHTON CAMPBELL: FAMILY, BOYHOOD, YOUTH, AND TRAVELS

Mary Campbell Hays

DOUGLAS HOUGHTON CAMPBELL was next to the youngest of Judge James Valentine Campbell's six children. My father, Edward De Mill Campbell, was the youngest. Born and bred in a Detroit very different from the turbulent city of today, the boys could roam freely the fields and farms beyond the town's edge.

Judge Campbell had imbued his children with many interests, just as he had been influenced by those of his father, Henry Munroe Campbell, who had come to Detroit in 1826 when some fifteen hundred or two thousand persons, many of them of French descent, made up the town. Its boundaries were then the river bank, Randolph, Fort, and Wayne Streets. Michigan was generally an unbroken wilderness with Indians coming periodically to dispose of furs and receive their annuities. Detroit was soon to grow rapidly, however, thanks to the Erie Canal and the trade and immigration it brought westward to the frontier.

Douglas Houghton Campbell's father, was admitted to the bar in 1844 and after thirteen years (1857) was elected one of the four judges of the new Supreme Court of Michigan, an office which he held until his death in 1890. Two years later he was appointed to the faculty of the newly opened Law School of the University of Michigan, and for several years served as its Dean.

Since the Law School course was then for only six months, he could give his lectures during one or two days each week, which was possible and perhaps also necessary, in view of his other obligations.

The family prospered and moved in the intellectual and cultivated society of the day, one constantly augmented by newcomers from the older Eastern states. This prosperity was not to last. Henry Munroe Campbell suffered grievously in the financial troubles of 1837. "After a severe struggle, he managed to pay his debts and keep out of bankruptcy, but, dying in January, 1842, he left little to his family save a name unimpeachable for integrity and public spirit. . . . Judge Campbell's early elevation to the Supreme Court and his continuance there almost without effort during the remainder of his life was a great honor but it took away all chance of his accumulating a fortune, or even of acquiring a modest competence, and led to a life of constant economy. The war of the Rebellion and the issue of paper money caused a great increase of prices and virtually cut in two a salary altogether inadequate in ordinary times."*

*Kent, C. A. James Valentine Campbell. Mich. Law Review 5:1-10 (repaged reprint). 1907.

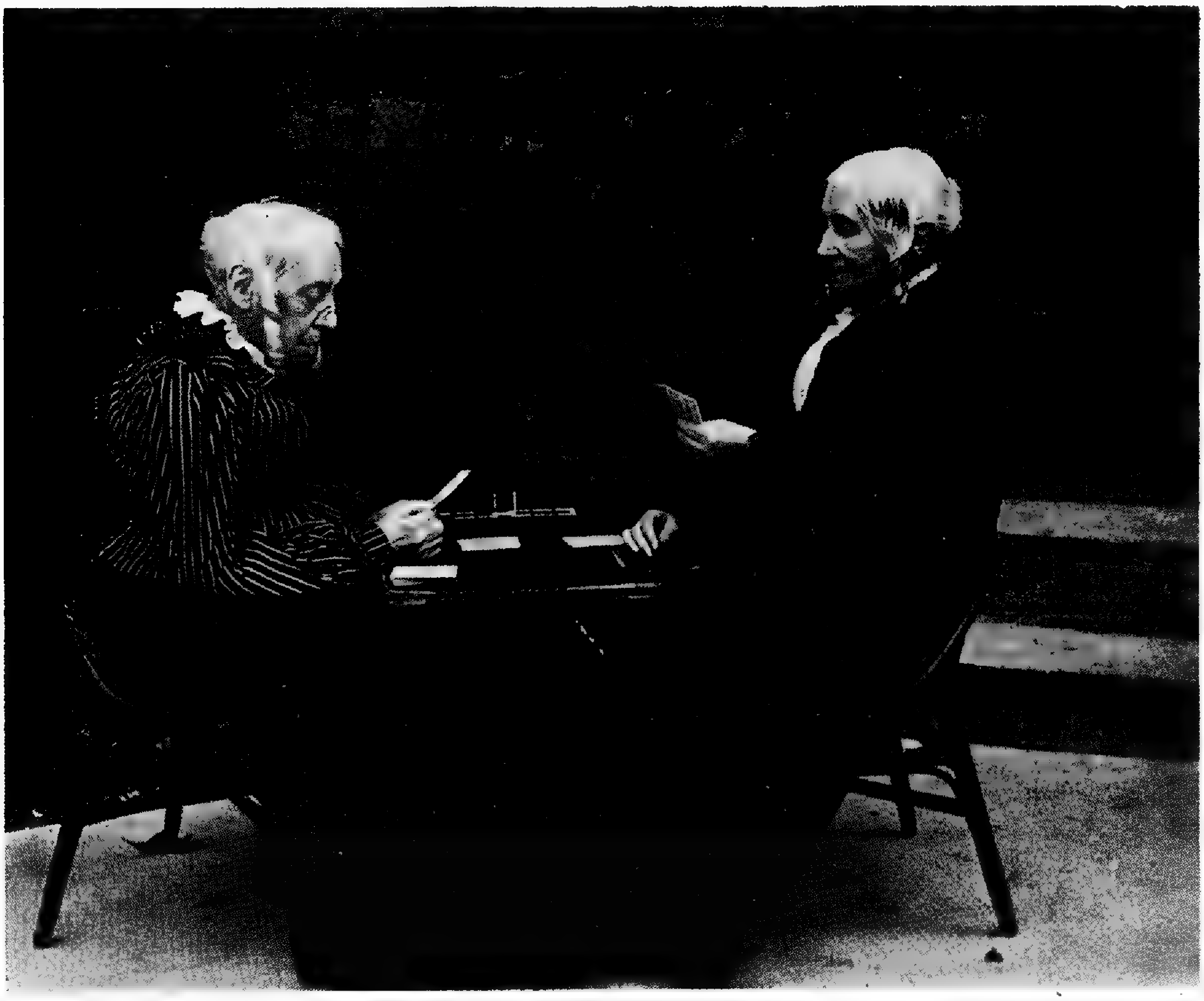
He had seen to it, however, that his children were given every opportunity possible for good education and development of broad interests.

The six Campbell children: taken about 1870, as a birthday present for their mother, Cornelia Hotchkiss Campbell. From left to right they are: Edward De Mill Campbell (seated) who was to become Head of the Department of Chemistry at the University of Michigan; James Valentine Campbell (standing); Henry Monroe Campbell; Charles Hotchkiss Campbell; Cornelia Lois Campbell; Douglass Houghton Campbell.

Henry Munroe Campbell's sons had gone to an Eastern Episcopal School at Flushing, New York, which had a collegiate course. His daughters were also well educated, and one, Valeria, was for nearly twenty years head of a successful school for girls in Detroit. Valeria, unmarried, lived in the home of her brother, Judge Campbell, for many years and it was she who taught all six children, schooling Douglas Houghton Campbell until he was 10.

Though the household lived simply, there was always enough for education and the accumulation of a fine family library. A fair number of books had travelled from New York State to Detroit in 1826 with Douglas's grandfather, Henry Munroe Campbell, and this foundation of the library, which grew through Judge Campbell's life, was of excellent quality, and must have deeply influenced his children.

The Judge himself "was a many sided man, interested in many subjects beside the law. He loved knowledge for its own sake . . . He was a constant reader to the end . . . interested in geology and to some extent in chemistry."



Douglas's Aunt Valeria, the Judge's unmarried sister (left) and her sister Elizabeth (right). Valeria Campbell tutored the six children, and was Douglas's only teacher until he started school at the age of ten. This picture was taken in her later life, after she had conducted a private school for girls in Detroit for twenty years.

If travel in the flesh was not possible, certainly the family ranged far and wide in their imaginations for the library list compiled at the time of Judge Campbell's death has a remarkable number of books on travel and exploration. There were few novels, save for some classics, a good deal of poetry, much history, biography, architecture, and art. Many fields of science were liberally included.

German, French, Italian, Latin and Greek, all were represented, but that French predominated among the modern languages was not surprising, since Judge Campbell had many friends among the French population and both spoke and read French fluently.

There was time to read, and room in the house built for an old-fashioned big family for the collections and experiments of young and curious children. The five boys had their own retreat "The Sanctum", with its herbariums, geological specimens and insects. Other boys brought their finds to be identified and Douglas was well pleased when he could tell one of them that his "petrified bedbug" was a trilobite.

Douglas Houghton Campbell was named after the eminent geologist who was not only a close friend but also kin to Samuel Townsend Douglass who married Elizabeth Campbell, sister of Judge Campbell. This accounts for the fact that in early years he spelled his name Douglass, with final double "s", in accordance with the usual family spelling, although later he dropped what he must have considered a superfluous letter. As a boy, he spent more than might have been thought its proper share of time in pouring over books and collections.

Always very nearsighted, ball games and other active sports seemed difficult for him, so he resisted his mother's endeavors to have him join the neighborhood play. Nearsighted he certainly was, but some deeper trait may have kept him from the usual rough and tumble of youth. Most of his life he seemed content to be on his own, reading, looking, experimenting.

Uncle Douglas said many times that he was most deeply influenced by a book that was his father's Christmas gift to his mother when he was ten. It was Wallace's "Malay Archipelago". That copy eventually became his and was in his Stanford library.

Among the many families with whom the Campbells were intimate was that of Bela Hubbard,* the geologist, who lived in Springwells, now Dearborn, some eight or ten miles away. The Hubbard place was spacious and Mr. Hubbard had planted many trees and shrubs new to the region. The house, too, was both large and handsomely furnished, with etchings and paintings, and, then of more immediate interest, a fine entomological collection, the property of the elder son who had attended Harvard.

Douglas had collected insects assiduously himself — but this! One book upon the subject at the Hubbards' fascinated him and he was delighted when upon his 12th birthday, his father gave him his own copy

*Bela Hubbard (1814-1896) was appointed Assistant Geologist of Michigan in 1837. He served in that capacity under Douglass Houghton for three years and later in 1845 and 1846. He was admitted to the bar in 1842. He was one of the original members of the American Association of Geologists and Naturalists (1840) which became the American Association for the Advancement of Science. Although in later life he devoted himself increasingly to non-scientific activities, he was ever an enthusiastic naturalist. He served as the first member of the Michigan State Agricultural Society, and was an early advocate (1877) of forestry in Michigan. — H. H. B.

of T. W. Harris' "Treatise on some of the insects injurious to Vegetation." "Nothing ever gave me more pleasure" — Douglas said.

Mr. Hubbard, a man of many interests, in science and in art, was kindness itself to the young and eager Campbell boy. Though Douglas had tried his own hand at watercolors some years before (among the many watercolors in Stanford at the time of his death were some done when he was only eight) the etchings and paintings at the Hubbards' opened up a really new world to him. They quickened his appreciation and sharpened his observation of art.

Having emerged from under Aunt Valeria's tutelage and completed work in the Barstow School, Douglas went on to the Detroit High School. There he took college preparatory work, but no botany, for he "knew by then more than the teacher."

Every summer the Campbell children had the happy opportunity of spending holidays on Grosse Ile, where their aunt, Judge Campbell's sister, Mrs. Samuel T. Douglass, and her husband had a charming Victorian stone house. The island was wooded, with a canal cut through, plant and small animal life abounded, and the Detroit river parted at the island's head, where the big boats took the Canadian side and one looked across to the Canadian shore, distant "foreign land" to the young. The little train went up to Detroit in the morning, came down at evening; the days were long, delicious, and full of all manner of joy for Douglas, his brothers, his cousins. It was an idyllic spot for children and each could follow his heart's desire, swim, sail, row, explore.

Douglas had his insect and plant world. Edward De Mill Campbell, his younger brother and my father, who was later to turn to chemistry and be professor and head of the chemical laboratory at the University of Michigan for many years, had then divided interests, -- chemistry and zoology. Birds, mammals, and especially their bones, just then absorbed him. Though chemistry claimed him largely in college, he had time and interest to mount a 5-foot skeleton, still in the Natural Science collection, and hung in his college room a plaque of dog bones spelling out "De Mortuis nil nisi Bonum". It now hangs in the study of the distinguished paleontologist E. C. Case in the Museum of the University of Michigan.

Edward's dead horse was anchored off the dock -- to have its bones bared. Douglas scoured the woods.

Among the books in the Detroit home was much food for inquiring young minds. When ten, Douglas received as a gift Menault's, "The Intelligence of Animals with Illustrative Anecdotes", when eleven, H. T. Stainton's, "British Butterflies and Moths." Undated early additions to his library were Benjamin Waterhouse's, "The Botanist" (1811), which had belonged to his grandfather, 10 volumes of Sir

William Jardine's, "The Naturalists Library," P. H. Gosse's "Evenings at the Microscope", (1872), Thoreau's "Walden" and "The Maine Woods," E. Reclus's "The Earth," Agassiz's "Introduction to the Study of Natural History," L. M. Underwood's "Our Native Ferns and how to Study Them."

Books in Edward's field of that day, but they must have interested Douglas as well, were: Elliott Coues, Key to North American Birds (1872), Vernor, Our Birds of Prey (1876), Baird, Brewer and Ridgway, History of North American Birds, 3 vols. (1874), and F. M. Daudin, 2 vol., Traite Elementaire et Complet d'Ornithologie (1800). These were in the home library. Also at home, and among the books in the field of fine arts which might well have influenced Douglas were, G. E. Woodberry's History of Wood Engraving (1882), P. G. Hamerton's Etching and Etchers (1883), Maxime Lalanne's Treatise on Etching, (1880), Ruskin's works, J. J. Winckelmann's History of Ancient Art (1880), and William Roscoe's Life of Lorenzo de' Medici. These books and many others were all at hand to be browsed over and some of them certainly read during Douglas's high school and college years. P. G. Hamerton's Life of J. M. W. Turner was given him when he was nineteen which indicates his early liking for substantial reading in art as well as science.

The great number of books of travel and exploration might well have made his own foreign tours, which began in 1886 and continued every few years including two trips around the world, a most natural way of life, though he came of a family who had only been fireside travellers.

Douglas followed his older brothers to the University of Michigan, and graduated from the Latin-Scientific course in 1882. Douglas's older brothers had joined the fraternity popular among their Detroit friends and I have been told that he felt it deeply when not asked to join. He was still something of a lone soul. Edward, coming later to the University, chose not to join after his brother's rebuff.

During all his years, Douglas seemed very reserved, — had no very close friends and never married. Marriage, with its responsibilities, could never have allowed him the almost total freedom to go and come over the earth in his research as he preferred to do. To Edward's six children, of whom I was one, his visits to Ann Arbor were in the nature of tantalizing glimpses of far-away places, for we too were a stay-at-home family. Uncle Douglas could tell us of distant shores, and did, but always in a rather brusque fashion, for the floral rather than the human aspects, which would have interested us most, had engrossed him. He did not, I think, feel greatly at ease with us children, nor could he have, I think, until we became more mature, and at least a little scientific or artistic in our questioning. Later, as one of us became a geologist, and another was interested in art, common ground was found and things went more easily.

Whether Douglas roomed alone during student days in Ann Arbor, I never heard him say.

He elected botany as his specialty, encountered the lower plants, most of them unknown to him until then, and found the teaching of the evolutionary processes so appealing that he then and there decided that botany was to be his field throughout life. He met his great eye opener — the microscope.

While he had no classes with Professor Joseph B. Steere, who had travelled widely in South America, the Philippines, China and Formosa, he knew Steere well and eagerly absorbed what he had to impart about the American and Old World tropics.

Professor Volney Spalding was most helpful to him, and directed his studies. Douglas took every possible course and read constantly. As his French and German improved more and more under the tutelage of Professor Walter and Professor Calvin Thomas, he began to know foreign scientists through their writings.

Professor Thomas, just back from Leipzig, and full of enthusiasm said "get your degree here, but keep on going."

His knowledge of the great contemporary German work in botany,

Douglas Houghton Campbell, from a photograph taken at Detroit and presumed to date from the period 1882 to 1886, when he was a candidate for the doctorate at the University of Michigan and teacher of botany and zoology in the Detroit High School.

drew him, and Dr. Thomas's enthusiasm pushed him, towards Germany.

Having taken his Master's degree in 1882, how to finance his Ph.D. was the next problem. The Detroit High School agreed that he should give a new combined course in biology, — zoology the first semester, botany in the second with classes in the morning only, thus leaving the rest of the day for his own studies.

By living at home and saving his salary he laid away enough for further study. A high school publication has added to it, in his sister's hand, that he also taught singing. He had a good voice and enjoyed using it singing German Lieder and selections from Gilbert and Sullivan. In 1886, having received his Ph.D., he left for Ireland, then England, where he began a bicycle tour which took him to Coventry, Peterborough, the Trossachs, Lake Country (where he climbed Ben Nevis) the West Coast, then on to the Isle of Wight and back to London. He had started with a young man recently met but "that did not last long", he said, "about a week", and he went on alone.

It was at this time that he began using his ability to record impressions in watercolor as a form of diary. From then on he always had the materials at hand and made rapid sketches as memoranda of his travels.

Early autumn took him to Germany, to Professor Strasburger at Bonn who was charming and welcoming and put him to work at once. This period, when he was one of four foreign students in Professor Strasburger's laboratory, was, he felt, the greatest event in his life, for he then learned Strasburger's methods, which meant everything to him.

The second semester took him to Professor Pfeffer at Tübingen for plant physiology. In contrast with Professor Strasburger, whose personality was charming, Professor Pfeffer impressed him as somewhat rigid and stiff-necked, though "an excellent man for work". That summer was spent in Switzerland and South Germany, but autumn took him to Berlin for a year in the laboratory of Professor Kny at the University of Berlin.

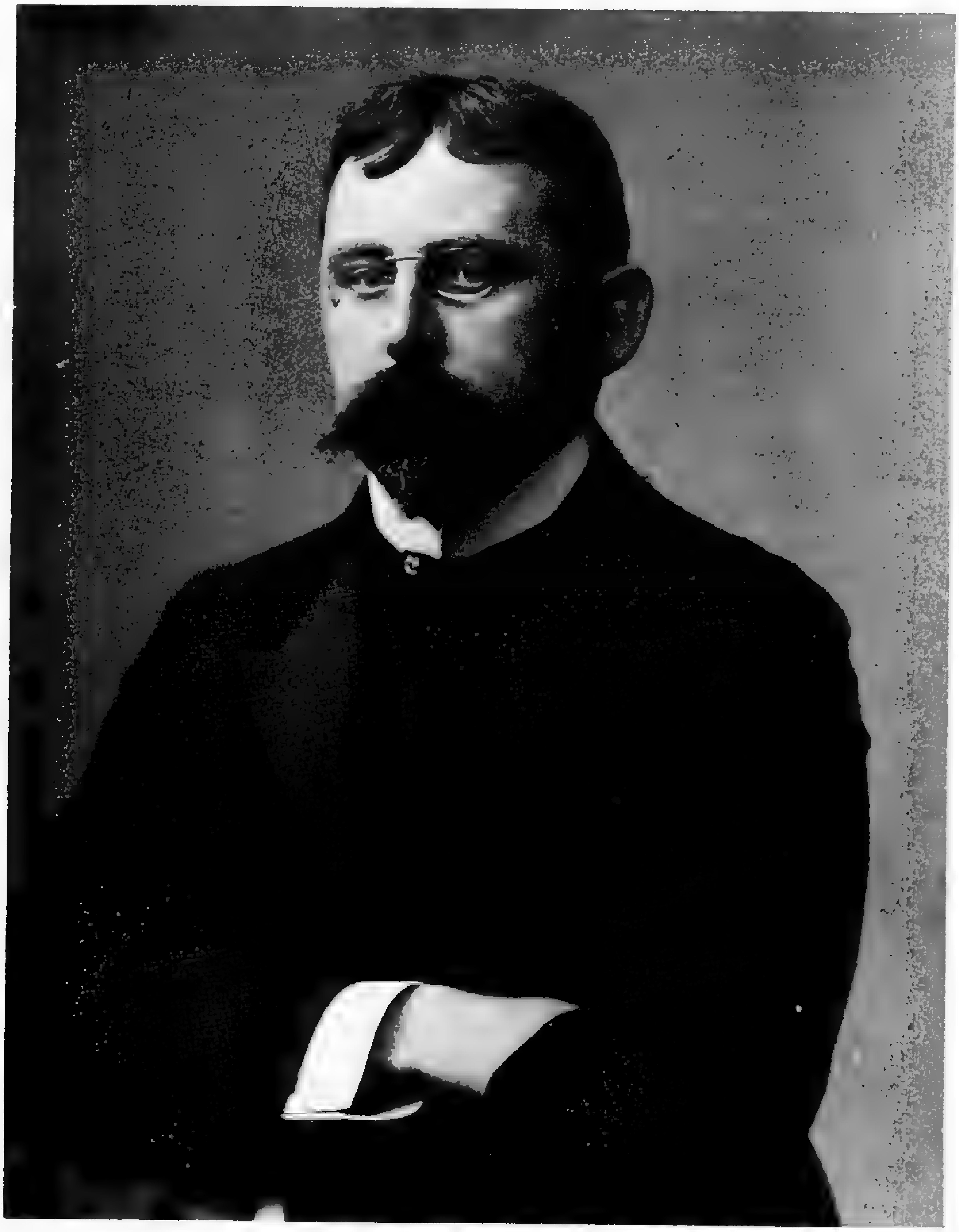
Here he learned how to stain the nucleus without killing it, and here he did his first microtome slicing with equipment which Professor Kny ordered for him from England.

To a young man fresh from the midwest it was exciting to witness the life of a great European nation. During his short residence, three emperors reigned. The great funeral ceremonies deeply impressed him.

Photographs taken in Berlin show him as rigid as Professor Pfeffer — complete with goatee and well-nigh walrus mustache. In due course the goatee departed but the mustache persisted to the end, though growing more and more abbreviated.

In the late summer of 1888, Douglas returned to teach at the University of Indiana, whose president was David Starr Jordan.

His early aloofness may have been augmented by German residence, for Bradley M. Davis, his first student there, writes "one would meet him hurrying back and forth from the campus, eyes on the ground, a flower in the lapel, too finely dressed for the style of the town. He



Douglas Houghton Campbell, at Berlin, while studying in the laboratory of Professor Kny, 1887-1888.

walked alone, apparently absorbed in thoughts of his work and when he entered his office in Owen Hall no one would think of disturbing him or the click of the microtome."

During the three years that he taught at Bloomington, he was indefatigably busy in every hour of spare time in cutting thin sections and making drawings from them to illustrate articles and books. From the very beginning of his career as a botanical author he did his own illustrating. Early preoccupation with art had been only secondary to that with botany, and he had the skill in drawing which enabled him to make one interest serve in developing the other.

When Stanford University opened in 1891 with David Starr Jordan as president, Campbell went there to organize the courses and department of botany.

Douglas Houghton Campbell, from a photograph taken during the years at Stanford University. This is the picture which is considered the best of those made in the prime of his life, but it is unfortunately not dated.

He travelled so extensively that one wonders how he could have been at Stanford long enough to strike root. That he did, however, quickly and deeply, and was forever after a devoted Californian.

A house most skillfully planned to permit sharing with one or two friends, yet allowing each complete privacy, was built on University property. Dr. Vernon Kellogg and Professor Allardice of the Mathematics Department, a Scot, were his companions. Each so effectively preserved his individual habits and privacy that a story circulated that a complete set of the works of R. L. Stevenson had been sold to each!

A tiny formal garden was laid out on the steep slope behind the house. Flowers, vines, and that pride of his heart, a red-wood tree which he saw grow from well nigh nothing to over 100 feet, gradually took over until to the less observing many fine growing specimens of lesser species were lost to view. Uncle Douglas, however, could always turn up some rare and charming plant from the undercover.

The house was never without several flower arrangements and the professor would as soon have gone collarless as without a boutoniere.

His research for "Mosses and Ferns" and "Lectures on the Evolution of Plants" and later books took him over much of the globe and he became personally acquainted with many of the world's botanists. Among his few intimate friends was Professor F. O. Bower whose interest also was in ferns and evolution. Campbell was working in the British Museum when, through Professor Bower, he met Mr. George Macmillan who wished to publish his "Mosses and Ferns" and Dr. Jordan granted him the time to finish it.

His botanical travels began in 1882, when he visited Mauch Chunk, Pennsylvania. In 1883 he was at Eagle Harbor, Houghton and Marquette in the Northern Peninsula of Michigan, and localities in Ontario. In 1884 he went to New England and Quebec. In the summer of 1885 he was again in the Upper Peninsula of Michigan, and went over to Isle Royal. That summer he carried an old-fashioned botanical collecting can (vasculum) as he did habitually, at least in those early years. Standing one day on a beach near Eagle River, he was accosted by a stranger who was also identified as a botanist by carrying a vasculum, then an ear-mark of the vocation, or, as it was more generally, in those days, avocation. Mr. Frank Elmer Wood said to Campbell, "I didn't know there were two fools up here." Mr. Campbell said to Mr. Wood, "Over in that swamp there are orchids." That was the sum total of the conversation, and they did not introduce themselves, for Campbell was taciturnity itself with strangers. In 1942 Mr. and Mrs. Wood were in California and were taken to call on Professor Campbell by mutual friends in Palo Alto. They had still never met Campbell, but conversation naturally turned to old days in Michigan and both remembered the meeting near Eagle River. Mr.

Wood recalled: "I said, 'I didn't know that there were two fools up here'" to which Campbell added, "And I said, 'Over in that swamp there are orchids'". Completing the record, Mr. Wood remarked, "I went to see, and found Calypso." There had only been fifty-eight years between!

Following 1886, Campbell travelled extensively, as shown by a list of countries visited which he appears to have made in 1908 and which has been supplemented from the notations on his water color sketches, which he made whereever he went, instead of keeping a diary. In early years he was a faithful but unsatisfactory correspondent of the relations at home, for although he wrote often and even took pains to number the letters consecutively, he told little in his letters except where he was and the state of the weather, which doubtless seemed to him more important than anything else, as it favored or interfered with botanical collecting and painting.

Uncle Douglas celebrated his 93rd birthday in December 1952 with a group of friends, and died February 23rd, 1953. It seems interesting to list his travels chronologically extending his own list of 1908 from the record on the backs of his dated water color sketches. If he travelled anywhere after 1908 without doing any painting, there are omissions from the list, which probably accounts for the gap from 1942 until his death in 1953. The list follows:

TRAVELS: 1882 TO 1942

1882: Mauch Chunk, Pennsylvania (Aug.)

1883: Orien, Bayfield, Ontario; Eagle Harbor, Houghton, and Marquette, Michigan (June, July, Aug.)

1884: Swampscott, Massachusetts, Gorham, New Hampshire, Quebec (July, Aug.)

1885: Grosse Ile, Michigan (July, Aug.)

1886: England (Aug. and Sept.); Germany (Oct.)

1887: Italy (March, April); Germany (June, July); Switzerland (Aug. Sept.); France and Germany (Sept. Oct.)

1888: Germany (July)

1889: Dayton, Tennessee (June); Bloomington, Indiana (Oct.)

1890: New England (July, Aug.); Bloomington (Sept., Oct.)

1891: Lake Placid, New York (Aug.); Grosse Ile, Michigan (Sept.); West thru Port Arthur, Banff, and Tacoma to Stanford. (Sept.); Carmel, California (Nov.)

1892: Big Trees, Yosemite (June); Hawaii (July, Aug.)

1893: Santa Barbara (March); Mackinac and Grosse Ile, Michigan (July, Aug.)

1894: England, France, Germany, Switzerland, Austria, England (July-Oct.)

1895: Grosse Ile (July); Quebec and New England (Aug.)

1896: Portland, Oregon and Vancouver, British Columbia (May); Japan (June, July, Aug.)

1897: Port Antonio, Jamaica (June, July)

1898: Castle Crags, California (June); Alaska (Coast) (June-July); Lake Tahoe (July-Aug.)

1899: England (Aug-Sept.); France (Sept.-Oct.); Germany (Oct.-Nov.)

1900: Egypt (Jan.); Italy (Feb.-June); Austria (June)

1902: Carmel, California (Jan.); Santa Barbara (March-April); Big Trees (June); Mexico (June-July)

1903: New Zealand, Australia and Pago Pago (June-Aug.); Palm Springs, California (Dec.)

1904: Asheville, North Carolina and the Smokies (June); Canadian Rockies (July-Aug.); Tahoe, Lassen (Aug.)

1905: Italy, Germany, Greece, Austria, Hungary (June, July); Italy, Germany, England (Aug.); Portugal down west coast of Africa (Sept.); Victoria Falls to Cape Town (Oct.); East Coast of Africa (Nov.); India, Mandalay (Dec.)

1906: Ceylon, India (Jan.); Ceylon (Feb.); Singapore, Java (March); Java, Sumatra (April, May); Java, Hong Kong, Japan (June); Japan (July)

1907: Yosemite (June)

1908: Tucson, Arizona (March); Panama, Jamaica, Barbados, Trinidad (June, July)

1909: Yosemite (June); Mt. Hood, Portland, Ranier (July)

1910: Belgium, Holland (May); Italy, Spain, Tangiers, Algiers (June); Italy, Yugoslavia, Germany (July); Paradise, California (Aug.)

1911: Tahoe, Rainier (Aug.)

1912: Barbados, Suriname (June); Port of Spain, Trinidad (July); England (Aug.); Germany (Sept.); Germany, Italy, France (Oct.); Italy, Algiers (Nov.); Aden, Port Said, Straits Settlements (Dec.)

1913: Straits Settlements, Penang (Jan.); Malaya, Sumatra, Singapore (Feb.); Borneo (March); Java, Philippine Islands (April); Philippines (May); Hong Kong, Inland Sea of Japan (June); Japan (July); Hawaii, Tahoe (Aug.)

1915: Tahoe, Shasta Springs (June)

1916: Canadian Rockies, Prince Rupert (Aug.)

1917: Hawaii (Aug.)

1918: Thunder Bay (July); Del Monte, Carmel (Sept.); Detroit, Ithaca, New Jersey, Asheville, North Carolina (Oct.)

1919: Carmel (March); Giant Forest, Carmel (June, July); Hawaii (Aug.-Sept.)

1920: Yosemite (July); Crater Lake, Glacier Park, New York (Aug.)

1921: Yosemite (June); Pago Pago, Australia (Aug., Sept., Oct.); New Zealand (Nov.); Tahiti, Papeete etc. (Dec.)

1922: Tahiti, Papeete (Jan.); Glacier Park (Aug.)

1923: San Diego (Sept.); Detroit; Williamstown (Oct.)

1924: Canadian Rockies, Toronto, Montreal, New York (Aug.)

1925: Alaska coast (June); Alaska, Yukon (July); Canadian Rockies (July-Aug.); Carmel (Sept.); Panama (Oct.)

1926: Victoria (June); Quebec (July); England (Aug.); England, France (Sept.); France, Switzerland (Oct.)

1927: Washington (April); Tahoe, Pyramid Lake (June); Mono Lake, Yosemite, Mt. Baker, Ranier (Aug.)

1928: Rio de Janiero, Bahia, Petropolis (July-Aug.); Detroit, New York (Sept.)

1929: Bronx, Detroit, Lakeport, California (May); Tahoe (June); Lake Crescent, Olympia, Washington, Victoria, B. C. (July)

1930: San Pedro, California (June); Canal Zone (July); England (Aug., Sept.); Lisbon, Azores, Brazil, Chile (Oct.); Valparaiso, Lima, Barro Colorado, Panama (Nov.)

1931: Washington (May); Jasper Park, Vancouver, Victoria (July)

1932: Yosemite (May-June); Detroit (July); Hood River (Aug.)

1933: Vancouver, Victoria, Vancouver Island (June); Yosemite (July)

1934: Guatemala, Colombia, Cuba, Caribbean area (March, April); Washington (April); Detroit (July)

1936: New York (May); San Diego (Aug.)

1938: San Diego (June); Asheville (Oct. - Nov.)

1939: New York (May, Oct.); Ann Arbor (Nov.)

1940: Washington (April); New York, Ann Arbor (May); Seattle, Victoria (June-July); Pullman (Nov.)

1941: San Diego, Tucson (Jan.); Ann Arbor, Madison (Oct.)

1942: Palm Springs, Phoenix (Feb.)

TWENTY-EIGHT YEARS WITH DOUGLAS HOUGHTON CAMPBELL

Ira L. Wiggins

A FEW years ago I met an elderly English gentleman in southern California whose face beamed with pleasure as he quietly boasted, "When I was five years old, I sat on Charles Darwin's knee!" I believe I know fairly well how he felt when he recalled that boyhood experience, for it is my privilege to be able to say, "I took two courses from Douglas Houghton Campbell during the last year he taught at Stanford University." That opportunity came to me during the autumn of 1924 and the winter of 1925. Dr. Campbell retired from active teaching at the end of the spring quarter in June, 1925.

Campbell's course in the Morphology of Bryophytes was one of the most stimulating (and one of the most time-consuming) courses I ever took. It was my first course in botany at the graduate level and it was with keen satisfaction that I studied slides he had prepared in connection with important research work and used as the basis for illustrations in learned papers and excellent textbooks. All five members of that class were in agreement concerning the unique good fortune that was ours in being able to study with the world-famous botanist.

His lectures on the morphology of the mosses, and during the second quarter on the ferns, were like Dr. Campbell's textbook, "Mosses and Ferns", usually flowing smoothly from one subject to the next with logical sequence, but sometimes they were stacatto and telegraphic in style, and rarely marked by repetitions covering parts of the material presented previously. No doubt the repetition was mainly attributal to his practice of speaking without notes, or with very meager ones, and also to his feeling that a particularly significant section should be given strong emphasis. Offsetting the occasional looseness of organization were his remarkable memory of morphological and anatomical details, of geographical distribution, and his keen insight into the evolutionary significance of features discovered during the course of his penetrating studies. His memory of cellular details was closely coupled with his ability to sketch such details rapidly and accurately on the blackboard while talking nearly as rapidly as his fingers traced the pictures etched in his mind. Members of his classes soon learned that they profited by reproducing his sketches, although in less finished fashion than he executed them, and to depend on their notebook drawings as much as they did on their written notes.

Many laboratory instructors today believe that students should not "waste time" in making careful, cell-by-cell drawings of plant structures. They often avoid this waste on the part of their students by supplying outline drawings in published laboratory exercise books,

Douglas Houghton Campbell, from a charcoal drawing by the Dutch artist Peter Van Valkenburgh, Jan. 1928.

complete with all of the necessary guide lines to critical structures and tissues. Campbell had no patience whatever with such practices! He insisted that we make a series of drawings to show progressive stages in the development of a tissue or a structure. Nor was a quickly pencilled sketch adequate. Each drawing had to be neatly "inked in" before it was presented for his final approval or criticism. Perhaps, therefore, we wasted a good many hours. But each member of that class could prepare a drawing acceptable to editors of professional journals when we had completed our apprenticeship with Dr. Campbell! Fortunately, none of us begrudged the time necessary to study the slides, preserved material and living plants thoroughly and to execute the necessary drawings. No doubt more than one of us used his drawings made under Campbell's critical supervision to refresh his own memory while giving courses in the following years!

In the laboratory we were permitted to study hundreds of slides which Dr. Campbell had prepared in connection with his own research, and from which many of the illustrations in his papers had been drawn.

Reprints of many of his papers were kept in the laboratory so we could compare the material with his published drawings and discussions. He was neither apologetic or boastful when he placed the reprints on the desk for our use. He had a good, but honest, opinion of most of his publications and did not hesitate to use his research papers to advance the knowledge of his students. We respected both his research ability and his integrity.

Douglas Houghton Campbell reading greetings on his 93d birthday, Stanford University, Dec. 16, 1952. Photograph by his grandniece, Nancy Campbell Hays.

Preserved material from many enchanting parts of the world was in cabinets lining the walls of the laboratory, and most of it was available so we could study the gross morphology of representatives of a many rare and peculiarly significant species in close correlation with our examination of the prepared slides from the same plants. Fresh material collected in the nearby hills was always on hand. The individuals in the class were encouraged, yea, often required, to secure some of the living material from the local habitats. He once told two of us to secure gametophytes, gametophytes with young sporophytes attached, and mature plants of Pityrogramma triangularis. He didn't tell us where to find them. In fact, I think he was testing us, for later he admitted he didn't think we would find all the stages, for the season had been slightly drier than usual and few gametophytes had produced young sporophytes that year. But he was highly pleased when we appeared in the laboratory the following session with a few representatives of each stage. We had found them in entrances to abandoned rodent burrows along the banks of Los Troncos Creek! He undoubtedly knew of two or three places where the plants might be found, but it was his practice to throw his charges on their own initiative as often as possible.

We studied the living plants, cut free-hand sections of many of them, and compared our laboratory preparations with the permanent ones in Dr. Campbell's collections. If we failed to acquire a thorough and accurate knowledge of the material it was through no one's fault save our own!

Each of us felt the sting of Dr. Campbell's sharp criticism from time to time, for he had no patience with careless workmanship, inattention to his directions, or with mental laziness. He welcomed the expression of ideas and suggestions concerning the interpretations placed on unusual structures or specimens, and comments on research papers that appeared in the botanical journals. Discussions stimulated by such subjects were brisk, concise, and adroitly shaped to further the objectives of his teaching -- that of impressing his students with the orderliness of plant relationships and evolution, and in training us to be constructively critical of every piece of writing and every oral statement that came to our notice. He did not permit the discussions to continue beyond profitable lengths, for there were far too many interesting things claiming his attention for Campbell to indulge in aimless "gabfests". Sometimes his criticism was bitingly sarcastic or his impatience embarrassing. But each incident involving either of these characteristics tended to keep us mentally alert and to spur us toward a careful reading of both the older research papers and the contemporary publications of American and European authors. He hesitated not an instant in assigning us reading in German and French publications!

Final examinations in Dr. Campbell's courses were an ordeal. He sat on a dias-like platform in one corner of room 472, the students facing him in a semicircle. For three full hours he would snap questions at us, allowing only a few seconds for an answer. If one hesitated too long or gave the wrong response, the question was tossed to another examinee. He did not indicate to whom the question was to be addressed until after it had been stated. Failure to understand the question or inability to begin answering immediately resulted in being passed over until the next circuit of the group was under way. But, although he was an exacting task master he was impartially fair. He took into account the quality of the work done in the laboratory and awarded passing grades to a person who had done well in his weekly work, even if nervousness caused him to miss many of the questions addressed to him during the final examination.

A very human trait Dr. Campbell possessed was his enjoyment in recounting some of his experiences during field trips to distant parts of the world. Once, in the Philippines, he accompanied a weather observer part way up a mountain into the forest where ferns, mosses, and liverworts grew in profusion. The weather man continued to climb to the top of the mountain to read a rain gauge. Dr. Campbell collected large quantities of material for his own research and was elated over the richness of the area. Late in the afternoon the observer arrived, woefully downcast. When questioned about the cause of his worry he replied, "I'm afraid I'm in for a severe reprimand, possibly dismissal. I felt under par physically last week and didn't make the usual trip up the mountain to read the gauges. I thought the gauge would hold two weeks precipitation, but it didn't and I lost an undeterminable amount because the gauge filled to the top and ran over! This will cause a break in the continuous records of a three year period." Dr. Campbell sympathized with him and asked, "How much does the gauge measure before it's full — what's its capacity?" To his utter amazement the answer was, "One hundred inches!" Campbell was astounded. He told us that his first thought was of the tremendous damage rainfall in excess of one hundred inches in two weeks would do in the vicinity of Stanford University, where the average annual rainfall varies from about fifteen inches near the bay, to between thirty and forty along the Coast Range fifteen miles farther west! He related this anecdote to give point to a lecture during which he discussed the relationship between rainfall and the distribution of hydrophytic and mesophytic ferns.

He enjoyed, also, recounting various jokes on himself. On his first trip to Australia he was greatly intrigued by a potted "fern" in a Sydney hotel lobby. The fronds were sterile so he was unable to guess the generic affinities, but he considered the circinate coiling of the young, unfolding frons to indicate that it was a fern. No one in the hotel knew where the plant had originated, what it was, nor whether or not it had borne sporangia on broad, ordinary leaves, or on special sporophylls. It was some time before he learned that his puzzling "fern" was Bowenia spectabilis, a cycad. Several jars containing specimens of that species are being used as teaching material at Stanford, thanks to Campbell's zeal in collecting large quantities of any plant that intrigued him.

A second cycad also was the source of minor embarrassment to him following a field excursion near Manila. He had collected the staminate cone of Cycas circinalis, and since he had no container large enough to preserve it in fluid, he decided to dry it. He placed the cone on a shelf in his hotel room and returned to the field for several days to round out his accumulation of materials. On his return all the guests and the entire hotel staff were nearly nauseated by a rank, permeating odor, and no one had been able to trace it to its source. Some believed an animal had died in an obscure corner. The mystery was solved when Dr. Campbell entered his room. The stench came from the cycad cone, which had begun to shed the pollen and partially deliquesce! Thereafter the cone reposed on the roof of a shed well removed from the hotel. Fragments of that cone, also, are still being used as teaching material at Stanford, and after the span of nearly fifty years, traces of the disagreeable odor still cling to the separated sporophylls!

At the end of my first year of graduate work at Stanford I was away from the San Francisco Bay Region for two years, then returned for my final two years of graduate study. At that time Dr. Campbell was still spending a full day four or five times a week in his laboratory and office, and I had an opportunity to know him more intimately for some of my classes were still being held in the small laboratory just outside his office door. In 1929 I became the junior member of the faculty of the Botany Department and had still further opportunities to draw upon Dr. Campbell's rich fund of knowledge of plant anatomy, morphology, and geographic distribution. It took several years to become closely enough acquainted with him to feel at ease in his laboratory, or to approach him with a problem involving some aspect of the fields in which he specialized. But gradually it was possible to outgrow the attitude of being an inexperienced student approaching a great master in the subject and to think of Dr. Campbell as a friend and a wise advisor. He complained bitterly, to me and to many others, when the Botany Department was abolished as a separate department and merged with the Zoology Department to make up the Department of Biological Sciences. He believed that botany would suffer under the new arrangement and used a homely phraseology to express his views: "When you put cows and plants into the same field, the cows eat up the plants!" He had not changed his point of view on that subject at his death.

Following his retirement from active teaching, Dr. Campbell devoted himself to writing, research, patronage of the opera, and to riding the equestrian trails throughout the foothills back of the Stanford campus. He regularly walked from his home to the post office, thence to his office, and frequently stretched the walk to take him to Palo Alto, something over a mile farther from home. On most days he walked back home for luncheon, but occasionally he stopped at the campus Union to join the faculty of the Botany Department, and later that of the Biology Department, at luncheon. He enjoyed discussing the paper on which he was working at the time, or one that had appeared in a current journal under some other botanist's authorship, or engaging in vigorous arguments about the significance of various features of the geographical distribution of plants, their evolution, or the theory of continental drift, extent of glaciation, or any of a number of controversial subjects. He considered Wegener's ideas about continental drift quite ingenious and thought that shifting of the continental masses could easily explain some of the aspects of geographical distribution he had observed during his travels. Dr. Bailey Willis, the noted geologist, opposed Wegener's hypothesis with considerable vigor. During one luncheon session Campbell was seated directly across the table from Bailey Willis. The late L. L. Burlingame, with a fiendish gleam in his eye, introduced the subject of continental drift, knowing very well that the two men held diametrically opposed ideas on the subject. Within the space of a few minutes each was vehemently defending his viewpoint, each talking rapidly and loudly, and neither one paying the slightest attention to the other, although each was addressing his argument at the other! Dr. Burlingame recalled that argument with glee for years.

Campbell possessed an artistic temperament that showed itself in his sketches and water color paintings, of which he made a great many; in the beauty, of an untrammeled type, that he nurtured in the garden surrounding his house; in the way in which he arranged cut flowers and potted plants inside his home; in his love of music; his frequent visits to the country's art galleries; and in his appreciation of the rolling hills, the red tile roofs of the university and the soft hues of autumn. He was impatient with the details of administration of the Botany department, and for years delegated virtually all of the routine departmental business to Dr. George J. Peirce in order that he might utilize all his time in carrying on his research and teaching such courses as he was called on to give from quarter to quarter. His impatience with routine matters and with the mechanics of running an office showed itself, also, in the apparently chaotic arrangement of books, papers, and journals in his office-laboratory. A few of the most frequently used books were kept in a revolving set of book shelves standing immediately behind his desk. A few others that he treasured, but which he used infrequently, were tucked into a glass-fronted cabinet that was opened only a few times a year. The huge number of reprints and the copies of nearly a dozen journals to which he subscribed were piled nearly two feet deep on one or two tables along the back wall of the room. When he wanted a particular paper, he had an uncanny memory regarding its position in a particular pile on the table. He rarely leafed through the wrong pile in search of an article, and many times he would dip into the accumulation at a level within a half dozen papers of the one he wanted! Periodically he would decide that he had accumulated enough reprints to have some of them bound, and shuffle together enough to make several comfortably sized books, and send them to the bindery. They were not arranged by author, by title, or in any chronological order. Yet he knew about where to find each paper if he had occasion to use it at a later date! He did not, to my knowledge, keep a card file or other index to the reprints he received from others, nor a list of his own publications. Each year, when the librarian requested a list of publications issued under his authorship during the preceding twelve months, he would scribble down the titles of such papers as came to his mind at the moment, and if one or two notes were omitted he brushed aside protests with a gruff comment that such inconsequential notes were of passing interest only and shouldn't clutter the bibliographies of a respectable library! Campbell was by no means a seeker of publicity and adulation.

Those who knew D. Campbell well realized that his aloof manner among strangers and his brusqueness with students stemmed mainly from a shyness he never quite overcame and from his difficulty in distinguishing and recognizing faces at anything beyond a very moderate distance. Within the circle of his friends, and within his own home when he held open house while his garden was at its annual peak, he was cordial, an excellent conversationalist and a charming host. Toward the end of his life he occasionally expressed regret that he had restricted his social life so rigorously in order to devote his time so intensively to research. While he was actively engaged in teaching, it seemed at times as though he were about to enter a more cordial relationship with his students, but after little more than momentary ventures into such a relationship he withdrew as though he felt that if he permitted himself to become informally friendly with them he would automatically spend more time in genial conversation and less in productive research and writing! After retirement it was too late to change the pattern of a life time, but he derived keen satisfaction from a close friendship with one of his former students, Mr. Albert Wilson, who visited him from once to several times each week as the elderly gentleman's ability to get to the post office and to his laboratory waned. Dr. Campbell, during those last years, spoke often of his brother, who had been head of the Chemistry Department of the University of Michigan, and of his nephew who chose geology as his field of endeávor. Dr. Campbell was very proud of the young man's success and delighted in the youthful companionship with him while the younger man lived at Dr. Campbell's home and attended classes in the Geology Department at Stanford.

As year followed year and the ranks of the original Stanford University faculty dwindled, Dr. Campbell became the sole survivor of that group when the physicist, Fernando Sanford, died in 1948. He regretted the passing of his old friends and contemporaries but did not seem depressed. Rather, he retained a remarkable interest in botanical progress and in the status of botany at the institution with which he was associated for over sixty years. He continued to keep his thoughts on many distant corners of the earth, and read a great deal. I saw him last on December 22nd, 1952, and as I was about to leave his home, he expressed a wish that he could lop fifteen years off his age so he, too, could see the Alaskan arctic! At ninety-three, he still had his eyes turned toward distant horizons.

A TRIBUTE TO PROFESSOR DOUGLAS HOUGHTON CAMPBELL*

Albert Wilson

DR. CAMPBELL was head of the botany department at Stanford when I went there in 1923. In 1925 he retired from the university; but as it turned out, he continued to be my teacher to the end of his life.

To us youngsters there in the class he presented an austere and formidable precision of knowledge; and he appeared in the heroic proportions of the great explorer who was bringing authentic wonders from the Andes, the Amazon, the headwaters of the Nile, and the Australian desert. We approached him with diffidence, but eagerly; and on a field trip I remember my astonishment at overhearing a colleague address him as Uncle Doug. With still more astonishment I saw him appear before us one day with a decorative black eye. 'I stepped on a rake,' he explained, and went on with his lecture.

As the quarters went by we began to realize that this professor had the quickest sympathy for our questions; he understood us quite as keenly as he did his subject. He had an intuition of what the stuttering plodder intended to say and do, and as I remember without exception took him on the right side. He had a sharp barb for slackness, and a blunderbuss for pretense, but earnestness could appropriate hours of time from his precious life.

His retirement left a hole in the place as deep and wide as the Grand Canyon. He was gone and we all knew he was gone. And, although I kept hearing of his association with the great ones in his foreign travels, in his National Academy membership, and in his presidency of the Botanical Society of America, I had the temerity to hope for a renewal of the relations which had endowed those first classroom days with glow and sparkle.

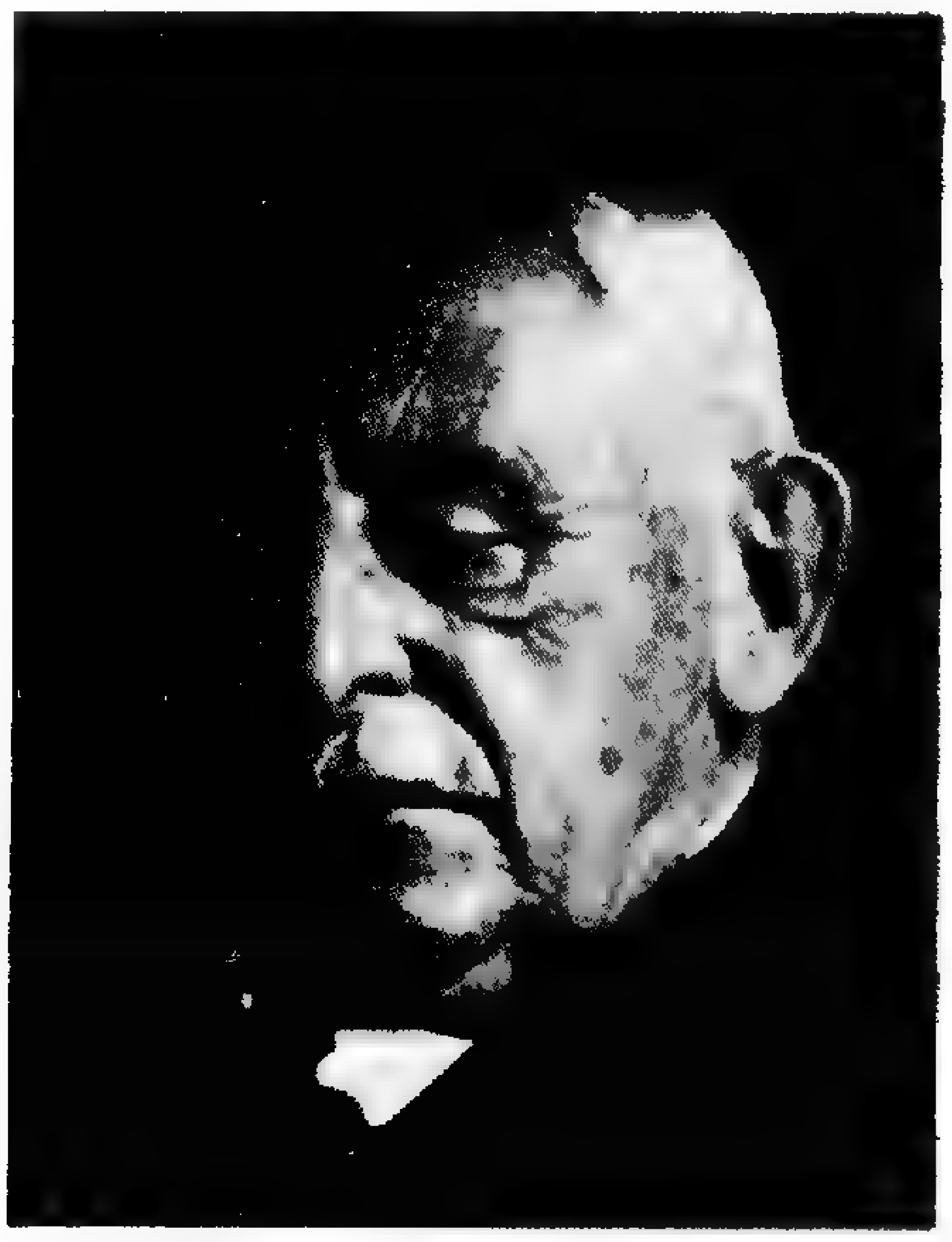
In 1927 Dr. Campbell was back in his house. I rushed out there, but as we walked around the garden, the sledding was tough. I tried it half a dozen times with the same result. Then on one glorious and memorable day I persuaded the professor into my truck, which resembled nothing so much as an old fish wagon, to visit a garden I was working.

*From the Palo Alto (California) Times, Tuesday, March 3, 1953. It there appeared with the following prefatory sentences by Mr. E. V. Cogswell, Editor of that paper: "For the past few days I've been making blundering attempts to get together some material on that perceptive and remarkable botanist who died last week, Dr. Douglas Houghton Campbell of Stanford's Old Guard. Now a botanist who learned from Dr. Campbell, not only as a student but throughout later years, has done what I couldn't and has given me the privilege of using his tribute." We thank the Palo Alto Times for permission to reprint.

From then on his vivid interest in the use of plants, and his fervent conviction that Californians must by all means be made to know the world-wide plant-supply available to them, dissolved all barriers. To my delight I began to realize a friendly warmth in Dr. Campbell's words.

Through the years we continued to meet at least a couple of times a month and to go on numerous excursions visiting the treasuries of this region. We visited Golden Gate Park, the Monterey Peninsula, Muir Woods, the old estates hiding within their walls and the hills back of Redwood City.

As we rolled along Dr. Campbell bubbled with recollections of the tree fern in New Zealand, the cryptomeria in Japan, the bougainvillea in South America, with all the charming peculiarities of their natural settings as he had first seen them years before.



Douglas Houghton Campbell, from a picture by his grandniece Nancy Campbell Hays, taken at Ann Arbor, 1941.

He was always full of business, as they say, he never was spontaneously facetious; but if some one else found the totality of sky and earth to contain an element of gaiety, the old man would guffaw with sudden appreciation.

Dr. Campbell was continually detecting the invisible. To most of us a forest carpet is merely a pleasing and novel substance which we encounter in our escapes from the paved city. To him it was a laboratory where the most fascinating links could be found in the mysterious chain of life.

From the instant he arrived here in California he began to supply the very links which had previously been missing. Moreover, he soon betrayed a love of his plants which was more than scientific; and his books presented to the world not only his facts but his feelings in drawings of extraordinary charm.

Though Dr. Campbell had become older and frailer his light never failed, even in his ninety-fourth year.

A MEMORIAL TO DOUGLAS HOUGHTON CAMPBELL*

Bradley Moore Davis

DOUGLAS HOUGHTON CAMPBELL (December 16, 1859 - February 24, 1953) distinguished botanist of Stanford University, had the background of birth, boyhood, and early education in Detroit, then a city of graciousness with gardens and shaded streets. His father was Judge James Valentine Campbell of the Supreme Court of Michigan who became head of the Law School at the young University of Michigan. The Campbell family was well established in the community and much concerned with its affairs. Judge Campbell had a wide acquaintance and among the friends of the family was Douglass Houghton, Professor of Geology at the University, well known for his pioneer work as Michigan State Geologist. His name was given to the boy who has been described by the family as reserved and very much absorbed in his own interests, striking characteristics of his later life. Extreme near-sightedness kept him from many of the sports of boys and he was largely thrown on his own resources. His interests were those of a young naturalist. Even before high school he had his herbarium and collection of insects which he studied with the help of Harris's "Insects Injurious to Vegetation", that wonderful aid to so many young naturalists of the period. He read Wallace's "Malay Archipelago" and remembered its great influence upon him. Douglas entered the University of Michigan from the High School of Detroit and received the degree of Ph.M. in 1882.

Campbell was fortunate in his instruction at the University. In Zoology he was influenced by Joseph Beal Steere, a traveled collector in tropical South America, Formosa, and the Philippines. Botany was taught through a number of courses by Volney M. Spalding and by Mrs. Charles H. Stowell, a microscopist of standing. Mrs. Stowell probably introduced him to the compound microscope with its revelations, remembered by Campbell as perhaps the greatest event in his college course. Spalding had keen interests in cryptogamic botany, and from these two teachers Campbell received good direction in structural studies based on types from the major groups of plants. Of the books that influenced him most in college Campbell placed first Currey's translation of Hofmeister's great work "On the Germination, Development, and Fructification of the higher Cryptogamia, and on the Fructification of the Coniferae" (1862). Campbell received his instruction in Latin and German from the distinguished philologist Calvin

*This memorial was prepared at the request of the American Philosophical Society for publication in the "Yearbook" of the Society. Through the kindness of Dr. Luther P. Eisenhart, Executive Officer, permission has been granted for prior publication with this group of articles.

Thomas, a friend of the family, from whom he accepted the advice that he take a Doctorate at the University of Michigan before going abroad so as to be foot free for a period of advanced study. The plan worked out well. Campbell taught biology in the Detroit High School for four years (1882 - 1886). During this period he completed a life history study "The Structure and Development of the Ostrich Fern" which was accepted as a dissertation for the degree of Ph.D. conferred by Michigan in 1886.

With the Doctorate achieved, Campbell for two years studied in Germany. The Autumn of 1886 found him at Bonn with Strasburger, the first of that large group of American Students that followed through the years and of whom Strasburger was so proud. Strasburger welcomed him and in later years Campbell spoke of this period as "the greatest event of my life". He studied cell structure and, important for him, acquired the then simple microtechnique of Strasburger. From Bonn he went for a semester to Pfeffer at Tübingen working there with stains that entered living cells, and obtaining results said to have surprised his master. The smear methods of staining chromosomes may have had their beginnings in these demonstrations. The last months of Campbell's time in Germany were spent in Berlin with Kny who obtained for him the material of Pilularia upon which one of Campbell's most important papers was based, "The Development of Pilularia globulifera L." (1888). With equipment ordered by Kny from England he apparently introduced to the German laboratories methods of sectioning plant material imbedded in paraffin. Although interested in microtechnique Campbell found a few simple practices sufficient for his research.

Campbell's return to the United States was hastened by letters from David Starr Jordan offering him a professorship at Indiana University. There is a legend that John Merle Coulter suggested Campbell to Jordan as a prospect worthy of consideration. Having accepted the professorship, Campbell arrived in the Autumn of 1888 at Bloomingon, then a small town of unpaved roads, flagged side walks, a central square with court-house surrounded by hitching rails. Modest houses lodged the University community. The town had something of a southern flavor. Little could happen that would draw Campbell from his rooms where he worked at night. East from the square lay the campus, a rolling area with virgin growth of maple and beech, very beautiful in Spring and Autumn. Out from the town in a ravine cut through the limestone ran the North Pike. An East Pike led to Brown County, wild and attractive.

It was in this setting that the author of this paper, a freshman at the University of Indiana, first saw Professor Campbell. One would meet him hurrying back and forth from the campus, eyes on the ground, a flower in the lapel, too finely dressed for the style of the town. He walked alone, apparently absorbed in thoughts of his work, and when he entered his office in Owen Hall no one would think of disturbing him or the click of the microtome. He gave an introductory course in the Spring and handled the few advanced students through conferences, as was the custom in German universities. From the talk of the advanced students a main subject of interest seemed to be the apical growth of stems and roots in certain fern groups and the apical growth of stem axes in liverworts and mosses. Probably much of Campbell's attention at this time was given to the last touches on his first book, "Elements of Structural and Systematic Botany" (1890).

The writing and illustrating of this little book must have been a labor of love going back to his teaching in the Detroit High School. The 128 figures are almost all from original pen and ink drawings. In skill as an illustrator Campbell was a master, showing grace in habit sketches and firmness of stroke in drawing of detailed structure. Some figures held a dozen or more small drawings well arranged to fill a space. It required time to work up such a series of figures and to write the text. Some of this work may have been done in Germany or perhaps earlier. As in many first books the author tried to compress too much into text and figures, with the result that it was not simple enough for its purposes. Nevertheless, it was among the first to give to cryptogamic botany something of its proper importance. This first book by Campbell introduced certain principles that he followed later in his book writing: he illustrated his books with original and fresh figures, and his books brought together matter on which he had already written and lectured.

When the writer took Campbell's introductory course in the Spring of 1891 it was the opening of an evolutionary outlook. The course was based on a study of types from lowly groups upward. The material was well selected and the lectures, clear and sharply delivered, were based on the laboratory studies. The time was a few years too early for an understanding of the significance of antithetic alternation of generations based on periodic reduction of the chromosomes (1894). Openings for research and speculations on the evolutionary processes were laid before us. One student in that class was carried away by enthusiasm and shifted his field of interest. He asked for an evening with Professor Campbell to talk over his plans and found a sympathetic instructor who gave cautious advice. His plans became involved with the decision of Campbell to join the faculty organized by Dr. Jordan to assemble at Stanford University in the Autumn of 1891. He followed his professor and was present throughout the first year of Stanford University.

Campbell's interest in the move from Indiana to California was not surprising. The West Coast had a rich and interesting flora. Beyond lay the Far East with its wealth of tropical and temperate plants. The teaching requirements at Stanford would not be heavy. Opportunities for travel would come and Campbell was prepared to take full advantage of them. His travels were wide and gave the opportunities for research expressed in numerous papers and several books. A remarkable feature of his interests and industry is the large collection of water colors left to Stanford University. All of his life Campbell sketched, sometimes in free style, more frequently with careful brush work. He drew easily and accurately with color on the brush. He has left a large output from what may have been the happiest hours of his life when sketching in many lands.

A more surprising reaction of Campbell to the western move was the manner in which he quickly established a home for himself. There were at least two calls to eastern universities but, however attractive to his tastes, they failed to draw him back. He built a house on the campus, a house planned to hold a friend or two and there, with a Chinese cook as overlord, he kept house with chosen companions.

Douglas Houghton Campbell, Ann Arbor, 1938. One of the most distinguished of Michigan's alumni, he was honored by the degree of LL.D., conferred upon him by his Alma Mater in 1938. (Photograph furnished by courtesy of "The Michigan Alumnus", in which it was first published.

Campbell lived with the university through some very difficult periods, the hard years of the government suit, the period of loss and retrenchment after the San Francisco fire. His attachment to Stanford grew with the years. Although he liked to visit relatives in Ann Arbor and Detroit it was always clear that he came to them from the outside, that is from California. He died, 93 years old, in the house that he planned and built.

Dr. Campbell spent the summer of 1892 in the Hawaiian Islands, his introduction to the tropics. Important papers appeared on Isoetes (1891), Osmunda (1892), Marsilia (1892), Azolla (1893), Pilularia (1893), Marattia (1894). The rapid development of the wonderful liverwort flora with each California rainy season amazed him. The time came when his conclusions called for a comprehensive statement and his second and perhaps best known and appreciated book was published, "The Structure and Development of the Mosses and Ferns" (1895). This well illustrated text, giving an account of structure and discussions of relationships, was most welcome and the book ran through three editions. It established Campbell as a leader in his field of Botany.

A summer in Jamaica (1897) then the subject of an examination by a group of botanists interested in the possibility of establishing in the Blue Mountains a tropical botanical station, gave to Campbell a new outlook. It is impossible in a memorial of this character to discuss the flow of notes and comments from the pen of Campbell. The fundamental studies on structure and life histories continued: Geothallus (1896), Naias and Zannichellia (1897), Dendroceros (1898), Lilaea (1898), Sparganium (1899), Araceae (1900), Peperomia (1901), Selaginella (1902). In this period Campbell wrote "A University Text-book of Botany", 579 pages, 493 figures, 15 plates, (1902), an amazing effort in that it included all fields of Botany. It seems surprising that Campbell, with interests primarily in research, should have taken on such a task.

With the "Text-book" off his mind Campbell seems rather suddenly to have developed a keen interest in travel. In 1906 he visited Java, Krakatau, Ceylon, Singapore, Capetown. Very important studies on the Ophioglossaceae (1907), Kaulfussia and Gleichenia (1908) were published through the Annals of the famous botanical garden at Buitenzorg, Java. Of special interest to him were Javanese forms in the Anthocerotaceae (1907, 1908). Papers appeared rapidly after Campbell's return from his travels of 1906, among them studies on Danaea (1909), Pandanus (1909, 1911), Angiopteris and Kaulfussia (1910). In this period the important contribution "The Eusporangiatae", 229 pages, was published by the Carnegie Institution (1911). Campbell wrote at this time an interesting book designed for general reading entitled "Plant Life and Evolution" (1911).

The next important period of travel came in 1912 when he visited the Barbados, British Guiana, Surinam and Trinidad, to be extended in the following year with travel in the Malayan Peninsula, Sumatra, Borneo and the Philippine Islands. This was something of a program, covering two years, and much was added to the collection of water colors. Structural and life history studies continued, Aglaonema (1912), Macroglossum (1914), Podomitrium (1915), Treubia (1916), Botrychium (1922). There was the study of the remarkable independent growth of the sporophyte of Anthoceros under certain conditions (1923, 1924). However, papers and notes of a different type became more frequent. There were discussions on distribution, the origin or derivation of particular floras, characteristics and contrasts of floras, popular accounts of excursions. Campbell's interests had broadened and problems of plant geography became matters of attention. Travel in Australia and New Zealand (1921), and later in Brazil (1928) urged on these interests. They culminated in the publication of "An Outline of Plant Geography", 1926. This book would hardly be called a text, rather it is a description of the principal floras over the earth most of which had been seen by Campbell himself, accounts of excursions and lengthy travel. It is well illustrated and one has the feeling that in the writing Campbell lived over again memories of younger days.

Dr. Campbell in 1925 reached the age of retirement, which is 65 years at Stanford University, but the output of papers continued, fewer structural studies, more on the characteristics of floras. Perhaps there was something of a lull but presently work started on the last of his books, one that brought together results of his lifetime research, "The Evolution of the Land Plants", 731 pages, 351 figures, 1940. This work gives his conclusions or opinions on lines of plant evolution and other controversial subjects. Few men at the age of 80 would attempt such an effort or could carry it to completion. The book was dedicated to Professor F. O. Bower, contemporary British plant morphologist, a close friend with many like interests and similar views.

Frequently the life work of a scholar is summarized in a statement of publications. For Campbell it is 6 books, about 88 contributions of outstanding research, and about 90 papers in the nature of notes, discussion and criticisms. This is an impressive record since Campbell did not collaborate (two papers excepted). He worked alone and made a place for himself in the line of great plant morphologists as had Hofmeister, DeBary, Strasburger, and Bower. Recognition of his accomplishments came through election to honor societies, The American Philosophical Society (1910), National Academy of Sciences, Royal Society of Edinburgh, Linnaean Society of London. In other than professional aspects Campbell was found by his associates to be quite of the world, keenly interested in art, music and literature, widely traveled and ready to talk of his impressions, aware of human surroundings and sympathetic to them.

DOUGLAS HOUGHTON CAMPBELL, AND ESPECIALLY HIS WORK ON BRYOPHYTES

Wm. Campbell Steere*

THE DEATH of Professor Douglas Houghton Campbell on February 24, 1953, at Stanford, California, brought to an end the era of a group of great plant morphologists, including Strasburger, Goebel, Bower and Campbell. Through the work of these investigators, with many others, the primary outlines of plant morphology are now established, so that recent workers have of necessity adopted more specialized and more experimental approaches to the study of the comparative morphology of plants.

The son of Judge J. V. Campbell, for many years a member of the Supreme Court of the state of Michigan and of the faculty of the Law School of the University of Michigan, Campbell was born in Detroit on December 16, 1859, and was named for a friend of the family, Douglass Houghton, who had been the state geologist of Michigan and the first professor of geology at the University of Michigan. Interested in plants since his childhood, D. H. Campbell very naturally specialized in botany during his undergraduate and graduate work at the University of Michigan, under the guidance of Professor Volney M. Spalding. We are fortunate enough to be able to quote Campbell's own explanation of the direction taken by his botanical interests (1925b), as follows: "Doubtless many can recall certain books which have greatly influenced their lives, and in my case one stands out especially, a translation** of

*This article is the first draft of a biography which Dr. Steere wrote for the June "Bryologist", and, except for very minor changes, is about to appear in that Journal. The article in the "Bryologist" will have only a partial bibliography, including the papers on bryophytes. As we print it here, the references have been changed to conform with the almost full biography which follows, also contributed by Dr. Steere. He writes: "Just a note to transmit a reasonably complete bibliography of the works of Professor Douglas Houghton Campbell. I have compiled this at the request of several persons, especially Dr. B. M. Davis. It is reasonably full, as I have searched the early volumes of Botanical Gazette, and have gone through such journals as the Botanical Abstracts, Hedwigia (literature lists), and Botanisches Centralblatt. Also, I have the set of reprints that D. H. C. gave to Davis through the years, and have had reference to Campbell's bound set of his own reprints. However, he obviously did not get reprints of notes or short papers, and so these sets are very incomplete. I am sure that one could find a few more titles in the volumes of Bull. Torrey Bot. Club between 1885 and 1910, and that he has published short notes in the American Naturalist and in Proc. Nat. Acad. Sci. covering work published fully elsewhere. We can be sure that all his major works are included in this list. I have also finished up a brief account of Campbell's bryological work for publication in the June issue of the Bryologist." — H. H. B.

**Hofmeister, W. 1862. On the Germination, Development, and Fructification of the Higher Cryptogamia, and on the Fructification of the Coniferae. Translated by Frederick Curry. 506 pages. London: The Ray Society.

Hofmeister's epoch-making treatise on the comparative morphology of the archegoniate plants. This book, studied while an undergraduate at the University of Michigan, was undoubtedly the most important factor in determining the trend of my botanical investigations for many years."

After receiving the degree of Ph. M. in 1882, Campbell accepted the post of instructor of botany at the Detroit High School, and carried on work toward the doctorate simultaneously. After the completion of his thesis, "The structure and development of the ostrich fern", in 1886, Campbell decided to obtain post-doctoral training in Germany in conformity with the tradition of the generation. He studied first at Bonn, in the laboratory of Strasburger, but it was only natural that he should spend a summer with Pfeffer at the botanical institute at Tübingen, where Hofmeister passed the last years of his life, and where one of his most distinguished students, Karl von Goebel, received his training.

A talented and well-trained investigator, Campbell was one of the first botanists to apply the at-that-time newly invented paraffin imbedding process to the study of plant morphology (1888g; 1889b). It seems to be too generally forgotten now that he pioneered the use of vital stains (1888d) and that he apparently originated the "squash" and acetic-stain method for studying chromosomes (1889d), so essential to cytological studies today, perhaps because he did not pursue these discoveries further. On his return from Germany, in 1888, Campbell was called to the chair of botany at Indiana University by its president, David Starr Jordan. When Jordan accepted the invitation to become the first president of Stanford University, he took Campbell with him, in 1891, to organize the Department of Botany. Bradley M. Davis and Walter R. Shaw, two of Campbell's students at Indiana, accompanied him to Stanford, entering as seniors and graduating at the first commencement of the newly-opened university.

Fortunately for us, Campbell has left an excellent account (1938a) of his first impressions of the bryophytes of the Stanford campus, and of the remarkable hepatic flora that he investigated so thoroughly (1895b; 1940). Of this the following paragraphs are especially illuminating:

"The summer months are practically rainless and the wet season normally reaches its culmination in mid-winter. The annual precipitation at Stanford University is usually under twenty inches, but in the redwood forests of the Coast Range, a few miles to the West, it may be two or three times as much.

"When I arrived in California to join the faculty of the new University which opened in October, 1891, it was near the end of the dry season and probably no rain had fallen for three or four months. The bare cracked adobe fields surrounding the new buildings, and the hills in the background, with their tawny covering of dried grass, offered a decidedly unpromising outlook for a student interested in the liverworts.

"A month or two later, however, there was a magical transformation. With the advent of the autumn rains the whole country quickly turned green, and a profusion of liverworts such as I had never before seen, appeared on the open ground where it had not been recently broken up, and on the shaded roadside banks. I soon realized that right in my own backyard, so to speak, was a wealth of material such as I had never imagined would be my good fortune to encounter. Here were gathered together representatives of all the main groups of liverworts, not only in in great numbers, but practically all fertile individuals.

"Such an invitation to make a comprehensive study of the structure and development of the liverworts could not be resisted; and the next three years were largely devoted to this work which finally resulted in the publication of "The Mosses and Ferns" (1895b) in 1895."

During his long term as professor of botany at Stanford University, from 1891 until his retirement in 1925, Campbell dedicated himself to teaching and research with an intensity and devotion that is reflected by the numerous outstanding botanists who were his students and by the quality and volume of his published work. He further demonstrated his ability as a teacher through the publication of two general texts, and his book, "Mosses and Ferns", although intended primarily as a report of original investigation, is written so lucidly and organized so well that it attained wide use as a text. His outstanding ability as an investigator is obvious from even a cursory study of his numerous publications. Beginning with his doctoral thesis, awarded the Walker Prize of the Boston Society of Natural History for 1886, Campbell's papers, monographs, and books continued to win honors for him of every kind.

In spite of his dedication to his investigations on the comparative morphology of plants, Campbell was a man of wide interests. He expressed marked artistic talent in the hundreds of original drawings made to illustrate his own publications, and in the water-color sketches he made on his many journeys. The extent of Campbell's travels over the face of the earth is astonishing, especially when one considers that his traveling was done by much slower means than are available today. He published interesting and botanically accurate impressions of his travels in many parts of the world, including California, Hawaii, Japan, Jamaica, Java, Borneo, Krakatau, Australia, New Zealand, Guiana, Trinidad, and Brazil. It is no wonder, then, that he became progressively more interested in problems of plant distribution, a topic upon which he published many papers and one book. His fundamental researches on the comparative morphology of plants led very naturally to an interest in problems of evolution, phylogeny, and classification. Although his concern with systematic botany was a secondary one, he encouraged students whose primary interest lay in this field, and when necessity arose, he did not hesitate to face taxonomic problems squarely, as evidenced by his authorship of two genera of Hepaticae, Geothallus and Megoceros. Both of these genera reflect his excellent eye for the unusual. Geothallus tuberosus Campbell, for example, appeared accidentally in 1895 as a volunteer on soil under a bell-jar in a culture of Ophioglossum nudicaule, and was not actually collected in the field until the winter of 1935-36.

On a trip to Java, he recognized under field conditions the significance of the multiple chromotophores in what he at that time considered to be a very aberrant species of Anthoceros, (1906b), upon which he based the genus Megaceros the next year, after careful researches (1907b). Within the Bryophyta, Campbell felt the greatest interest in the thallose Hepaticae, especially the Anthocerotales, which he made the subject of several important investigations. His brilliant work on the independent growth of sporophytes of Anthoceros in culture and in nature (1917, 1924, 1925a), combined with his realization of the morphological similarity between Anthoceros and some of the primitive Devonian Psilophytes, have figured prominently in recent considerations of phylogeny and the question of the origin of vascular plants. After his retirement from teaching in 1925, Campbell continued actively in research, as his publication record demonstrates amply. His career culminated in the appearance of his largest work, "The Evolution of the Land Plants (Embryophyta)", published in 1940. The demand for this important book covering our knowledge of the comparative morphology of plants has been so great that it is already out of print.

Campbell's concern for bryophytes was only one of many interests, and the greatest concentration of his efforts seems to have been with the Pteridophyta, a group with which he had worked from the time he was a student. He nevertheless wielded a very considerable influence in the field of bryology, the effects of which will be apparent for a long time. His detailed accounts of the structure and reproduction of numerous groups of hepatics, and his correlation of these findings with fundamental questions of the evolution, phylogeny, classification, and distribution of Hepaticae have become an integral part of our modern concepts in the field of bryology.

As a student at the University of Michigan and later as a staff member there for many years, I looked forward with pleasure to Campbell's not infrequent visits to Ann Arbor, where his brother Edward was professor of Chemistry. Any student who elected the course in plant morphology given by Professor B. M. Davis, became immediately aware of the importance of Campbell's work, partly through contact with his book, "Mosses and Ferns", and partly through the many personal references given by Davis, who moved with Campbell from Indiana University to Stanford University while still an undergraduate. Partly on account of my interest in bryophytes and partly because he had been a friend and informally a student of Joseph Beal Steare, my paternal grandfather, Dr. Campbell treated me with great friendliness, which, of course, left a deep impression on me as a student. My present position at Stanford University in the place that he occupied for so many years, causes me a very special feeling of regret at the passing of this truly great figure among American botanists.

THE PUBLICATIONS OF DOUGLAS HOUGHTON CAMPBELL

William Campbell Steere

1881. On the development of the stomata of Tradescantia and Indian Corn. Amer. Nat. 15: 761-766.

1883. Fern notes. Bull. Torrey Bot. Club 10: 118-119.
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1887. A useful artificial light. Bot. Gaz. 12: 40-41.

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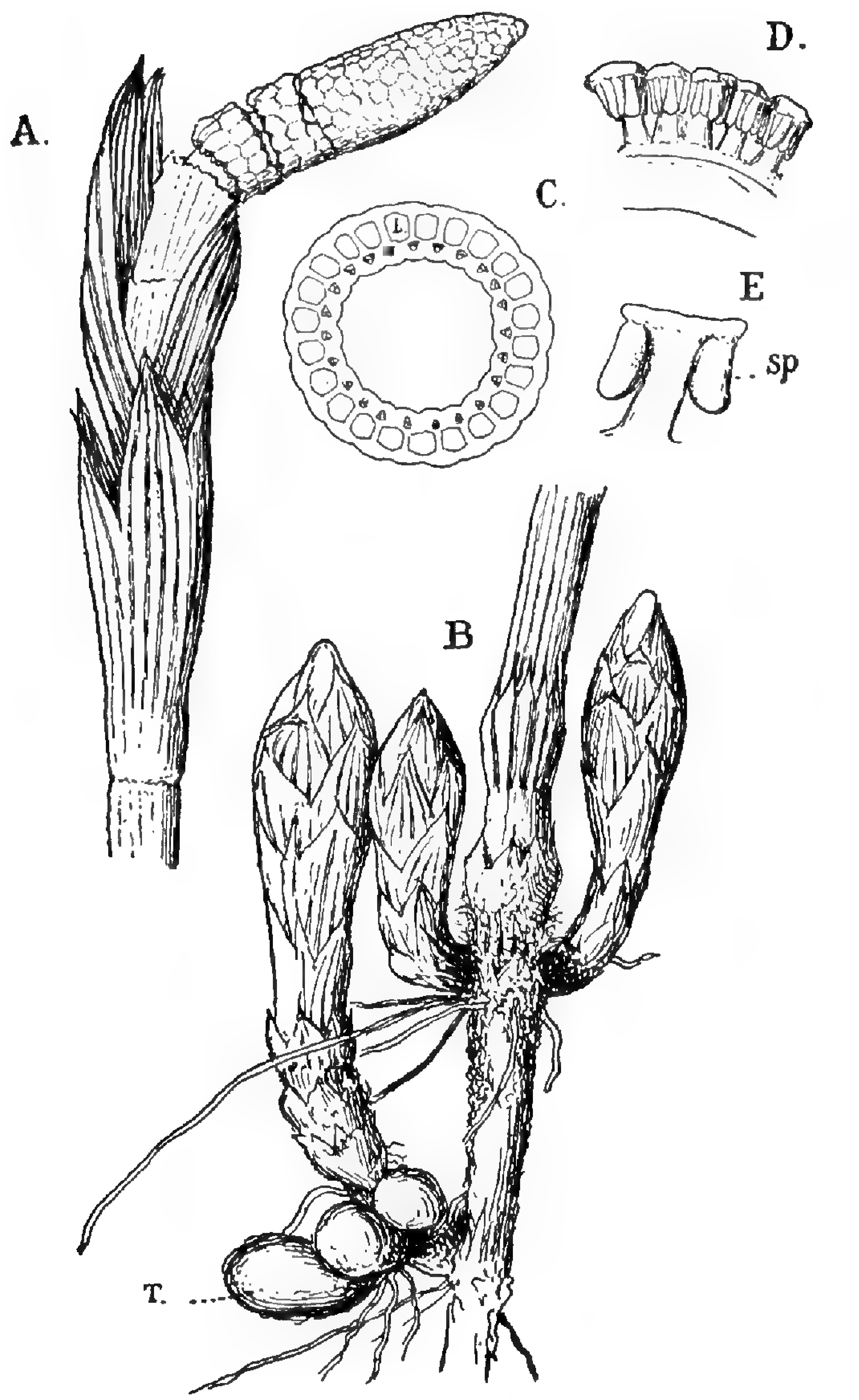
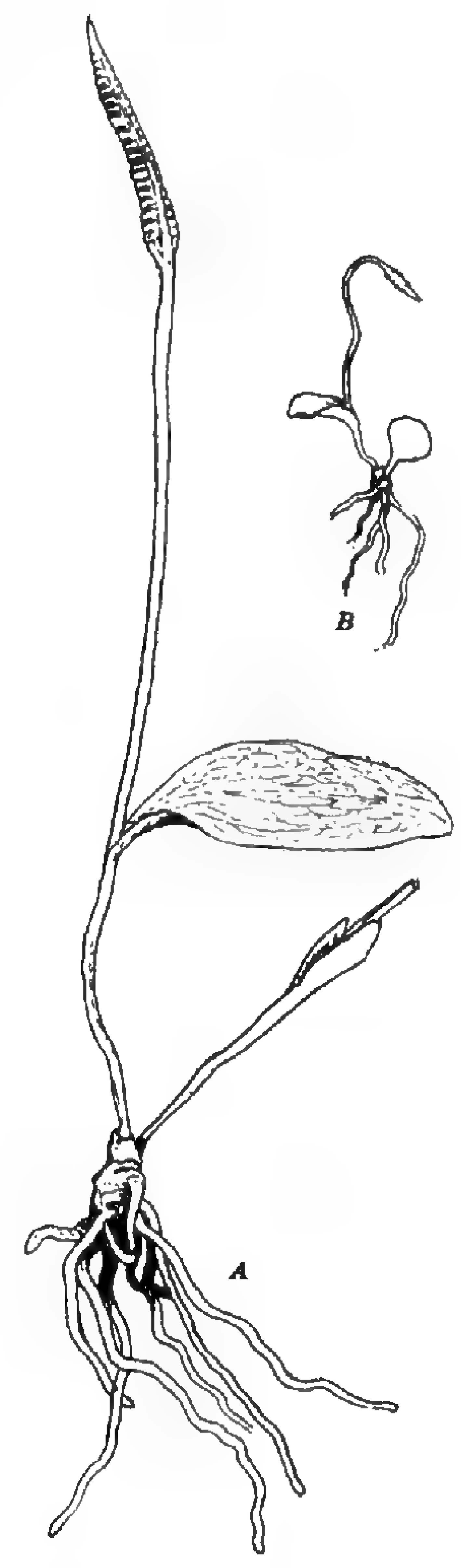


Equisetum telmateia. *A*, upper part of fertile shoot (× 1). *B*, part of rhizome with lateral shoots; *T*, tubers. *C*, cross-section of an internode (× 4); *L*, cortical lacunæ. *D*, sporophylls (× 4). *E*, single sporophyll (× 6); *sp*, sporangium.



Two specimens of *Ophioglossum moluccanum* (Schlecht), slightly reduced. The larger one is the typical *O. moluccanum*; the smaller one is probably a second species.

Examples of Campbell's botanical drawings. Left: Equisetum Telmateia, from the "University Text-book of Botany". Right: Ophioglossum moluccanum and a probable second species, from "The Eusporangiatae", Carnegie Institution of Washington, 1911.

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*There was a Russian translation of "An Outline of Plant Geography" by N. G. Alekhina, edited by V. V. Alekhin, State Publishing House of Foreign Literature, Moscow, 1948. Reviewed by N A. Troitski (Simpheropol), Botanicheskii Zhurnal [Journal of Botany, U. S. S. R.,] 35: 95-97. 1950. See Guide to Russian Scientific Literature 4: 300. 1951. (Office of Technical Service, U. S. Dept. Commerce, Washington.) — H. H. B.

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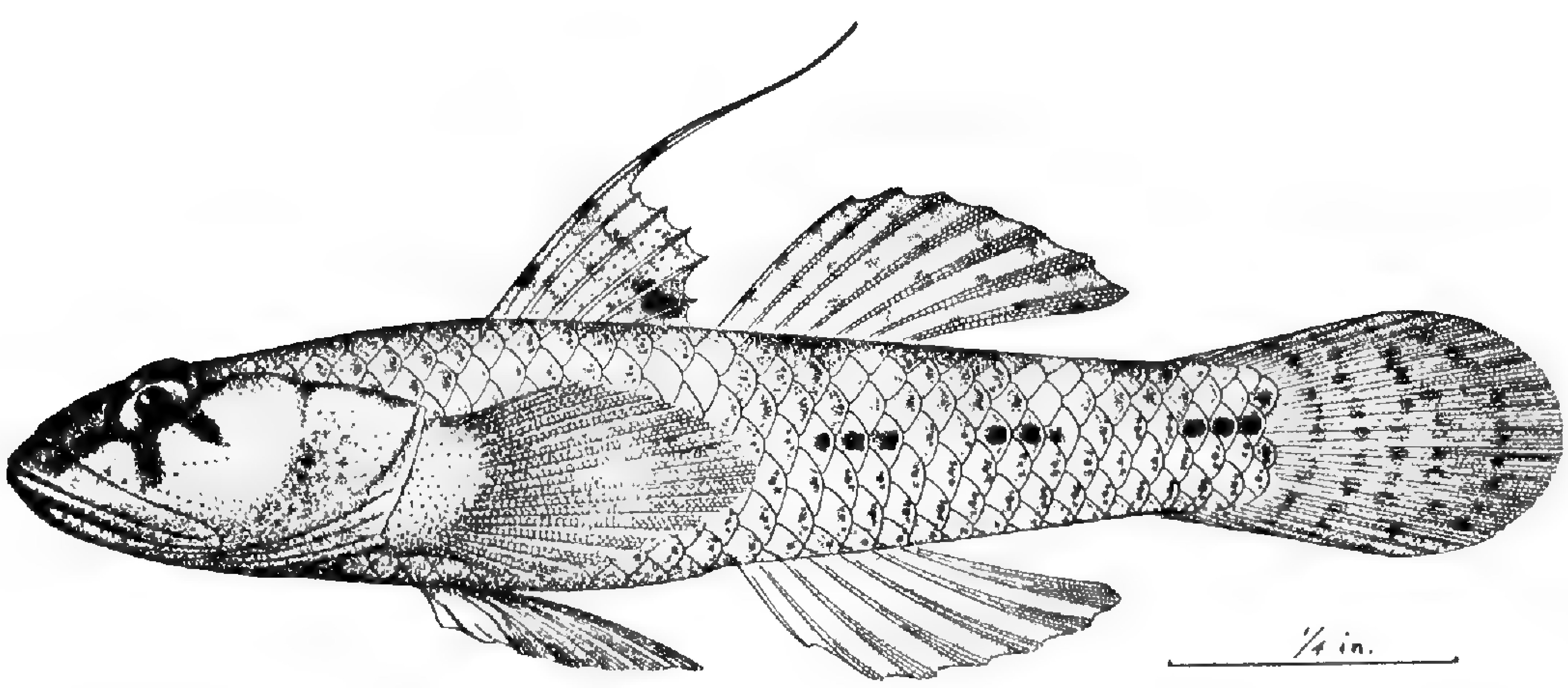

FIG. 2.—GLOSSOGOBIUS CAMPBELLIANUS.

24. GLOSSOGOBIUS CAMPBELLIANUS (Jordan and Seale, new species).

A Javan fish collected by D. H. Campbell and named for him by David Starr Jordan and Alvin Seale, in "List of Fishes collected in the river at Buytenzorg, Java, by Dr. Douglas Houghton Campbell. Proc. U.S. Nat. Mus. 33: 535-543. 1907.

ENGLISH NAMES OF SOME EAST-INDIAN PLANTS AND PLANT PRODUCTS

H. H. Bartlett

THIS article deals with a few English names of East Indian plants and plant products that are of Malay or Malayan origin or have at some time been supposed to be Malayan. It has fallen together somewhat accidentally. Since 1918 an envelope of notes labelled "Malayan words in English" had been accumulating, from which Dr. F. E. Robbins, editor of the "Michigan Alumnus Quarterly" asked the writer to prepare a popular article. That grew vastly too large for the purpose intended, and has been broken into three of which the one most probably of general interest, largely zoological, but highly miscellaneous, has gone to the "Quarterly" under the original title, with no bibliographic encumbrances. (Anyone who wishes it may eventually receive a separate on request.) The publication here of the part on the English names of various East Indian plants and plant products enables the references to be retained. There still remains a third article on the introduction of Malayan words into scientific nomenclature, mostly from the time of Rumphius through the early Linnaean period.

"Malayan" is used in this article as applying in a broad sense to the whole large group of languages of which Malay is the best known. Linguists of the last generation have customarily called them "Indonesian", although "Malayan" is an older and now, in view of the turn of political events, at least equally serviceable term. The change from "Malayan" to "Indonesian", a word invented a century ago by the English traveller and anthropologist Earl (see the interesting article by Van der Kroef, 47) at one time seemed to bring about greater definiteness of meaning, but the meaning of Indonesian has been suddenly perverted by the political decision to use it specifically for Malay as rapidly expanded and modified to become the "national language" of the new Republic of Indonesia. There are scores of Indonesian or Malayan languages spoken not only in the former Dutch Indies and British Malaya, but also throughout the Philippines, in eastern Formosa, and even in Madagascar. Makers of dictionaries have too often considered words from various Malayan languages and dialects as merely colloquial or badly recorded "Malay", and so have gradually conformed the variant spellings found in older English literature to the standardized Malay of modern dictionaries. As a matter of fact, Malay, in spite of being the best known language of the group, may not be as close as some others to the hypothetical ancestral language which linguists attempt to reconstruct as "Original Indonesian". It retains many words in "original" form but its grammar has changed greatly. A few words of Malay interlarded with Sanskrit and Arabic have been found on a grave stone in Acheh, North Sumatra, which Stutterheim (42) has published. There is scanty inscriptional evidence of what may be Old Malay from the 7th century, which was made known by van Ronkel (50: see also Coedes, 9).

For purely political reasons the Indonesian nationalists do not wish to call their national language "Malay", because the choice of a minority language, even Malay, obviously the most suitable of the group, would be more acceptable if it were to be called by a new name. So Malay, with new political, commercial and technical words and usages from many sources, is now called basa (or bahasa) Indonesia ("Indonesian language") instead of basa (or bahasa or bĕhasa) Melayu ("Malay language") which it really is.

The numerous innovations hardly as yet make a distinct language of modern Malay, but even if they do not, the now general acceptance of "Indonesian" in a restricted sense for a single language will make the term less intelligible and useful than "Malayan", its predecessor, for designating a language group. I am using "Malayan" as the inclusive term for the language group, and "Malay" for the single language.

In this article only the better-known names of plants and plant products that have entered English from Malayan are touched upon. Many others have entered scientific nomenclature but are not in general use as English words.

AGAR-AGAR

Agar-agar is produced from more than one genus of edible seaweeds. It has little nutritional value but is employed, like gelatine, in making a jelly-like vehicle for other foods. Its very indigestibility and great bulk in gel form have given it a place in medicine, but its greatest use is now in culturing microorganisms, the colonies of which may develop differently if grown on indigestible agar-agar or on digestible gelatine as a substratum. Bacteriologists are understandably too impatient to use the reduplicated Malay name agar-agar, which means "a certain kind of agar", and have reduced it to agar. In Malay the latter seems to have dropped out of use with the general meaning "seaweed", if indeed it ever meant that, and the reduplicated word has a definite application to somewhat similar kinds of red seaweeds, which are used in making the commercial product. Burkill (5) says: "Agar-agar is made in the chief centres on the coast of the Malay Peninsula, but to what extent this alga [Gracilaria lichenoides] serves, or others of the genus, or Eucheuma, is unrecorded." Wilkinson (52) informs us that it is also made from imported species of Gelideum, and also that gelatine is called in Malay "agar-agar bělanda" ("Dutch agar-agar"). The usage of only the reduplicated form to mean Algae is old enough (going back to the "Malay Annals", which cover the period from the founding of Singapore to the conquest of Malacca by the Portuguese) to suggest that the unreduplicated word does not refer to seaweed at all but to some property of seaweeds that they have in common with other things. This is indicated by the name agar lumut (meaning "moss-agar") which applies to a climbing shrub, Sphenodesme barbata.

In the legend of the founding of Singapore, "Sang Nila Utama proceeded with his princess to . . . . Tanjong Bemban . . . The princess sat under a pandan tree . . . viewing the amusements of her attendants, one of whom . . . collected agar-agar for making a relish". Here agar-agar clearly refers to raw, unprepared seaweed (25).

CAMPHOR

Although known to the ancients by the same name that we use in English, "camphor" is admitted by the best dictionaries to have received its name from Malayan. When the word first reached Europe it is not even known that Malay as such had come into existence, but a few words of "Old Malay" of the 7th century have been preserved on an inscription at Palembang in South Sumatra (van Ronkel, 50). So at any rate there was already Malayan speech before Latin was "dead" in Europe. Burkill (5) wrote: "Commercial camphor had been unknown in Europe until the Arabs brought a knowledge of it, as a medicine, towards the Mediterranean, about the time of Christ, or soon after, and then it was Dryobalanops camphor which they brought; and it is thought that it was this camphor which was known in India in Sanskritic times," and that the Chinese "were certainly receiving it from Malaya in the eighth century, and probably had then been receiving it for some time".

The famous Rumphius, the "Pliny of the Orient", said in Dutch (37): This precious gum is known to us Europeans by the new name Camphora; the Greeks called it Caphura; in Dutch it is Campher. All these names are derived from the Malay-Indian word Capur Baros, that is Baros calc-spar, from its having the appearance and color of calc-spar." Baros was the ancient as well as the modern name of the place in northwest Sumatra from which the camphor was exported. Even today the word kapur has the basic and widespread meaning of quick-lime, produced by "burning" any form of calcium carbonate (calc-spar if obtainable would have done better than marble, limestone, or coral, which might contain sand) to be chewed with the narcotic sirih quid, for releasing the volatile alkaloids from the areca-nut and pepper-leaf upon which the narcotic properties of the quid depended. There is an old record that those who were wealthy enough put camphor (kapur Baros) into the quid as a medicine and flavoring, just as tobacco came to be added after that plant reached the Indies and came to be cultivated there. The use of both lime and camphor in the sirih quid may account for such dissimilar substances as lime and camphor having the same name, kapur. Names of generic significance were often based upon use rather than intrinsic similarity. Almost the first critical student of comparative Malayan philology, Van der Tuuk (49) pointed out that kapur was cognate with Tagalog apog, meaning generally "that which remains after burning", more specifically, "lime". It may be added that Tagalog, one of the Philippine sister languages of Malay, has derivatives which refer to areca-nut and pepper-leaf chewing, such as tagaapog or nangangapog, "one who prepares the lime for the betel chewers"; pangapolan, "the metal container carried by the betel chewer"; inapogan "the quid prepared with lime" (31, 41). Apogan, "lime kiln", may be added. These words illustrate the mutation of "r" to "l" and "g" which is so frequent in the Malayan languages. More important in the present connection is the presence of such linguistic equivalents as kapur and apog as evidence of the antiquity of the word, in some form probably Original Indonesian, or, as perhaps one should now better say, "Original Malayan".

According to the Oxford Dictionary, European forms of kapur are immediately from Arabic. In English the typical form down to about 1800 was "camphire": the modern "camphor" is conformed to the Latin. Leading in geographic order from Europe toward the Sumatran source, the forms were Spanish and Portuguese canfora or alcanfor (Arabic of course), Mediaeval Latin camphora, Mediaeval Greek kaphoura, Arabic kafur, Old Persian kapur, Cinghalese kapuru, Prakrit kappuran, Sanskrit karpura, Malay kapur. There is such an excellent record and such great similarity of the words that no reasonable doubt would seem to exist that Malayan is the source. Of course camphor came anciently from China also, but that from Sumatra was more highly esteemed by the Chinese than their own, and they called it ku-pu-po-lu, which might be about as near as Chinese would be likely to come to kapur barus. According to Laufer (24) Tibet and Mongolia must have received camphor and a name for it via India rather than China, for in those countries it was called by the less debased name gabur. There was also a Tibeto-Mongol representative of Sanskrit karpura, namely gadpura, as well as a Chinese equivalent transcribed as kie-pu-lo.

CINNAMON

Another ancient product of the Orient, cinnamon, is supposed to have its name from Malayan, but this conclusion appears to be based upon very little if any evidence. The editors of Webster's New International Dictionary (30) accept Malayan origin, citing, however, no history for the word except that it came into English from Latin cinnamomum, which, in turn, is from Greek kinnamomon, kinnamon; Hebrew quinnamon. I find no convincing Malayan (Indonesian) source for this name, which would certainly have persisted in some of the numerous languages and dialects. In fact, the only similar Indonesian names that I have found for any aromatic plant are those to which English cardamon (Latin cardamomum) is related. These are recorded by De Clercq (15) as garidimong (Bugi and Makasar) and kardamunggu (Batavian Malay) and both are so irregular in aspect as to suggest that they may represent a commercial drift of the word "cardamon" to the East Indies from the Mediterranean or southwestern Asia. This is by no means improbable, for the name was known to Pliny. It seems very doubtful if either "cinnamon" or "cardamon" can be proved to be of Malayan origin. If anyone could have hunted out a Malayan source for "cinnamon" it would have been Burkill (5) but he says that the Latin word came from Phoenician through Greek. Cinnamon is the highly aromatic bark of trees of the genus Cinnamomum; "specifically that of the Ceylonese C. zeylanicum (Ceylon cinnamon) or the Indo-Chinese C. Loureirii (Saigon cinnamon), as distinguished especially from that of Cinnamomum Cassia (Chinese cinnamon, or Cassia bark), which has a less agreeable flavor and fragrance". The names in Malay are of two words, the first meaning skin or bark (kulit) and the second adjectival, such as manis (sweet) or lawang (hollow: from the thin inner bark rolling into hollow quills in drying). The two words run together and treated as a compound substantive occur as a specific name in post-Linnaean botany, as in Laurus Culilaban and Cinnamomum Culilawan. Linnaeus started a more conventional spelling following the most usual Malay form, as Laurus Culitlawan, but also used Cinnannomum Culilaban. The former has been disregarded, for the reason that the Dutch botanist Blume, who first published the name with the generic name Cinnamomum, and in the accepted sense, did not refer to Linnaeus, but went back to Rumphius who had given culit lawan, culilaban, and culilawan as variant Malayan vernacular names. So botanists have the scientific name Cinnamomum Culilawan instead of C. Culitlawan, as perhaps it might better have been.

The traditional point of export of the best cinnamon was Ceylon, which was probably vaguely referred to by the geographer Strabo as a cinnamon-producing country at the end of the habitable lands to the southward, on the shores of the Indian Ocean. It would seem that Ceylon, not the farther East Indies, should be searched for the origin of the word "cinnamon".

GUTTA-PERCHA

A relatively modern commercial product with a Malayan name is gutta-percha. Because it is an exudate from the bark of a tree one might jump to the wrong conclusion that it is related to Latin gutta, tear or drop, because most of the things called getah are exuded from punctured or cut plants in drops. Actually the word has nothing to do with Latin. In Malay, getah, gotah, or guta, in a broad sense, means rubber, gum, resin, or latex, such as is obtained by cutting the bark of many trees. "Getah" without any qualification now usually means ordinary plantation rubber. Gutta-percha (getah pertja, in dictionary Dutch orthography) is the special and very different product of the tree known as percha or pertja, and the latter word is therefore not always an adjective. There is no clear distinction, to be sure, between substantives and adjectives in Malay any more than in English, but qualifying words generally have found their way from Malay into English only as components of names.

Now that all sorts of synthetic plastics are being invented, one wonders how long "gutta-percha" will persist in the language. Its place is assured so long as submarine cables are still insulated with gutta-percha. Old-fashioned submarine cables are now less easily tapped than the wireless waves, and so cables will not immediately go out of fashion.

MANGROVE

There is an assemblage of curious trees in the tropics, not all of them botanically related, although most of them are, which thrive in brackish and maritime habitats, extending their dense growth into the sea. All are called in English "mangrove", although they belong to various genera. Rumphius (37) called them all in his New Latin, Mangium, corresponding to Malay manggi or manggi-manggi. The Rumphian name has remained in scientific language in the binomial Acacia Mangium, which we might freely translate as "that particular Acacia which is a manggi." This particular manggi or Mangium is one that grows inland and has nothing to do with the sea-coast mangrove formation, but merely looks as if it might. There is neither botanical nor (presumably) linguistic relation between Mangium or manggi ("mangrove") and New Latin Manga or Malay manggis (mango).

Mangrove is a firmly established English word of very dubiously Malayan origin. The Oxford Dictionary (29) says that "Malay manggi-manggi (not now current in the Malay Peninsula, but recorded in early dictionaries) is usually regarded as the ultimate source, but it is difficult to account on this view for the early appearance of Spanish mangle referring to America. The English forms mangrowe, 1613, mangrave, 1657, are unexplained . . .; the modern form is doubtless due to assimulation to Grove." There seems to be no evidence that manggi was used in Peninsular Malay for mangrove, for Common and Original Indonesian as well as Malay is bako, or a variant of that, which by a nation of coasting navigators, would pretty surely be used everywhere the Malays went. In the literature searched, the earliest record of manggi in the East Indies is that of Rumphius, who leaves no doubt of its occurrence in Moluccan dialect by giving the native specific names for several trees generically classed as manggi.

The origin of Spanish mangle was said in 1881 by the lexicographer Roque Barcia (3) to have been the same as that of an old local plant name, mangla, of the Sierra Morena in the Provinces of Cordoba and Jaen in Spain. He indicated that they were merely masculine and feminine forms of the same word. The supposedly masculine form was the name that came quickly to be applied, after voyages to the East and West Indies began, to various species of trees that inhabited brackish and truly salt-water habitats nowhere except along tropical coasts. There are no mangroves anywhere near the Mediterranean region. From some of the mangroves, eastern or western, could be obtained a gummy tannin extract that had numerous uses in tanning leather and in dying and waterproofing cloth and cordage. The supposedly feminine form mangla was locally applied to a Spanish shrub, ordinarily called ladano, of the rock-rose family, that yielded a sticky, resinous or gummy product, the laudanum of the old pharmacists. Barcia greatly weakened, and, in fact, appeared to invalidate his opinion by making an altogether incorrect statement about the geography of mangle. He said: "The mangle is not a tree of America, as the illustrious Academy says, but of the Indies, as would be demonstrated by its Malay name, manggi-manggi." Botanically similar associations of mangrove are actually found in both the western tropics and the eastern. Anyway, "the illustrious Academy" had not accepted Roque Barcia's idea at least as late as 1939, when the 16th edition of the Academy's Dictionary appeared, but affirmed with neither argument nor evidence that mangle was a Carib word, therefore West Indian.

Difficulty is quickly encountered, however, when one looks into the early use of mangle in Spanish or Portuguese. In 1535 Oviedo (34) did indeed use the Spanish name, but Portuguese mangue, said to date also from the 16th century, was in that century more common, and has the aspect of being merely a variant of Moluccan Malay manggi, although very early applied to trees of Brazil, not of the East Indies. This is perfectly possible, and an example of such geographical transference will shortly be given, for voyages to the East and West "Indies" were taking place simultaneously in the 16th century and the repeated observation of so conspicuous and uniform a feature of tropical coasts as the mangrove swamps, east and west, would have required some name to be adopted quickly by navigators and sailors. Maybe the Portuguese did actually take manggi from a local speech of the Spice Islands, and maybe the Spanish actually did take over a Carib word mangle, and maybe the accidental similarily and confusion of the two was the reason for the assimilation of both into the curious word "mangrove."

The modern English spelling of mangrove (according to Murray (30) preceded by "mangrowe" and "mangrave") appears in seventeenth-century accounts of the West Indies by J. Poyntz (1683), writing on Tobago, and of W. Hughes (1672) author of the "American Physitian", whose book applied especially to Jamaica. Next cited by the Oxford Dictionary is that engagingly observant pirate and born botanist Dampier (12, 13). His volume of 1699 entitled "Voyage to New Holland" (i. e., Australia) actually describes the mangroves of Brazil on the voyage thither and compares them with those that he saw and described earlier in the West Indies and Panama. "Mangrove" was firmly established in English literature by Dampier, and it is interesting to observe that his contemporary French translator (14) used mangle, taken over from Spanish, as the equivalent.

Without more delving that there has been time for into rare books of the 16th and 17th centuries, the evidence is equally good that the obscurely formed word "mangrove" came from Malayan manggi or Carib (? Spanish) mangle, or from both, by way of words that suggested and were assimilated to appear as if compounded with English "grove."

There is no tropical plant society that attracts more attention from naturalists and general travellers than the mangrove swamps, with trees whose roots grow up into the air out of salt water or brackish mud; with other trees hung with pod-like embryonic seedlings that plant themselves by falling like darts into shallow sea water or tidal mud; with mature trees extending out into deeper water by producing arched adventitious aerial roots from the trunks, among which the mud teems at low tide with curious out-of-water tree-climbing fish and crabs. The mangrove swamps protect coasts from erosion, and trap alluvium for the extension of land into the sea. The basic English word for describing all of this entrancing natural history is "mangrove," a word that the botanist could not get along without but whose source he may never be sure about.

BAMBOO

One of the most interesting of all the plant names that has been ascribed to Malay is "bamboo". It is now understood or used almost everywhere in the Malayan region, especially as spread by Europeans. In the writer's experience, Malays among themselves use bulu, not bambu, but Europeans in speaking Malay to Malays always say bambu. It is quite clear that Europeans think they are using a Malay word, but that Malays (where I have been) do not seem to feel that it quite belongs to them, and their own word bulu has not been superseded, although "bamboo" has, of course, found its place (as bambu) in the Malay dictionaries. The lexicographers have hedged somewhat, however, in indicating its origin. Thus, Scott (40) pronounced "bamboo" to be an Indian word introduced through Malay, and Wilkinson (52) only goes so far as to say that it is "generally understood in Malaya".

A clear cognate of Malay bulu, however, is found in an Old Malay inscription of the 7th century, dated by van Ronkel (49) as of 606 Saka (684-685 A. D.). With reference to planting a garden, the inscription (in Palembang, South Sumatra) names among various other plants haur and wuluh, which, occurring together, cannot possibly refer to anything except bamboo types known today as aur and buluh or bulu.

The oldest use of the word "bamboo" that seems to have been so far discovered is that of Garcia da Orto. This author's "Colloquios" was published in 1562 at Goa in India, in Portuguese, and seems to have been always a rare book. Until recently it is quite safe to assume that nearly all of the references to it have been to the translation into Latin by Clusius (8) or translations from Clusius into other languages, such as Italian (33). The work in its original literary form did not become generally available until 1895 when the edition of the Conde de Ficalho (32) appeared. This was because Clusius (8), to save space, condensed it by doing away with the superfluities of dialogue ("colloquies") and kept only the substance.

For some time Clusius's editions of Garcia's work (Aromatum Historiae) were the chief source of information on the botanical and other commercial raw products of the East Indies. Then Garcia was supplemented by the somewhat similar work of Cristoforo Acosta (1). From these two authors Clusius (8) and his contemporaries derived most of what they knew about the botanical source of Oriental drugs, spices, and such commodities. Clusius was the translator of Acosta as well as of Garcia.

What Garcia actually told about bamboo was in the colloquy on tabashir where he said that the latter was called in the country that it came from sacarmambum, or sugar of mambum. As the name of the "tree" he also gave mambu. The tabashir has come to be well known as a silicious deposit that sometimes forms in the hollow joints of bamboo. As for the places in India that it came from, Garcia da Orta mentions Bisnager, Bisnaga, Batecala, and Malavar (Malabar).

It was Rumphius (37) who reported bambu and mambu as Moluccan. Judging from Garcia's account, the combination sacar mambu would suggest seeking the source of the word mambu in a language in which "sugar" is sacar. The latter word may well have travelled from Persia to India, where bamboos grew, and from there to the Malayan region, into which there was early introduction of many Persian words. Introduction locally into the Malayan Archipelago of the word mambu or banbu by early traders from India, and its local persistance as bamboo, may have come about. Expected phonetic changes in any Malayan language would account for banbu or mambu passing to us as bamboo. In this argument there is an excess of speculation over evidence, but a plausible conclusion would seem to be that an intermediate Malayan source for an originally south-Indian word may be claimed, in accordance with the Oxford Dictionary, which has: "Original source doubtful: now in Malay (Central Sumatra), Sundanese, and Javanese (West and Central Java) bambu; but some consider it an introduced word there, and take the original to be Canarese banbu or banwu. The native word in the Concan, in 16th century, was represented by the Portuguese as mambu, still found after 1600."

SAGO

Sago, the well known starchy food derived from the pith of palms of the genus Metroxylon, is said by some of the dictionaries to be the Malay sagu. A similar product is derived from Cycas, which is the type genus of the Cycadaceae, the cycad family, more nearly related to the pines and their allies than to the palms or any other flowering plants. Often called sago palm, these cycad plants have a trunk with a soft-tissued starch-bearing interior which may be used for making a kind of sago. Tapioca is a product not too different from sago, but it is made from the starch of the root of the South American Manihot utilissima, or manioc, which reached the East Indies with the early Portuguese and Spanish, being now one of the basic food plants. The old time sago of the Malayans, however, was the product of palms, primarily species of Metroxylon growing in sub-brackish coastal swamps, but also, and more seldom, of the sugar-palm, Arenga. The process of getting starch from either of these large trees has been so many times described that it can only be alluded to briefly. When the palm is chopped down it is found that the cylinder of dense wood is relatively thin, and that the rest of the trunk is a soft pith with only widely spaced strands of fiber in it. If the pith is mashed with water a great quantity of starch is released from the broken pith cells. The starch, suspended in water when the depleted pith is strained away, settles as a fine white flour if the suspension is allowed to stand in a big receptacle such as a dug-out canoe, and may be dried after the water is poured off, or made into the familiar little pearl-like beads by a subsequent process.

In some places sago is very important in native economy especially as a reserve food available in times of scarcity.

The word sago is found in a number of variants in the Malayan region. Some of them are as follows: sageë (Atchinese), sagai (Mentawei Islands off the West Coast of Sumatra), sagu (most of the languages, including Malay), saghoe (Madurese), sago (Malay also), saku (Nias), sa and su (Sula). A most important fact is that the name for Metroxylon, according to Merrill (27) is sagu in Manobo and Bisayan of the southern Philippine Islands, but that in two other Philippine languages, Bikol and Ilocano, both northward beyond the range of Metroxylon, sagu is a name given to the introduced Maranta, the arrowroot. If the Spanish and Portuguese accomplished the introduction of Maranta to the Orient, so the Filipinos transferred the name of a large tree whose trunk yielded starch to the herb Maranta, whose root was also a source of starch. The quick interchange of plants and plant names from the West to the East Indies and vice versa was quite amazing. Since the English word may have come from any one of a number of dialects, the variation should convince anyone of the futility of conforming English spelling to standard dictionary Malay. If, as in the instance of the binomial Metroxylon Sagu, a vernacular word has been frozen in scientific nomenclature, that spelling would be the one to keep if there were any choice.

ARROW-ROOT

Having accepted sago as a Malayan plant name, we at once come up against the perplexing fact that in Latin America the starch-yielding arrowroot is widely known as sagu. In Colombia (specifically in Antioquia) for example, Uribe (46) gives no other Spanish or indigenous name for Maranta except sagu, "arrowroot of the English". For Mexico, Martinez (26) gives no alternative native name to sagu. In Guatemala, however, the names have no resemblance to sagu. The same is likewise true in Venezuela, where there are entirely different names, guapo or guate, and, Pittier (35) says, "From its rhizomes is extracted the arrow-root called in Venezuela sulu". One may reasonably guess that the Spanish moved the plant Maranta from the West Indies to the East, but brought back a name for it from the East Indies to the West, of which Venezuelan sulu may conceivably be a variant, used for a product of the plant, not for the plant itself.

An example of a plant name which has every superficial aspect of presenting no philological problem is "arrowroot". It is customary to explain the name by quoting Sloane's History of Jamaica, where it is said that Mexican Indians use juice from the root of Maranta as a remedy for wounds from poisoned arrows. Burkill (5) for instance, the author of the standard reference work on the economic products of the Malay Peninsula, says: "A herb of the West Indies found in use there, in the early days of European voyages across the Atlantic, for the treatment of wounds by poisoned arrows. From this use has arisen the name 'arrowroot', which has travelled about the world with improved races used for food . . . . One island in the Dutch Indies, Halmahera, has actually exported it . . . . "

If, however, we turn to plant names in languages of East Indian regions that also produce arrowroot starch, we find a clue at once to what may seem to be a more credible etymology. The Malayan peoples have a long record for adeptness in the utilization of materials from which starch can be made. So, although they received Maranta from the American tropics, they already had similar and botanically somewhat related plants with names so close to "arrowroot" that the native name appeared to make sense in English, but actually, of course, did not. Here is a selection of names in Indonesian languages from the northern Philippines to the Moluccas, and then westward to the Malay region proper:

araru	(Ibanag)	Maranta arundinacea
kulyau	(Ilokano)	Curcuma longa
kulalo	(Pampanga)	Curcuma longa
aroru, aruru	(Tagalog)	Maranta arundinacea
arut, laru, larut, salarut	(Madurese)	Maranta arundinacea
garut, irut, rarut, waherut	(Javanese)	Maranta arundinacea
rarut, arerut	(Minangkabau)	Maranta arundinacea
arairut, ararut, arerut	(Malay)	Maranta arundinacea

Here it appears that we have the Malayan basis for the English "arrowroot," varying to a form which may even have been accepted by English speakers of Malay as meaning something in their own language. As a popular etymology, the transformation of such a word as araru to arrowroot is quite as acceptable as the change of the name of American sunflowers from Italian gira sole to "Jerusalem," when the edible tuberous root of a perennial species of Helianthus came to be known in England as "Jerusalem artichoke."

The use of arrowroot for the manufacture of starch appears to have been a minor industry in Indonesia. According to the Dutch botanical lexicographer De Clercq (15) it was only locally significant, and the article of European commerce all came from Saint

Vincent in the West Indies. Although it is conceivable that the popular etymology is correct, and that the English name "arrowroot" gave rise to a long list of cognate derivatives in the East Indies, where the English had some influence, it presses credulity almost too far to believe that the native names in the Philippines should have come from English! The Spanish generally used the word "sagu," even though some Spanish-speaking botanists do explain "sagu" as arrow-root de los ingleses. "Sagu" itself seems to be an Indonesian, not American, word, and possibly related to the "aru" series of words. If this supposition is correct, and there is evidence in its support, it strengthens the acceptance of the English word "sago" as clearly of Indonesian or Malayan origin.

In English there is no commonly known or generally used synonym for arrowroot, although the Australian botanist Von Mueller (51) introduced the interesting variant aru-root, indicating that he, for one (but apparently the only English-writing author), did not believe the etymology usually accepted. He referred to "the true Arro-root-plant or more correctly Aru-root, inasmuch as Aru-aru is the Brazilian word for flour, according to Martius." One bit of possible evidence for derivation from a place name is afforded by the name in Amboina for a sago palm (Metroxylon longispinum) of inferior worth as a source of starch. It is called sagu makanaru, which would be better written sagu makan aru. It might then mean "the sagu which is the food of Aru" if not "sagu or flour food." The Aru Islands are not far from Amboina. In reading the quotations from Dutch authors one must remember that their "oe" is the equivalent of English "u".

In French or works written in French, we find, among unrelated names, exact translations of arrowroot such as herbe a la fleche and herbe aux fleches.

German reveals the translations Pfeilwurz and Pfeilwurzel. Dutch has "arrowroot", taken over directly from English, and the translation pijlwortel, but also arraroet, in Curacao, where the starch is known as araroetoe. This may have been an introduction of an Indonesian word from one Dutch colony to another, by colonial planters, or just a perversion of English by the Dutch, which makes us wonder if the same thing could have happened in Indonesia and have led to the long list of words which I suppose to be good Indonesian. There is one Dutch writer, however, who quiets our misgivings a little by giving preference to a non-English synonym. Jasper (21) writing on means of subsistence of the natives, said that starchy roots were obtained in Indonesia from the "laroet or arrow root."

If the writer appears to be indecisive about all this, the reader must bear in mind that this article is not intended to present the last word on the subject. It is interesting to speculate about linguistic origins even if we do not arrive at certain conclusions!

LEMON AND LIME

The words "lemon" and "lime" have been traced by most dictionary makers only to Arabic laymun, but since the Mediterranean Arabs did not have the fruits named until they brought them from the East, it is quite obvious that a more remote source must be found for the names. Even the great Oxford Dictionary, after citing variant spellings in English from about 1400 on, and in the Romance languages, has only the following: "The words are probably of Oriental origin: cf. Arabic laimun, Persian limun, Arabic limah, collective lim; fruits of the citron kind. Sanskrit nimbu, the lime."

If origin from Sanskrit is suggested by Murray, we are caught in a dead-end, for it would be hard to admit, after finding as we shall, the true origin of "lime" and "lemon" in similar words of the Malayan languages, that the very different Sanskrit word was in the direct line of descent between the Malayan and European words.

In the first place we must consider the botanical evidence about the native country of the fruits to which the names apply. In the Indonesian region in general there are many varieties of citrus fruits. Among them are varieties of the lime, Citrus aurantifolia, and these were considered by Swingle, the best authority on the subject, to be indigenous in the islands. He ascribed the lemon, Citrus Limon, to Southeastern Asia, but with doubt, stating: "The origin of the lemon is a mystery". He was not sure that its status as a species was at all certain, and indicated that if it had come about as an interspecific hybrid, one of the parents was the lime. It is therefore logical to consider the Malayan Archipelago or the adjacent mainland to have given rise to it, unless, indeed, it was a horticultural product that might have arisen anywhere that the lime and the other putative parent, the citron (Citrus medica) were both cultivated. Indonesia would fulfill this condition quite as well as any other region.

As for philological evidence, it is plentiful in favor of Malayan origin. There are three basic series of names in the Malayan languages that are of somewhat generic status. The individual names vary from language to language but the three series of cognates are wide-spread. They are the limo series, the djeruk series, and the munte series. Ranged under these somewhat generic terms in a manner that exactly corresponds to our Latin binomial scientific names are citrus "species" of low status, or varieties. Some are mere horticultural forms, unknown wild.

The only such classification by native names that can be given that is complete for a locality is the one that Rumphius (37) presented in the "Herbarium Amboinense". Lemon, Moluccan Malayan as a generic name for various citrus fruits, covered varieties which our botanists would place in several major categories or species, with lesser horticultural varieties ranged under them. As a matter of fact in his Latin terminology Rumphius did not keep them all in the broad Malayan genus "lemon", but distributed them to groups for which he used the New Latin names Limo, Limonellus, and Aurantium. Not all of the varieties which he assimilated to the native genus "Lemon" were known to Amboina, so he took those which occurred elsewhere in the East Indies (or even in Amboina), whether known as limo, or djeruk, or by other names, and assimilated them to lemon. In all, his extensive and almost perfectly binomial system included some 35 names under Lemon. Among them were the following:

Lemon Cassomba	Lemon Suangi
" Sussu	" Maas
" Martyn	" Madura
" Curamas	" Utan Basagi
" Perrut	" Itam
" Papeda	" Manis Tsjina
" Carbon	" Manis Besaar

Such an extensive system of names would hardly have arisen in the Malayan region except for plants native there or at least anciently introduced and used. Words of recent introduction would also show less dialectical variation, so it is interesting to find that recorded names related to or derived from the ancestral word that gave English "lemon" and "lime" are as follows: limau (Malay, Minangkabau, Lampong, Dayak, Bisayan); alimau (Bisayan); limo (Batak, Balinese); limu (Minahassa dialects and others related); lemo (Buginese, Makasarese, Halmahera and related dialects); lemon (Moluccan Malay); limon (Philippine languages, but considered there as Spanish); limeu (Gayo); leno and lelo (Timor). The last name (lelo) might seem dubious if it were not confirmed by the modifying name of the native binomial lelo sina, parallel to Malay limau china, "Chinese (or foreign) limau".

It is strange that the limau names should reach only into the southern Philippines (as Bisayan limau and alimau) except for the reintroduction of Spanish limon. Delgado (16) who finished his "Historia de Filipinas" in 1754 (although it was not published until 1892) had little to say regarding the names that interest us. In his chapter on oranges he said that the species called limao was sweet, and almost like what was called lima in Spain. Under the limones he said that aside from the two most valued kinds there were various lesser kinds known under the generic name aslum. Transposition of syllables with phonetic modification is not unknown in the Malayan languages, so even this word may belong to the limau series, although I have not ventured to put it there. It would seem to be more likely related to "asam" meaning acid or sour and wide-spread in many Malayan languages.

It would seem that the evidence from the Indonesian area shows that our English words "lemon" and "lime", together with the similar words of the Romance languages came from the Malayan limau or limo, and that there is no need to worry about anything so distant and possibly unrelated as Sanskrit nimbu. Clusius's 5th edition of Garcia (8) in the Exoticorum Libri X, chapter on "Nimbo," states that the pounded leaves of that plant applied to wounds with juice of Limo (or Limon: he gives only the genitive plural Limonum) which is a sort of "Assyrian apple", cures them miraculously. According to the Conde de Ficalho (32) "nimbo" would seem to be a Portuguese rendering of an Indian word nim or nimb, Melia Azadirachta L. His Portuguese edition of Garcia gives the other constituent of the poultice as limao. The Italian edition of 1589 (33) has limone, which in modern Italian might be either "lime" or "lemon". So we know from Garcia that the Portuguese adventurers at Goa, in southern India , found there a variant of the same word for lime or related species of Citrus that they also encountered in the Malay Archipelago, and traders may have taken it there. Also, we have grave doubts cast upon the word "nimbo" as applying to any kind of Citrus in recent centuries at Goa, whatever nimbu may have meant in Sanskrit, and assuming that nimbu was linguistically equivalent to nimb of the Hindus at Goa and nimbo of the Portuguese at the same place. Nimbo in India would seem generally to have applied to members of the laurel family.

MANDARIN

Another citrus fruit has an English name that is surprisingly not of Chinese origin but Malay, namely the mandarin, whose name reminds us only of China and things Chinese, — of the officials who in imperial days wore buttons on their caps to indicate their status, of the official Mandarin language, and of the mandarin orange. Wilkinson (52) one of the most eminent lexicographers of the Malay language, related this word to Malay menteri (in old books spelled mantri), which designated all minor officials of the old Malay courts, and makers of English dictionaries have supposed that the latter word came to us in the form "mandarin" through Portuguese. There is, however, another honorific title in Malay that would seem even more likely than mantri to have given us "mandarin" by way of Portuguese; that is, "mangindera" or mengindera", meaning "to rule" or "to have exalted status," consisting of the Malay verbal formative meng plus indera (Sanskrit

Indra, "divine king") which Malay borrowed from Sanskrit. Indera came to be applied to any exalted individual. Thus, his Portuguese Majesty's representative as ruler of the fortress and town of Malacca is referred to in Malay writings as "Kapitan Pertukal Indera," and a "ruling Sultan" as "Sultan mengindera". The latter word, in the sense of "royal" would seem to be a likely source of our English word "mandarin". "Mandarin" orange would correspond linguistically (even if not botanically) to "King" orange.

The dictionaries have not had time to catch up with the latest botanical identification of the mandarin, which, according to the late Walter Tennyson Swingle (43) our best authority on the classification of citrus fruits, should not bear the name Citrus nobilis (the "noble" orange) but, rather, Citrus reticulata. The fine orange which is now in the American market as the "King" variety (said to be a shortening of "King of Siam", — for we are too lazy to keep so long a name regardless of how pleasantly it would make our imaginations wander) is the one that should bear the scientific name X Citrus nobilis, in which the "X" indicates a plant presumed to be of hybrid origin, unless the name is abandoned, as Swingle disposed of it. The King of Siam orange is presumed to have sprung from a hybrid, with the mandarin as one parent and the ordinary sweet orange, or perhaps the pummelo, or even a cross between these two, as the other parent.

Swingle was preeminent as an originator of new citrus fruits that he and his collaborators produced by hybridizing different species, and even different genera. For the resulting hybrid fruits he devised hybrid names. One of them, "tangelo", already in the dictionaries, is defined as the name for hybrids between the tangerine (mandarin) and pummelo. His group name for the definitely known and presumed hybrids between the mandarin and the sweet orange is "tangor", and that would probably serve as a general common name of the King or King of Siam variety as well as the Temple orange of Florida. "Tangor" is not yet, however, so widely known and accepted as "tangelo". Nor, perhaps, should either word be mentioned here, but for the fact that some of the other hybrid names which he introduced have Malayan parents or grandparents. Such are "citrandarin", from "Citrus" and "mandarin"; "eremolemon", (if we admit the ultimate origin of "lemon" as Malayan limo) from Eremocitrus and "lemon". Others are "citremon", "lemandarin" and "citrandarin". Swingle tried to give names that would suggest the parentage of complex hybrids that had as many as five species in their ancestry. Whether these names (if the curious hybrids to which they apply should persist in horticulture, as we hope they may) will be accounted as of Malayan origin is a problem for the philologists of the future!

AILANTUS: TREE OF HEAVEN

The best known botanical name of Malayan origin that has been misspelled in order to give it a false etymology is Ailanthus, the tree of heaven (and the tree that grows in Brooklyn!). The proper form is "Ailantus." This name, as Scott (40) observed, has been referred to the Chinese, to the Sanskrit, and to one of the Malayan dialects of the Molucca islands (correctly to the latter); and in all of these languages it has been said to mean "tree of heaven." This is a literal translation of the original Moluccan ai lanto and of its Malay equivalent kayu langit, "sky tree."

Ailantus came to be erroneously spelled Ailanthus because so many botanical names are derivatives of Greek anthos, "flower." So Desfontaines (1786) set up the erroneous form Ailanthus, as the name of the genus. In French, "langit" appears as a synonym of ailante, ailantus. This langit can only be, of course, a fragment of the Malay name kayu langit; only the part that means "sky."

CAJUPUT

"Cajuput", another example of two Malay words compounded in English, is equivalent to Malay kaju puti. This name means "white wood"; the kaju (Dutch spelling) is pronounced kayu in Malay and means tree; putih (or puti) means white. This tree Eucalyptus Leucadendron, yields an essential oil of which the name is sometimes shortened to "cajuput" oil. The word entered English in a translation from Dutch, and the j remained in the word and is pronounced as in English because it was not changed to y in the translation, as it should have been.

A SOUTH AFRICAN NAME FOR THE CAPE JASMINE

"Katje piering", the Cape jasmine (Gardenia florida) has no more remote ancestry, according to the New Webster's International Dictionary (30) than "South African Dutch." It is Malay bunga kacha-piring, "glass-plate flower," from Sanskrit kacha, meaning glass, in Malay sometimes looking-glass, and Malay, piring, plate. The name has no meaning in Dutch, for katje, a little cat, or an Oriental unit of weight (catty) has no possible applicability, nor does piering have any Dutch meaning. Wilkinson (52) cites the word from a printed edition of the Malay classic Hikajat Siddha Rama (Balai Poestaka, Batavia, n. d.) and gives the botanical identification. In Badings' Malay Dictionary (2) it is found as katja piring, a strong-scented white flower. In the "Auctuarium" of the "Herbarium Amboinense" (38) will be found the following, in Latin and Dutch: "No other name is known except the Malay Catsjopiri or Catsjopiring and, so far as known, it is used for no other purpose than as an ornament and perfume, for one or two flowers can fill a whole room with their fragrance, and that for two days. This plant was exotic in Amboina, and was first brought in from Batavia."

COCO AND COCONUT

I have left until last the name of one of the most important economic plants of the East Indies, the coconut. The origin of the name "coco" ("cocoa" is merely a misspelling) has been much disputed. Some, as, for instance, the great Belgian botanist Clusius, appear to have assumed that the coconut had been known to Europeans since ancient times, and that coco is etymologically the same as Greek and Latin koix, koikos, and coccus. Theophrastus said of palms that there were several kinds, most of which he treats as kinds of date palms, which, of course, he calls phoinix. In one passage, however, he refers to the phoinix (phoenix) and koix as having similar reedy leaves, thus setting off the two by name as more distinct than mere kinds of phoenix. He does not refer again to koix except as we assume it to be the same as koikos, which Sir Arthur Hort (44) translated as doum palm, a species of northeastern Africa. The latter was said to differ from other palms in being more often branched, (although Theophrastus described phoinix as occasionally branched) having sometimes two or as many as five stems arising from the original one. Branching is indeed characteristic of Hyphene thebiaca, the doum palm, and even though the identity of koix and koikos with the latter is not certainly established it is nevertheless very probable that the Greeks may have misapplied those names to it and to other little known palms as well. Linnaeus would not have failed to make this identification if he had known the doum palm by any satisfactory modern account, but since he did not, he considered Coix (koix) to be one of those ancient names that could not be applied with certainty, and was therefore available for reassignment. He therefore applied it to the Oriental grass commonly called "Job's tears", which therefore got the name Coix Lachryma-Jobi.

Aside from several varieties of the date palm, Theophrastus accounted also for the little underground-branching Mediterranean fan-palm, so his koix had to be either the doum palm or something of which knowledge had come from farther away than "Ethiopia" even though we grant that that geographic term might have been vaguely used.

It is probable that ancient voyagers brought to Greece tales of the coconut palm with a name like "koix", and that the Greeks confused the latter with what we now know as Hyphene thebiaca, the doum palm. Nothing is commoner than the transference of a plant name from one region to another without applying it to the same plant, but to one with a real or fancied resemblance in appearance or utility.

Theophrastus said that koix had a branched stem, which could refer only to the doum, but he also attributed great utility to it, which it does not have. This led some botanists to think that koix was the coconut palm and others thought it might have been the sago palm. Neither of the latter could have persisted in Africa after introduction from the Far East except in the moist tropics. Hyphene, however, is native to northeastern Africa. A variant of the name doum, even if not the plant, appears to extend across Africa applying to a palm of the Gambia. In East Africa, the northern part of the coast is an arid one and a considerable voyage from Arabia would have been required to reach places where there are modern plantations of the coconut palm, which would have been the nearest appropriate places where it might have been introduced in ancient times. Although the coconut palm is salt-tolerant and flourishes especially near the sea, it is found where rainfall is abundant and the soil water is not highly saline. It is not a desert plant. To the southward along the old Arab trade route, in Zanzibar and the neighboring island of Pemba, the climate nearly enough resembles that of the East Indies so that these two islands now produce most of the world's cloves, and a large crop of coconuts. Trade routes from Arabia to Zanzibar and the Orient are so ancient that the coconut (although not the clove) may have been a much earlier introduction to equatorial East Africa than has been supposed. "Ethiopia" was a region of vague extent in classical times. It is possible that confusion of the doum palm with the coconut palm need not have required travel to the Orient, but only down the east coast of Africa. That the doum palm was partly indicated by Theophrastus, however, is clear from his description of koix as a small palm having a branched stem, for that is characteristic of the doum palm but not the coconut. The manifold uses, however, indicate confusion with something else, and account for the old-time guesses that koix might have been coconut palm or even sago palm. In 1582 the botanist Clusius (7) used Coccus, doubtless as a Latin equivalent of koix, to mean the coconut palm, probably influenced by the use of "coco" by the Portuguese in the Orient for the coconut, and later botanists called the genus Cocos, which is current.

Recent familiarity with the word "coco" in any region of the East is not sufficient proof that it is an indigenous word. That one form of it is secondarily, although not primarily, Malayan seems at least reasonable, and evidence is not altogether lacking. The writer (4) long ago pointed out the similarity between English "coker," (commercial jargon for coconut) and kokoer (kokur) of

Sumbanese. This and other Indonesian Languages might have softened a harsh Arabic trade name to conform to their phonetic system, just as the Portuguese did, and quite independently. The more usual and widely used Malayan words for coconut have no possible etymological affinity with "coco," and the argument for an ultimate Malayan origin of the latter is therefore entirely unconvincing. If, as the sagacious Rumphius (37) thought, the word "coco" itself represented a softening of an "Arabic" trade designation, the question still confronts us: Why did the Arabs have such a word for a foreign product? They might more naturally have picked up some Malayan or Indic word in regions where coconuts were grown.

Old Portuguese voyagers reported that coconut at the Portuguese foothold in India, Goa, was there called "cocos." This might seem definite evidence of origin, at first sight, if it were not that the Portuguese believed that they originated the designation coco themselves, because of the three holes, or eyes, at the end of the nut. These eyes, they said, reminded them of masks, or such objects which were known at home in Portugal as coco, and were there employed by the women to scare the children! This explanation of the origin of the word has been more or less accepted, and, being repeated with variations, has retarded search for the real origin. The popular etymology has been accepted by some Portuguese and Spanish lexicographers (28) but not all. It is not admitted by two of the best Portuguese dictionaries (17, 20) but no alternative explanation is offered. Cristoforo Acosta (1), "African" physician who traveled to the Orient and wrote a famous work on drugs and aromatic plants, said (I have used the Italian edition of 1585) that the Portuguese called the nut coco because of the three spots that it had, but he also tells us that the Turks called it Cox Indi. This, as we shall see, means "Indian nut."

The old Portuguese writers were emphatic, when they mentioned the native Indian names tenga (Malayalam) and narle (Canarese), in saying "we call these fruits quoquos"; "our people have given it the name coco"; "that which we call coco and the Malabars temga."

The writer once advocated reconsideration of the suggestion of old Rumphius that the harsh and gutteral Arabic guazos-indi, translated nux indica or Indian nut, may have been softened by the Portuguese or the Malays to the eventual word "cocos." Even then, it seemed that the Arabs must have taken their name from some language foreign to them, for it was too quickly assumed that their arid country, supposedly too cold in winter, had no coconuts.

In 1932, however, Bartram Thomas (45) told of his exploration of the Qara Mountains, located in a summer rain belt in Arabia along the coconut-fringed shores of the Arabian Sea. He found this region to be "an Arcadia of luxurient forests that clothe steep mountains, with perennial streams". Thomas's remarkable book has two photographs of coco-nut palm groves which fully authenticate his observations. These are the plates opposite p. 2, "A Coco-nut grove at Dhufar" and opposite p. 16, "A Street Scene in Dhufar." His other specific references are as follows:

p. 3. "We . . . rode along the edge of a coco-nut palm grove to make the fort of Dhufar . . ."

p. 8. "Just over the mountain divide flourish the famous frankincense groves of Arabia. This precious product, sent to the temples of India . . . . has been the prosperity of Dhufar through the ages, though it were well not to confuse the locality with the Dhufar of Arrian . . . in the Yemen . . ." (An indication of the ancient sea traffic which brought the coconut from India to the Hadramaut coast.)

p. 16. "Our way lay . . . through a deep coco-nut grove (in Dhufar the coco-nut palm takes the place of the date palm found elsewhere in Arabia) . . . and so across the strip of plain that fronts Salala town."

p. 17. "Coco-nut palm is in universal use in Dhufar for window sashes and ceiling rafters, and good and enduring material it is, in contrast to the fibrous and inferior date-palm log of Oman buildings."

In the Hadramaut of today the old contact with Malaya and Java continues. Van der Meulen and von Wissman (48) found many of the Arabs who gladly conversed in Malay, and had lived in Java or Singapore. In 1886, they tell us, L. W. C. Van den Berg investigated the fluctuating Hadrami Arab population of Netherlands India and found it to number seventy to eighty thousand persons. He also credited these seafaring Arabs with the founding of the old sultanates of Siak (in Sumatra) and Pontianak (in Borneo). As for the coconut in the Hadramaut they say of the port of Makalla: "The frame-work of the picture, formed by coconut and date palms, mango and papaya trees, is of such a jubilant beauty in this world of rock and sea . . . makes everything . . . beautiful." In nearby Zeman es Seghir there were coconuts for sale, indicating that they produce fruit here; also lemons and bananas.

This indicates that the Arabs or their ancestors may have brought the coconut to their own country very early, and that they may have known it and had a name for it afterwards independently of their continuing trade to the Orient. The reason for their having their own non-East-Indian name for it was that they and their predecessors in the Near and Middle East had called it in their various related languages, or by borrowing, or by translation, merely "nut of India." From Arabia one may suppose that it would naturally have been carried down the African coast trade route to the appropriate climate and latitude of Zanzibar, but it remained for the Portuguese to carry it around the Cape of Good Hope to west tropical Africa.

It is strange that a plant of such great interest to early travellers should not have been illustrated earlier than it was in books of the 16th century. It remained for the great Belgian botanist Clusius to publish two of the earliest pictures of important Asiatic palms, in 1582, in the curious little booklet of Notes on Garcia's History of Aromatic Plants (7). One of them was the coconut-palm, the other Areca. He had had pictures of both from Alphonsus Pancius many years before, he tells us, but supposed them to be spurious until he had an opportunity to converse with a returned resident of Goa, Don Fabricio Mordente of Salerno, who declared them to be authentic, but made slight changes, after which Clusius published them. They had been omitted from Clusius' second and third editions of Garcia's Historia Aromatum. With the drawings that he finally published in 1582 he included a brief description under the Latin name Coccus, which may be taken as the first "scientific" name established for the coconut in modern botany. Later, in 1605, he published rather good wood-cuts of the nut, both with and without husk (8).

The argument for a Near Eastern origin of the name "coco" was well presented by Rumphius who wrote prior to 1690 although his great work on East Indian botany was not published until 1741 to 1755. Rumphius (32) said that the great nut-bearing Indic palm was named in Latin Palma Indica major, et Coccifera . . . in Dutch Cokos . . .: the fruit was called in Latin Nux Indica (Indic nut) and badly . . . Coccus . . .; in Portuguese coquo and coco, on account of the resemblance, as Linschooten and many other writers would have it, to a 'sea-cat' [Burmann's Latin translation says 'Cercopithecus', monkey] as, indeed the three eyes in the shell suggest, but according to my idea one can find a more certain and truer origin for this name, since many nations to whom this fruit is known call it "Nut". Thus, it is called in Arabic Gauzoz-Indi or Geuzoz-Indi, which is Indian Nut, . . . which by the translators of Avicenna is corrupted into Jausi-Alindi and, even worse, Jansi-Alindi; and in Turkish Cocx-Indi, with the same meaning, whence without doubt the African Moors and their neighbors the Spaniards and Portuguese have made their Coquo. Actually all these names have their origin from the Hebrew word Egoz which has the meaning "a nut" . . . . There remains pure Arabic Egoz or Gauz, from which stems the Greek kokkos, by which they designate all big seeds".

Commenting on the Rumphian explanation Yule and Burnell (53) said: "One would like to know where Rumphius got the term Cock-Indi, of which we can find no trace". They would have found their answer, of course, in Christophoro Acosta (1).

Laufer (24) refers in his fascinating (even if not easily read) "Sino-Iranica" to Iranian words for "nut" as anggwoz and agoz: he also gives koz and goz as New Persian for walnut and other names for the walnut as Hebrew egoz, Arabic joz, Sariqoli, (and other dialects of the Pamir) ghauz, ghoz, Pushtu ughz and waghz, Turkish koz and xoz. Travellers rendered the latter as "cocks", and the coconut as cocks (or cox) indi, i. e., Indian nuts, considering cox as Turkish or Arabic. We remember the Turkish name given by Acosta, namely, Cox Indi, in 1578. This is the word most amenable to being rendered in the Malay as koko or in Greek or Latin as koix. So it may have given koix (coix) to Greek and Latin, and this word may have referred to coco-palm at first, subsequently to the doum palm.

There is no doubt whatever that interchange of words between Persian and Malay began long before there is a record, and maybe as far back as the early centuries of the Christian era, although proof is not available. Among the ancient words from Persian in Malay are doubtless pusa, "cat" (English "pussy") and nakoda "ship-captain." H. K. J. Cowan (11) has called attention to a gravestone with Persian inscription in the region of Pase, the ancient kingdom of Samudra or Sumutra, which is in modern Atjeh (Acheh), the northern end of Sumatra. This inscription is on a tomb with two stones, one in Arabic indicating that it is the burial place of Na'ina Husam Al-Din, who died A. H. 823 (A. D. 1420), the other, in Persian, with one of the odes of the Persian poet Sa'dî (A. D. 1193-1292). This stone is unique, no other in Persian occurring in North Sumatra among many inscribed in Arabic. It confirms the statement of the early Arabic traveller to Samudra, Ibn Battutah, who said that in A. D. 1345-46 there were several Persians among the officers of the Sultan's court. Two of them were from Shirâz and Ispahan respectively. The prevalence of Arabic instead of Persian on tombstones is readily understood, since the Muhamadan confession of faith and other pious passages, such as the "verse of the throne" were quoted directly from the Koran. Both Arabs and Persians at the time of the early propagation of Islam came from Gujerat, where Persian influence was strong and Persian was the usual language of science and literature. Some of the gravestones of Pase, according to Krom (23) are known to have been shipped from India.

Most of the harsh words for coco that have been quoted as of Semitic or Iranian origin would have had to be modified to be adopted into a Malayan language and subsequently into Portuguese. So, whether softened to our modern form by Malayans or by Portuguese, we conclude that "coco" has come down to us from originally Iranian or Semitic words for nut, and that "coconut", etymologically considered, means "nut-nut". The Near-Eastern form of not too ancient a time which most nearly approaches Greek koix, Latin cocus or coccus and the New Latin generic name Cocos is "Turkish" cox (in Cox Indi, "Indian nut") but there must have been similar forms in antiquity. Nux indica of the 16th century writers was an exact rendering of Cox Indi. So Rumphius was evidently right, and the makers of English and other dictionaries may well forget the popular etymology of the Portuguese seamen, which derived "coco" from a mask or puppet used by nursemaids to scare children. This was the view of the editors of the Century Dictionary (6) who were doubting Thomases about the popular Portuguese etymology, and said: "cocoa, coco . . . probably from Greek kouki . . . perhaps of Egyptian origin: cf. koix, an Egyptian kind of palm. The resemblance of the Spanish, Portuguese name to Spanish, Portuguese coco, a word used to frighten children, a bugbear, is probably accidental."

The scholarly Murray, however, inclined to the other explanation, which seems surely wrong, and so we find in the great Oxford Dictionary (29) the following: "coco . . . The early writers from Cosmas 545 to the 15th century knew it only as the Indian nut or nut of India; coquos (plural) is quoted first from the Roteiro de Vasco da Gama (Portuguese, 1498-9); Barbosa, 1516, has (Portuguese) quoquos; Pigafetta, 1519, has (Italian) coche, plural of coca; Oviedo 1526, Barros, 1553, Garcia, 1563, and Acosta, 1578, have coco; Correa, 1561, coquo. The Portuguese and Spanish authors of the 16th century agree in identifying the word with Portuguese and Spanish coco 'grinning face, grin, grimace', also 'bugbear, scarecrow' . . . Historical evidence favors the European origin of the name, for there is nothing similar in any of the languages of India, where the Portuguese first found the fruit . . . In English the Latinized form cocus, afterwards (as in botanical Latin) cocos, was at first used, both for singular and plural . . . . Another spelling, coker, has been used, with various modifications since about 1620 (Purchas has cokers, Burton coquer-nuts); it appears to be from 17th century Dutch koker-noot, and has long been in commercial use at the port of London to avoid the ambiguity of cocoa. The Greek words kouki and koix applied by Theophrastus, and, after him, by Pliny (cuci, coix) to certain palmaceous trees, have both been suggested as sources of the name, but without any ground, except their distant resemblance to coco."

It would hardly be fair to pass over without mention a third theory, according to which the word "coco" is of South American origin. Thus, according to the dictionary of Santamaria (39) "coco" is an Aimara word, but no evidence is presented. This author, however, accepted the theory of American origin of the coconut, advocated by De Candolle (who changed his mind), by Hemsley, by O. F. Cook and others, and therefore sought an American source for the name. Santamaria however, locates the Aimara Indians and language in the region of Lake Titicaca in high Peru and Bolivia, where there are no coconuts. It must be insisted that the geologically ancient evolutionary origin of the coconut palm is one problem, and the etymology of names for it is quite another. If as some have argued, the coconut drifted in the equatorial current from America to Polynesia, it would probably have arrived quite nameless, unless voyagers drifted with it. This discussion of where the word "coco" originated has nothing to do with the botanical affinity of the palm or its geographical origin before it was widely distributed by man, which may have been before the human race evolved. One may mention that the coconut palm is known to have been grown at Palembang, South Sumatra in the 7th century A.D., for it is mentioned by a still persisting name nyiyur in an inscription of that century deciphered by van Ronkel (50).

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NORTHERN MICHIGAN TRIP OF THE AMERICAN FERN SOCIETY

Dale J. Hagenah, Warren H. Wagner, Jr., and Kathryn E. Boydston

ARRANGEMENTS are being made for a six day field trip, August 30 through September 5, in northern Michigan to precede the meetings of the American Institute of Biological Societies at Madison, Wisconsin. The organization for the trip is as follows: Leaders: Dale J. Hagenah, 164 Westchester, Birmingham, Michigan and W. H. Wagner, Jr., Department of Botany, University of Michigan, Ann Arbor; Secretary, Mrs. Kathryn E. Boydston, Fernwood, Route 3, Niles, Michigan. Those who plan to make the trip or any part thereof should contact Mrs. Boydston, who will send a form for registration.

The excursion will cover a wide range of pteridophyte localities, stressing as much as possible rare or controversial species and unusual habitats, as these are represented in the northern Lower Peninsula, and in the Upper Peninsula of Michigan. Many of the localities to be visited will be newly discovered stations resulting from recent field work by the leaders of the trip, which have not yet been reported in the literature of Michigan botany.

The foray will begin officially at Alpena, Michigan, on Sunday evening, August 30th. Since Alpena is served only by bus transportation it is suggested that arrangements be made by those requiring transportation, and those willing to take passengers, to meet in Ann Arbor or Detroit. From either city to Alpena is a pleasant drive of about 230 miles, more than half of the distance along the shore line of Lake Huron. During the next six days the party will travel approximately 800 miles, mostly on good highways. In "off the highway" visits to fern localities, however, some "rough country" such as rocky terrain and swamps will be reached, so appropriate field clothing and suitable footwear, in particular, will be needed. The trip will be officially completed Saturday evening, September 5th, at Iron Mountain, Michigan, which is about 225 miles northeast from Madison.

Arrangements will be made for accommodations at each of our planned overnight stops. (See the detailed itinerary below.) With the exception of two nights at the University of Michigan Biological Station at Douglas Lake the stops will be either at hotels or motels. In order to be sure that each participant has accommodations, and since the trip will cover the week before Labor Day, one of the busiest weeks of the vacation season, reservations must be made as soon as possible. Meals will be in restaurants, and the Committee will not make advance arrangements. It is understood that some may not wish to participate in the whole 6-day excursion, or will be more particularly interested in one or two particular localities. So the itinerary has been precisely timed, and Mrs. Boydston must be informed about how many to plan for at each overnight stop.

All those who join the excursion should try to include the Madison meetings, September 7, 8, and 9, in their schedules. American Fern Society activities there are being arranged by Professor Herbert L. Clarke and, in addition to the Session for reports of fern studies, there will be either a Breakfast or a Luncheon, and a local foray of the Society. Further details of these activities will be published in the American Fern Journal.

DAILY ITINERARY

Sunday, August 30: Sunday evening the group will assemble in Alpena, Michigan, located on the shores of Thunder Bay, Lake Huron. A short "briefing meeting" at which the leaders will discuss the geology and botany of the areas to be visited as well as the details of arrangements for the week will be followed by a "get-acquainted" party.

Monday, August 31: After breakfast in Alpena the group will drive approximately 20 miles to the "Sink Hole" area near Leer. The sinks are large holes in the Devonian limestone formation, which is only thinly covered with drift in this vicinity. Some of the larger sinks are more than a hundred yards across and as much as 100 feet deep, and are usually wooded in the bottom. Some of the more interesting ones can be explored with only a moderate amount of climbing. Among these are the "Twin Sinks" where Dryopteris filix-mas occurs alongside beds of D. marginalis, D. intermedia, Cystopteris bulbifera, and Athyrium pycnocarpon. A large sink nearby contains heavy stands of Dryopteris goldiana, Athyrium thelypteroides, and Adiantum pedatum. Other interesting sinks are a small one where there are good patches of Camptosorus rhizophyllus; a deep one containing a colony of a curious giant woodfern, possibly a form or hybrid of D. filix-mas; and another nearby where crevices along the rim on one side contain the only known Lower Peninsula station for Asplenium trichomanes. In the fields near the sinks Botrychium multifidum is luxuriant and in great variety, so we can look into the nature of some of its "varieties."

After devoting the morning to the "Sink Hole" area we will stop in Hillman or Atlanta for lunch enroute to a locality east of Gaylord where Botrychium simplex occurs along with other grape-ferns. From this stop it is about 20 miles to Wolverine where Dryopteris clintoniana is abundant in a mucky swamp, and where there are many of its hybrids with D. intermedia. What appears to be "D. boottii" here, then, is actually not that species at all. After one more stop for a roadside examination of Selaginella rupestris in a habitat that will surprise our more southerly members, — sandy, flat soil in the jackpine country near Indian River, we will have our evening meal at Indian River or Topinabee before proceeding to the University of Michigan Biological Station for the night. (Note: Since the summer session will have terminated before we arrive, there will be no facilities for eating at the Station, and all meals will be taken in nearby towns such as Indian River or Pellston.)

Tuesday, September 1: The entire day will be devoted to the surprisingly varied flora of the Biological Station region, which includes 14 kinds of Equisetum and 11 kinds of Botrychium. The morning will be spent seeing Gymnocarpium robertianum, a rarity of Reese's Bog; Botrychium dissectum in two varieties growing with other grape-ferns and Ophioglossum vulgatum at Levi Burr's farm; the 5 or 6 species of scouring rushes (Equisetum sect. Hippochaete) at Grass Bay; and probably some gametophytes ("pin cushions") of Equisetum sylvaticum at the Burt Lake Hardwoods. After lunch we will visit the Lycopodium inundatum and Isoëtes macrospora areas at Vincent Lake, and then go over to Sturgeon Bay, Lake Michigan, to see various Lycopodium and Equisetum populations. After dinner, probably at Pellston, we return to the Station for a second night. Those who wish may take a pleasant walk along the woodland road to Grapevine Point on the shores of Douglas Lake where the rockcap fern, Polypodium virginianum, grows on a sandbank.

Wednesday, September 2: Early rising will be necessary, for we must get to Mackinaw City early, so as to avoid delay in boarding the ferry for the ride across the Straits of Mackinac. We will breakfast either in Mackinaw City or in St. Ignace, where the ferry docks in the Upper Peninsula. From St. Ignace we drive 18 miles to the roadside colonies of "pipes," Equisetum fluviatile, and common field horsetail, E. arvense. Here, on route 134, near the crossing of Pine River, there is a convincing interspecific hybrid, X E. litorale, in a large colony interspersed with its parents. About 20 miles to the northeast of this stop we will spend considerable time at the limestone outcrops near Pickford. Here, where the Niagara formation swings to the west across the Upper Peninsula, such ferns as Asplenium viride, the green spleenwort; Polystichum lonchitis, the northern holly-fern; and Camptosorus rhizophyllus, the walking-fern, grow in luxuriance. If the season has been favorable we hope to be able to observe the two somewhat controversial ferns, Botrychium minganense and B. lunaria, growing intimately together. The populations of the two species at this locality are among the finest yet known in the Upper Peninsula. Usually the two entities occur separately in this area, one on the edge of fields, the other on limestone pavements and outcrops. When we leave Pickford we shall drive straight to Blaney Park, stopping only to see the interesting Great Lakes Region endemic, Cirsium pitcheri on dunes along the lake, and such ferns as Thelypteris phegopteris and Dryopteris spinulosa var.

fructuosa at Cut River Bridge. We shall remain at Blaney for the night.

Thursday, September 3: After short stops near Manistique to see Selaginella selaginoides in the sandy marshes along Lake Michigan and a colony of Botrychium minganense, here growing as much as a foot tall, we will proceed to Munising, to the Pictured Rocks area. Among other species to be observed here are Polystichum braunii and Cryptogramma stelleri. A few miles west of Munising we will stop at Scott's Cave to see the glowing moss, Schizostega, and an interesting stand of Polypodium. From here we continue some 30 miles to the west on the scenic drive along Lake Superior to Marquette, where we shall spend the night.

Friday, September 4: Leaving Marquette in the morning we will spend at least a couple of hours exploring Sugar Loaf Mountain, and other rocky areas along the Lake Superior Shore. Woodsia ilvensis and other rock ferns are found here, as well as Selaginella rupestris in its more usual rocky habitat, by way of contrast with the sandy one seen near Indian River. Returning to Marquette, we proceed westward and then southward through parts of the iron-mining country. Among the interesting ferns in the Lake Michigamme area are Dryopteris fragrans and Botrychium lanceolatum. Near Felch Mountain we hope to observe the problematic fragile-fern, Cystopteris tennesseensis, in what may be one of its most northern stations, growing here with the northeastern variety of the fragile-fern, C. fragilis var. laurentiana.

By late afternoon or evening the group will arrive in Iron Mountain, where two nights will be spent.

Saturday, September 5: This, the last day of the trip, will be devoted to the interesting environs of Iron Mountain, where Woodsias are well developed. We shall examine stands of Woodsia cathcartiana, W. ilvensis, and W. obtusa (the latter a very rare plant in Michigan), and keep on the lookout for hybrids. Another interesting locality is the only one in Michigan where Pellaea atropurpurea and P. glabella are known to grow near each other.

The Iron Mountain area is very complex geologically and supplies appropriate habitats for a large number of ferns. Cryptogramma stelleri, Camptosorus rhizophyllus, and forms of Cystopteris fragilis are all well developed in this region. Since this will probably be a rugged day of climbing among the hills and rocks we have planned to spend the night here before leaving for Madison or home, as the participants individually decide. Those having engagements in Madison on Sunday may wish to leave Saturday afternoon.

MICHIGAN'S NATURAL AREAS COUNCIL*

William B. Hall

BELIEVING that the concept of conservation includes the protection of certain types of plant and animal environments for the benefit of present and future generations, a small group of Michigan men and women have established a functional organization whose primary purpose is to find, inspect, and recommend to appropriate land-holding agencies the preservation of certain areas of land in a natural condition. These areas are to remain as part of the living record of the variety and profusion of the resources that have made America a land of opportunity. They will be located in all parts of the state to illustrate its variety and to enable more people to understand and appreciate the living world and the complexities of ecology.

In 1949, far-seeing members of the Michigan Botanical Club proposed that some machinery be established within the framework of that club by which certain tracts of land in Michigan might be preserved by state or other agencies for protected public use and enjoyment. By June a functional group had been formed under the title, Natural Areas Committee. From its inception until October, 1951, this committee existed as an operating unit of the botanical club but included delegates of some three dozen national and state-wide cooperating institutions and organizations invited to participate, as well as a group of individual members from the club.

Any individual or group might recommend a specific site to the Natural Areas Committee by formal report. The committee would then delegate a reconnaissance committee to make a field report describing fully all natural features and characteristics of the area, including the unique or specially interesting plant and animal life, soil types, forest conditions, and geological formations. It would also suggest boundaries. This report was then returned to the Natural Areas Committee, which appointed two members from the council and one from its individual membership to serve as a site-selection committee. At the same time, two representatives were appointed by the state Department of Conservation to serve on this committee.

The functions of this committee were to visit the area as a group, decide on the boundaries of the tract to be reserved, and determine whether further action should be taken to recommend it for reservation. The decision was referred to the Natural Areas Committee, and, when approved, the report was forwarded to the Department of Conservation or other appropriate agency, for final action.

*For permission to reprint this article the Asa Gray Bulletin is indebted to Mr. Howard Zahniser, Editor of "The Living Wilderness", a quarterly publication of the Wilderness Society, in which it first appeared (No. 43: 20-22, Winter 1952-53).

Since a number of sites might be recommended over a given period, a number of site-selection committees and reconnaissance committees might be operating at any one time.

By October of 1951 the somewhat dual personality of the Natural Areas Committee, as an operating unit of the Michigan Botanical Club with an objective importance involving fields and organizations far outside the normal limits of the club, resulted in the club's deciding that the committee should become an independent organization.

Reorganization in January, 1952, provided for a recreated Michigan Natural Areas Council, but for continued operation of existing reconnaissance and site-selection committees, and the continuity of the program until a new constitution might become effective. In addition, a screening committee was established to determine whether a recommended site deserved further study, and to ensure that all reports were complete before being submitted to the council for final study.

By this reorganization, much of the ambiguity and confusion of subordination to the Michigan Botanical Club was resolved and a more smoothly running, integrated single organization was made possible.

That the efforts of the Michigan Natural Areas Council have been effective is shown by the acceptance by the state Department of Conservation of the proposed principles of special-area management and the tracts recommended for reservation. In April, 1951, the Department of Conservation approved the specific recommendations of the council for classifying four sections of Wilderness State Park: Crane Island Area and Sturgeon Bay-Sucker Creeks Area as natural area preserves, and Waugoshance Point Area and Big Stone-Cecil Bay Area as nature study preserves.

Later recommendations proposed the reservation of certain parts of the Porcupine Mountains State Park in the Upper Peninsula as nature reserves and scenic sites. In addition, the Haven Hill Nature Reserve has been proposed, including within its boundaries one large natural area preserve, one smaller natural area preserve and one nature study preserve. Also, studies are being made of the Pictured Rocks area and part of the Tahquamenon River area in the Upper Peninsula, as well as in other regions.

A Scenic Site is that kind of area which deserves reservation by virtue of its scenic value, its esthetic beauty, or its unusual character as a natural geologic feature. Its intrinsic value as an isolated site must be greater than that to be gained from alternate use or from no use. A cliff promontory, for example, can not be subjected to agricultural use, and may without effort by anyone become a scenic site unofficially. Lacking protection, however, it runs the risk of vandalism, becoming a public dump, or the repository of picnic beer cans. Under government protection, controls are possible which safeguard the inherent character of the site, provide suitable access, and prevent commercial development. Most important, the area is preserved for the people as a part of their heritage of American beauty.

A Nature Study Preserve is a land unit with significant natural history values which are preserved for nature education. This type is allowed the greatest use for public purposes commensurate with the maintenance of the natural values inherent in the area. The development of nature trails, the trailside exhibit, and the museum are examples of desired features. A service area, with parking and camping facilities, water, shelter, and lavatories adjacent to, but not in, the area, is needed. On the restrictive side the collection of natural objects even for scientific or classroom use is proscribed. Unrestrained roaming away from the trails by unconducted groups or individuals is prohibited, as well as fires, picnics, and the like.

A Natural Area Preserve is, in some respects, the most important of the three types of land unit considered. The pressure of exploitation and modification of wild land has produced a feeling of urgency on the part of those who wish to see parts of the land saved in their original state. The urgency is justifiable when there is an awareness of the great pressures to continue the exploitation of the land to the last acre without thought for the present needs and the future heritage of our children. We must save what we can in a natural state while we have it to save. There is very little left, or time in which to act, as the pressure on wild land is growing at an ever accelerating rate.

A Natural Area Reserve, a fourth and more inclusive designation, may include two or more of the others together with a "buffer zone".

The ecological concepts of the interrelationship between man and nature, between animal and plant, and the long interlocking interdependencies and needs of the animal, the plant, and the environment of each, are but incompletely known. There is only one laboratory where many of the truths of ecology may be studied. That is on the land which is permitted to live its own life, as it were, without benefit of quack-doctors and cure-all panaceas, and without the interference of man, well intentioned and economically important though the interference may be. Since man is subject to his environment he must learn to live with it. The thoughtless modification of that environment means his eventual self-destruction.

Those tracts which are classified as natural area preserves must receive complete protection in order to be maintained in a natural condition. Their protection depends to a considerable extent upon inaccessibility, since easy access complicates protection and invites disaster. They must be protected from surrounding development and from future road and air access by "buffer zones", which do not permit the core of the area to be affected by conditions outside their perimeters. They are not to be considered as "no trespass" areas, but are to be managed so as not to attract the general public on its Sunday drives. They should be open for study and research by qualified persons interested in wildlife, native fauna and flora, forestry, soils and geology. They are not for the recreation and esthetic delectation of the nature lover alone, but are also for the use of the many kinds of students of natural phenomena, as the forester, wildlife manager, soil technologist, and geographer.

These areas are not to be modified by cutting, clearing, burning, or other operations affecting individual plants and animals, or their organization into communities in a natural state. Grading, filling, drainage, dam construction, or other land operations affecting the physical and biological situations in the tract are not permissible, nor is the construction of roads, graded foot-trails, housing, camp sites, or other facilities for human use.

Questions arise at once. Protection involves not only safety from man, but from fire, insect ravages, and other hazards arising from the fact that such an island of naturalness is on a much more delicate balance than if the primitive conditions existed on an extensive tract. For example, an unnatural shortage of predators may result in over-abundance of deer with an ensuing heavy browsing pressure. Similar problems have led to the feeling that such a preserve may be opened temporarily at the discretion of the operating body for controlled hunting and fishing, for combating parasites and disease, for fire protection, and for stream improvement to ensure water quality maintenance.

In addition, the question of private in-holdings has not been adequately answered. Private agreement is temporary at best, and economic necessity may force a private owner to cut the timber on parts of his land included in a natural area. Corporation needs may require a change in the original agreements. Also, there is no legal certainty that new officials in the public land-use agencies will continue to co-operate with the Natural Areas Council and follow the management principles developed by it. This problem would not be answered by a quasi-official status granted to the council, as its efforts receive their greatest influence from being a citizens' organization.

The importance of these questions is indicated by the fact that there is still considerable doubt as to how the objectives of the program are best attained. That the program is essential, there is no doubt. And since it is a continuous one, lasting literally forever, there is no need for all the answers to be supplied by tomorrow afternoon at three o'clock. The decisions must be reached, of course, but setting aside the tracts is the hurdling of an obstacle that only a few years ago would have been insurmountable in the thinking of most people.

The people of Michigan do not have a perfect system. Yet the Michigan Natural Areas Council is one state organization which does seem to have hit on a system that will work.

VEGETATION OF THE HAVEN HILL TRACT, OAKLAND COUNTY, MICHIGAN:

Part of a Report of the Michigan Natural Areas Council to the Michigan Department of Conservation

Paul W. Thompson

THE HAVEN HILL TRACT, located a few miles east of Highland, is one of the most varied forested areas of southern Michigan. Until purchased by the State a few years ago, it formed the nucleus of the Edsel Ford Estate. It is completely fenced and occupies an area of approximately three square miles in sections 19 and 30 in White Lake Township and the eastern portions of sections 24 and 25 in Highland Township, Oakland County, Michigan. It is located between Ford and Duck Lake Roads, bounded on the north by highway M-59, and represents about one third of the five thousand acres of the Highland Recreational Area which lies thirty miles northwest of Detroit and twelve miles west of Pontiac. Thus, the Haven Hill Tract is within easy reach of one of the nation's largest cities, and the populous Michigan cities of Ann Arbor, Jackson, Lansing, Flint, and Pontiac.

Because of its central location and its unusual natural features this tract is an ideal nature study area for southeastern Michigan.

Geological History and Surface Features

The Haven Hill Tract has a varied and rugged topography. As elsewhere in the glaciated region, surface features were formed by the Wisconsin Glacier. As this mammoth ice sheet moved slowly into Michigan from the north some 30,000 years ago, it plowed and pushed before it gigantic piles of rock, clay and boulders. Later, as the ice retreated, a portion of the debris was left as moraines. Many local topographic features were formed when masses of earth, frozen into the glacial ice, were released as it melted, and much material was reworked by transport in rapid glacial streams and redeposition in lakes. The long range of wooded hills that extends in a northeast-southwest direction through the Haven Hill Area is a part of the Interlobate Moraine formed by the convergence of the Huron and Saginaw Lobes of the glacier. The swirling melt waters carried gravel from this morainal ridge and deposited it to the south as an outwash plain which is part of the more extensive Commerce Outwash Plain. Teeple Lake, to the south, lies in a shallow depression of this plain. Haven Hill Lake, in the northern section, was once a marshy pond at the foot of the glacial moraine. In 1924 Edsel Ford converted the pond into a large artificial lake by damming the stream which drained it. Scattered throughout the hills are many potholes which were formed by the melting of huge blocks of ice which had been entrapped in the morainal till.

History

Edsel Ford purchased the Haven Hill Tract in the early twenties. Previously, this land had been divided among several owners, some of whom had carried on farming activities. Among these were William and Andrew Beatty, Archie Degarmo, Jos. Skarritt, Messrs. Teeple, McNulty, Weber and Parks. Except for an occasional tree, cut for barn timbers, no lumbering operations have been carried on in the northern portion of the area during the last fifty years. In the earlier days dead trees were often removed for firewood and Mr. Ford cut a few cedars for fence posts, shortly after he acquired the property. Consequently, the wooded portion of this tract has remained almost undisturbed for at least half a century.

Mr. MacKee engaged in trapping operations in the wooded area many years ago. Mink and muskrat were the principal animals which he trapped; occasionally a raccoon was captured.

Ecology and Flora

Because of the varied terrain, the largely wooded northern portion of the Haven Hill Tract contains examples of the more common forest communities that occur in southern Michigan. Their location and relation to the terrain are shown on the vegetational map (Fig. 1). The high morainal hills are covered with oak-hickory forest in which the red and the white oak (Quercus rubra and Q. alba) and hickories (Carya spp.) are the dominant trees and the understory species are witchhazel (Hamamelis virginiana), flowering dogwood (Cornus florida), maple-leaf viburnum (Viburnum acerifolium), and the ironwood (Ostrya virginiana).

The low swampy outwash plain, encompassed by the morainal hills, supports an extensive swamp forest composed mainly of white elm (Ulmus americana), black ash (Fraxinus nigra), basswood (Tilia americana), and the moisture-loving species of hickory (Carya spp.). Associated with these are the spice bush (Lindera benzoin), leather-wood (Dirca palustris), red-berried elder (Sambucus pubens), and several species of dogwood (Cornus spp.). Many species of flowers grow in this mucky soil in the spring, such as Douglass and spring bitter-cress (Cardamine Douglassii and C. bulbosa), jack-in-the-pulpit (Arisaema atrorubens), Dutchman's breeches (Dicentra cucullaria), blue cohosh (Caulophyllum thalictroides), and the cut-leaf and broad-leaf toothwort (Dentaria laciniata and D. diphylla). The wood nettle (Laportea canadensis) and the cinnamon, royal, and maiden-hair ferns (Osmunda cinnamomea, O. regalis and Adiantum pedatum) are abundant during the summer season.

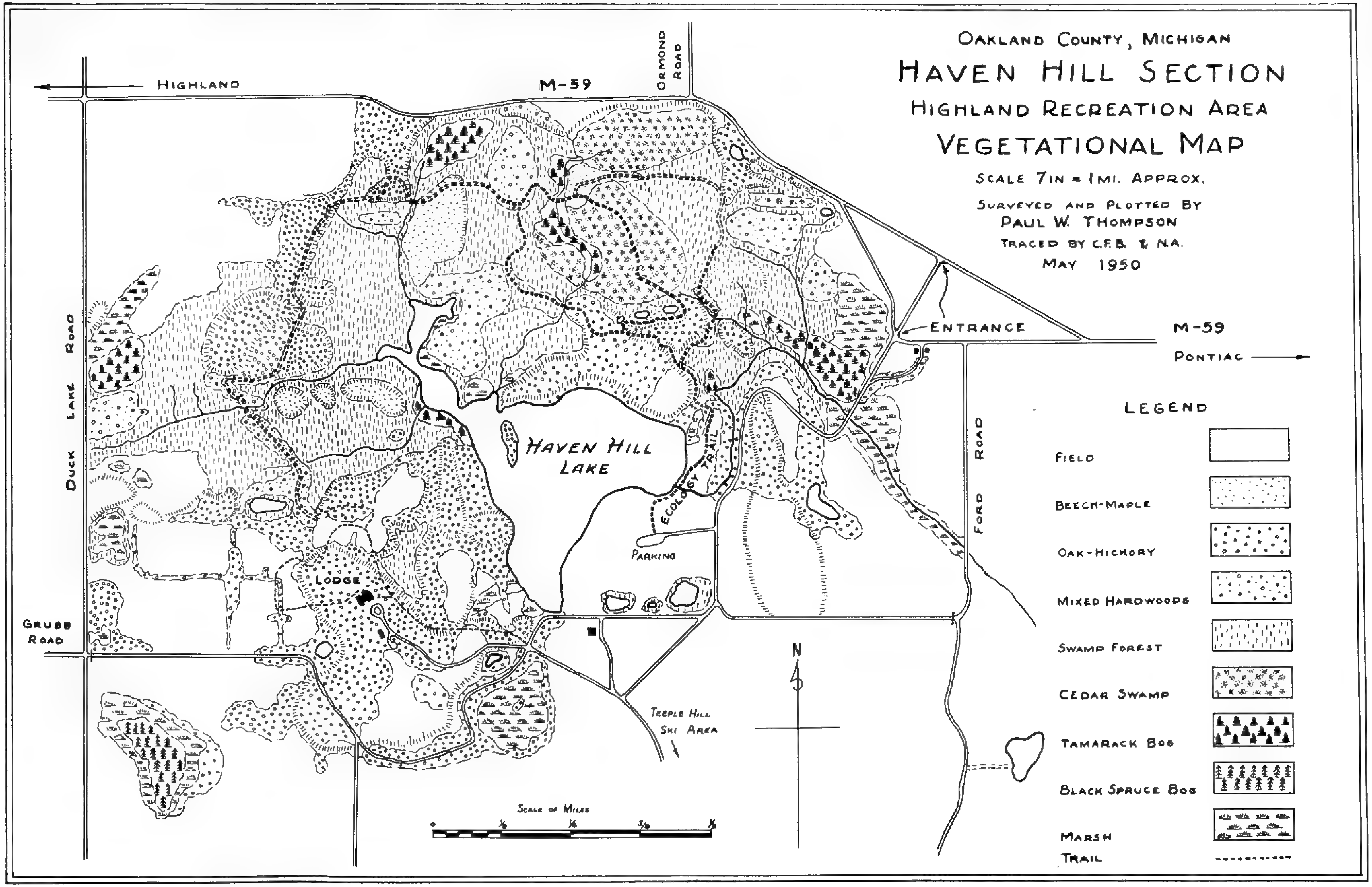

Fig. 1. Vegetation map of the Haven Hill tract, Oakland County, Michigan.

Fig. 2. Winter view of the white-cedar (Thuja occidentalis) swamp at Haven Hill, Oakland County, Michigan. One of the best southerly examples of this plant association. Photograph by Paul W. Thompson.

Fig. 3. Tamarack (Larix laricina) swamp along west shore of Alderman Lake, Haven Hill Tract, Oakland County, Michigan, 19 Oct. 1950. Photograph by Charles F. Boehler, used by permission of the Michigan Department of Conservation, Parks and Recreation Division.

Fig. 4. Black spruce (Picea Mariana) bog surrounded by a moat. This bog is near but not on the Haven Hill Tract, near the center of Sec. 32, T. 3, NR8E, White Lake Township, Oakland County, Michigan, 27 Apr. 1952. Photograph by Chas F. Boehler, used by permission of Michigan Department of Conservation, Parks and Recreation Division.

Pocketed between the protecting hills, a portion of this swampy plain is covered with a large white-cedar swamp. The boggy character of this area, resulting from slow drainage, is shown by the presence of bog iron. This community has the aspects of the Northlands; white cedar (Thuja occidentalis) and bronze-barked yellow birch (Betula lutea) are the principal tree species. Beneath the dense shade of these trees grow the red-berried elder (Sambucus pubens), swamp currant (Ribes triste), and Canada honeysuckle (Lonicera canadensis). A thick carpet of miterwort (Mitella nuda), enchanter's nightshade (Circaea alpina), and white violet (Viola pallens) form a conspicuous ground cover. On the many hummocks under the cedars one finds the shiny green leaves of the goldthread (Coptis groenlandica). The bulblet fern (Cystopteris bulbifera) and several species of the wood fern (Dryopteris spp.) are numerous. Other common plants are the dwarf raspberry (Rubus pubescens), the bishop's cap (Mitella diphylla), and the swamp saxifrage (Saxifraga pennsylvanica). In the moist areas mosses and liverworts form thick green carpets.

In the northern section of Michigan the cedar swamp, which occupies the low valley lands, is a common plant association. In southeastern Michigan, on the contrary, it is of rare occurrence, here reaching the southern limit of its range. The few stands of white cedar which are found in this area often exist only as narrow strips of vegetation bordering lakes and streams, failing to give the typical aspect of the cedar swamp of the North. Thus the preservation of a large tract of white cedar such as this at Haven Hill becomes increasingly important to naturalists.

Many of the species of plants mentioned above grow only under the conditions which are so distinctive of the white-cedar swamp. The interlocking boughs of the cedar produce a close canopy which shuts out most of the sunlight and creates a quiet, dark, shady habitat, which with its moisture and coolness, favors the abundant growth of these species. Failure to preserve such vestigial habitats results in the disappearance of many species.

In wetter areas one finds tamarack bogs in which the characteristic tree species is the tamarack (Larix laricina) with its associate, the poison sumac (Rhus Vernix). Interesting companion plants are bog birch (Betula pumila), high-bush blueberry (Vaccinium corymbosum), the bog buckthorn (Rhamnus alnifolia), pitcher plant (Sarracenia purpurea), bog shinleaf (Pyrola asarifolia), and the tufted loose-strife (Lysimachia thyrsiflora).

Scattered throughout the swampy plain are several low "islands", only a few feet higher in elevation, but covered with a very different type of forest —the beech-maple association. This is the climax forest of southern Michigan. The dominant species are the sugar maple (Acer saccharum) and the beech (Fagus grandifolia). The white ash (Fraxinus americana), black cherry (Prunus serotina), basswood

(Tilia americana), and the red oak (Quercus rubra) occur in smaller numbers. Because of the dense shade the shrub layer is quite sparse and contains principally transgressives and a few shrub species such as the shadbush (Amelanchier spp.), Canada honeysuckle (Lonicera canadensis) and the leatherwood (Dirca palustris). However, a large number of heraceous plants develop in the early spring on the rich humus of the forest floor before the tree leaves appear: spring beauty (Claytonia virginica), Canada violet (Viola canadensis), acute-leaf hepatica (Hepatica acutiloba), white trillium (Trillium grandiflorum), yellow trout-lily (Erythronium americanum), wild garlic (Allium tricoccum), yellow violet (Viola pubescens), and the broad-leaf sedge (Carex plantaginea).

Aquatic vegetation is usually found in the various lakes, ponds and streams of the area. Haven Hill Lake, artificially formed, lacks the usual shore plants, which were deeply submerged by flooding, to the present lake level in 1924 and have still not become reestablished in 1952. However, the waters are abundantly filled with such common aquatic species as coontail (Ceratophyllum demersum), wild celery (Vallisneria americana), water crowfoot (Ranunculus longirostris), yellow pond-lily (Nuphar variegatum), and white water-lily (Nymphaea tuberosa).

Teeple Lake, the only other large lake of the area, has narrow beaches and the shallow water contains rushes, bulrushes and pondweeds. Pickerelweed (Pontederia cordata) is one of the interesting species found here. Several cattail communities are found bordering ponds and lakes where shallow water conditions are suitable for the growth of cattails (Typha latifolia), the dominant species.

There are many field communities, especially in the southern portion of the Haven Hill Tract. Common plants are the Kentucky bluegrass (Poa pratensis), the long-haired hawkweed (Hieracium longipilum), white sweet clover (Melilotus alba), wild bergamot (Monarda fistulosa), the bush clover (Lespedeza capitata), early goldenrod (Solidago juncea), and the common St. John's-wort (Hypericum perforatum). It is not uncommon to see the tree and low-spreading junipers (Juniperus virginiana and J. communis) scattered over the open slopes. Invading species from the surrounding areas commonly are the staghorn sumac (Rhus typhina), blackberry (Rubus allegheniensis), chokecherry (Prunus virginiana), and aspen (Populus tremuloides). In old fields adjacent to once cultivated land, in addition to the named field species, the following are common: yellow sweet clover (Melilotus officinalis), red clover (Trifolium pratense), alfalfa (Medicago sativa), sheep sorrel (Rumex acetosella), and star thistle (Centaurea maculosa).

The range of habitats at Haven Hill offers suitable conditions for the growth of a wide variety of plants. Mr. George W. Thomson and the writer made a preliminary survey of the area in 1946, and a long list of plants was compiled. Subsequently, the writer has conducted a more complete botanical survey, resulting in enlarging the list. Over five hundred different species of plants have been discovered and identified, exclusive of members of the grass and sedge families which are now being studied. The richness and variety of the flora is evident since approximately half of the recorded flora of Oakland County can be seen in this small tract. (See Bingham's Flora of Oakland County, Michigan, Bull. No. 22, Cranbrook Institute of Science.)

Because of the large area of undisturbed woodlands, the following less common plants which require rich humus are fairly common in the Haven Hill Tract: pine-sap (Monotropa Hypopithys), Indian pipe (M. uniflora), flowering dogwood (Cornus florida) and spotted coral-root Corallorhiza maculata). The tulip tree (Liriodendron tulipifera) and leatherwood (Dirca palustris) are both quite common bordering damp ground. Ten different species of orchids have been located; these include such interesting kinds as the putty-root (Aplectrum hyemale), northern green orchis (Habenaria hyperborea), bracted orchis (H. viridis var. bracteata), and the showy orchis (Orchis spectabilis). Such rare species as the golden seal (Hydrastis canadensis) the large ginseng (Panax quinquefolius), the dwarf ginseng (P. trifolius), anticlea (Zigadenus glaucus), and purple polygala (Polygala polygama) grow at Haven Hill.

AREAS RECOMMENDED FOR PRESERVATION

The following areas of the Haven Hill Tract, (see Vegetational Map), are recommended for preservation:

Nature Reserve. The northwestern portion of the Haven Hill Tract should be designated as a Nature Reserve. The Nature Reserve is our broadest category of protected natural areas. We recommend that one large and one small Natural Area Preserve and a Nature Study Preserve be established within the Nature Reserve indicated above. The three areas are described below.

Nature Study Preserve. The easternmost section of the Nature Reserve should be designated as a Nature Study Preserve (see Fig. 1). This section is ideally suited to this purpose. It contains a variety of natural habitats, — beech-maple, swamp and oak-hickory forests, tamarack bog, white-cedar swamp, field, cattail marsh, several streams and a portion of Haven Hill Lake. The Haven Hill Ecology Trail, starting at the east side of Haven Hill Lake, is located within these boundaries. This trail was established by the Southeastern Chapter of the Michigan Botanical Club in cooperation with the

Michigan Department of Conservation. Signs along the trail point out natural features which demonstrate ecological relationships. The various species of trees and shrubs and a few of the more interesting herbaceous plants are labeled with metal tags. The trail has been used by a large number of groups such as scout troops, nature organizations, conservation clubs, hiking groups and educational organizations. Several colleges and universities located in southeastern Michigan have used this area for class studies in outdoor subjects. Deerpath Trail, through the wild northern part of this area, gives the visitor an opportunity to observe the few tall white pines, relics of earlier days. A road and parking lot just southeast of Haven Hill Lake gives access to this area.

Haven Hill Natural Area Preserve. The area directly west of the proposed Nature Study Preserve should be designated a Natural Area Preserve (Fig. 1). It incorporates all of the natural habitats which are found in the Nature Study Preserve. Since it is the most isolated portion of the Haven Hill Tract, its natural features have been disturbed very little. It includes the northwestern portion of Haven Hill Lake which has already been designated and maintained as a Wild Life Sanctuary. The isolated North Bay area of the Lake is an excellent breeding ground for wildfowl. Canada geese, mallards, black ducks and herons frequent this spot. Until the tall dead trees in the North Bay were blown down by strong winds several years ago, a small heronry existed here.

Small plots located in this section and in the proposed Nature Study Preserve are under study by the writer so that these may be established in the future as permanent study quadrats.

An old bridle path, winding along the higher ground gives access to this area.

Black-Spruce Bog Natural Area Preserve. A small but very interesting black-spruce bog is located in the southwestern corner of the proposed Nature Reserve. The cattail moat which completely encircles this spot serves as a natural protective barrier. A thick carpet of Sphagnum moss forms a ground cover in which white birch, black spruce and tamarack grow. Several northern species of plants are scattered throughout this habitat.

Acquisition Recommended of a larger Black Spruce Bog as an Addition to Haven Hill Tract. Located one half mile east and south of the intersection of Ford and Cedar Island Roads is an extensive Black Spruce Bog. One half mile in length and a quarter of a mile wide, it is one of the largest areas of this type to be found so far south in Michigan. The entire area is covered with a thick carpet of Sphagnum moss. The dominant trees are the black spruce (Abies mariana), mixed with tamarack (Larix laricina). It is of unusual value because of the occurrence of a large number of species of northern plants. These include pitcher plant (Sarracenia purpurea), creeping snowberry (Gaultheria hispidula), cranberry (Vaccinium macrocarpon), roundleaf sundew (Drosera rotundifolia), pink lady's-slipper (Cypripedium acaule), bunchberry (Cornus canadensis), and star-flower (Trientalis borealis). In the wetter spots are found marsh cinquefoil (Potentilla palustris), bog birch (Betula pumila), and leatherleaf (Chamaedaphne calyculata). The poison sumac (Rhus Vernix), bog alder (Rhamnus alnifolia), dwarf raspberry (Rubus pubens), and choke berry (Pyrus melanocarpa) are common shrubs of this habitat.

It is strongly urged that this unusual area with a suitable buffer strip be purchased, annexed to the Haven Hill Tract and designated a Nature Reserve, and that the black spruce bog be designated as a Natural Area Preserve.

Acknowledgements

Acknowledgement is made to the many persons and organizations that have aided in the survey and in the present development of the Haven Hill Area. Thanks are expressed to the leaders, representatives of scientific and conservation organizations, who cooperated in the general survey and evaluation of this Tract during May 1950 at a joint campout of the Natural Areas Committee and the Michigan Botanical Club and who, at the conclusion of this survey, enthusiastically recommended the preservation of the northern section. To members of the Southeastern Chapter of the Michigan Botanical Club, especially those who were members of the Committee on Wilderness Tracts and Trails of that organization, belong the credit for the construction and development of the Haven Hill Ecology Trail. The cooperation of members of the Michigan Department of Conservation has been of great assistance on many occasions. The wholehearted support of Charles Harris, former superintendent, and Shuman Worrell, the present superintendent of the Highland Recreational Area, has contributed much to the various activities which have been carried out at Haven Hill.

The late P. J. Hoffmaster, former director of the Michigan Department of Conservation, and members of his staff should be commended for their foresight in the acquisition of this ususual tract and for the excellent judgement which they showed in administering this area so as to utilize best its outstanding features in the interest of outdoor education and conservation.

Finally, the writer wishes to thank the members of the Reconnaissance Committee, Ralph O'Reilly and George W. Thomson, whose specialized training has been of considerable value in evaluation and selection of the areas proposed for preservation in this report and to thank Nora Altman Peisner of Ethyl Corporation and Charles F. Boehler for the excellent tracing of the Vegetational Map.

Submitted January 1952.

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THE MICHIGAN BOTANICAL CLUB

Paul W. Thompson

TO PROMOTE the conservation of native plants; to stimulate public interest in the preservation of plant life through education, knowledge and understanding; to sponsor and promote research and publications dealing with the plant life of Michigan; to preserve the flora of Michigan by the establishment of sanctuaries and the enactment of protective laws; and to support projects which advocate the wise use and conservation of natural resources and scenic features of our country — these are the aims of the Michigan Botanical Club.

It was in the spring of 1941 at the Wildflower Festival at Trout Lake in the Upper Peninsula that the Michigan Botanical Club, then known as the Michigan Wildflower Association, was founded. Organized by persons interested in the above aims, the group was soon leading the program to enact legislation which would adequately protect some of Michigan's most colorful and picturesque wildflowers whose beauty and attractiveness led to an alarming decrease in their numbers.

Several chapters were soon formed to carry on actively the program of the organization on a local scale, — one in the Upper Peninsula at Marquette, another named the Bay County Chapter with headquarters in the Bay City-Saginaw area, and Junior Chapters at Grand Rapids and then at Saginaw. During the spring of 1943, in the Metropolitan Detroit area, the nucleus of another group was formed. It later became the Southeastern Chapter, the largest and most active of the local chapters.

This group shortly organized an extensive Junior program as part of the chapter's educational program. In 1948 the Copper Country Chapter was created in the Hancock-Houghton area. For a few years the State group as a whole was known as The Michigan Association for Native Plant Protection. The present name, The Michigan Botanical Club, was selected in 1949.

Through field trips and outings during the outdoor season, and a series of illustrated lectures, conservation discussions and demonstrations during the winter, and through bulletins, the local chapters bring to a large number of persons a program dealing with all phases of plant life. Two outings are scheduled each year, one in the spring and another in the fall, at which members of the Botanical Club exchange ideas, plan future activities, and become acquainted more intimately with the natural features of different sections of the State. "Campouts" have been held at such places as Douglas Lake near the Straits, Trout Lake in the Upper Peninsula, Ocqueoc, the Conservation Training School at Higgins Lake, Clear Lake, the Waterloo Area, the Irish Hills and Island Lake, Haven Hill, Kensington Park, Walden Woods and Fish Lake in the vicinity of Detroit. Members of the Botanical Club became more intimately acquainted with the facilities and programs of such institutions as the University of Michigan, Michigan State College, Wayne University and Cranbrook Institute of Science through conducted tours. The Michigan Botanical Club has called freely upon both professional and amateur botanists, ecologists, biologists, foresters, conservationists and educators within its ranks to acquaint its members with the wildlife of the State and the problems and programs of conservation, locally and within the nation.

During the past years many activities have been carried on by the Michigan Botanical Club as a group, and individually by its local chapters. Exhibits at the Detroit Flower Show stimulated interest in plant life and brought to the public a real wildflower habitat featuring many spring flowers in bloom. For a number of years an International Nature Photography Salon was sponsored and a large number of excellent photographs of wildlife subjects, both in black and white and in color, were presented at public showings.

In the initiation of the Natural Areas Project in 1948, the Michigan Botanical Club established one of the most significant and important conservation movements within the State. The purpose of this project was to promote the establishment of areas which would permanently preserve, throughout the State of Michigan, all types of native plant and animal habitats such as sand dunes, swamps, bogs, forests, mountains, prairies, lakes, etc. Since many conservation organizations of the State were interested in this program, the Michigan Botanical Club suggested the creation of an independent organization, later to be known as the Michigan Natural Areas Council, which would more universally represent the various groups. The Michigan Botanical Club furnished from its ranks many of the persons who conducted the extensive studies and surveys required before these areas could be recommended for preservation. Among the tracts surveyed completely or now under study are portions of Wilderness Park, Tahquamenon Falls State Park, Haven Hill, Porcupine Mts., Keweenaw Peninsula, Warren Woods and Dunes, Ludington Park, Sleeping Bear Dunes, Bald Mt. Area, Proud Lake Tract and Platte River Plains.

Additional projects were the construction of an Ecology Trail at Haven Hill, designed to bring to the public an understanding of the associational plant relationships and their importance in the conservation program and related activities. A ten-day Ecology Institute, scheduled during the early summer of 1948 in the Highland area, dealt with a wide variety of outdoor topics, stressing their interrelationship. Classes in plant sociology, ecology and biology offered members and other interested persons an opportunity to further their understanding and knowledge of these subjects. The collection of a series of kodachrome slides was undertaken to be available to and utilized by educational groups. Many individual members, who are actively engaged in wildlife photography used their own collections of kodachrome pictures to present programs that contributed further to this important field of education. Currently, the Michigan Botanical Club is lending its support to the establishment, in the Detroit area, of a Museum of Science and Man, an institution which would play a very important role in presenting natural science to the public.

Individually and as a group, the Michigan Botanical Club has supported conservation legislation; aided the establishment of new sanctuaries, wilderness tracts and natural area monuments; and has assisted in the protection of our National Park System in opposition to those who would destroy it for their own selfish gains. To keep its members better informed of the many conservation activities, both local and in other sections of the country, the Michigan Botanical Club affiliated with such organizations as the Wilderness Society, the Nature Conservancy, the Wildflower Preservation Society, the National Parks Association, and the Michigan United Conservation Clubs.

Many of its members through surveys, plant collections, and special studies, have furthered knowledge of the flora and ecology of Michigan.

During the years since its establishment all of the activities of the Michigan Botanical Club have furthered the aims for which the organization was founded. Since one of the objectives is "to promote research and publications dealing with the plant life of Michigan", it is hoped that its members will in increasing numbers support the Asa Gray Bulletin, which will make a public record of its important activities.

THE SOUTHERN APPALACHIAN BOTANICAL CLUB IN 1953 *

Earl L. Core, Elizabeth Ann Bartholomew, and B. W. Wells

I. HISTORY OF THE CLUB AND ITS JOURNAL, CASTANEA

Earl L. Core

THE Southern Appalachian Botanical Club was organized late in 1935 and began the publication of its journal in January, 1936, The purpose of the Club, as stated in the constitution, was "to promote botanical interest and to disseminate information concerning the flora of the Southern Appalachian region".

Through the 18 years of its history, the Club has carried out these objectives primarily in two ways, namely, through the holding of forays and other meetings of botanists, and through the publication of articles dealing with the plants of the area. Many new species have been described, and every State in the Southeast has been treated in one or more papers. The promotion of better understanding and closer cooperation among botanists of the area is an activity that has been favored particularly by the holding of field trips, whereby a wider acquaintance with the flora may be gained while the students of the flora become better acquainted with each other.

The financial support of the Club has been aided by an annual grant from West Virginia University, plus payment of all postage charges. A large number of periodicals are received in exchange for Castanea and these are turned over to the University Library when the volumes are completed.

A regular arrangement for meetings and presentation of scientific papers has been worked out in connection with the annual assemblies of the Association of Southeastern Biologists.

Having completed almost two decades of work, the Club may now look towards the future with some degree of confidence. The journal, Castanea, is coming to have a steadily increasing circulation and is being quoted more widely. It may, therefore, be expected that the Club will be able to render still greater services to southeastern botany in the years that lie ahead.

*Continuing the policy of A. G. B. to make a record of botanical field meetings, we welcome the opportunity of presenting a group of articles assembled by Professor Core, about the activities of the Southern Appalachian Botanical Club, especially emphasizing cooperation with the Association of Southeastern Biologists in one of the forays, which will continue, we hope, to be an important feature of the annual assemblies of these organizations. Other contributions of a similar nature will follow. We believe that the separates will be valued by the participants in such meetings as mementos of especially interesting and interesting experiences. — Eds.

II. Distribution of Herbarium Specimens of Southeastern Plants

Elizabeth Ann Bartholomew

A PLAN for activating interest in making and distributing good herbarium specimens has been proposed for botanists of the Southeastern United States and for others who can supply species that enter the southeastern flora or are closely allied. The plan, as originally presented to the members of the Southern Appalachian Botanical Club, and as now extended to a geographically wider group, the readers of the Asa Gray Bulletin, follows:

The first step is for you to send me as large a list as you can of the interesting flowering plants and ferns that you will be able to collect in reasonable quantity, without damage to habitats of rare plants, during the coming season. "Interesting" will be construed in the broad sense and is meant only to exclude weedy, widely common, or otherwise undesirable material. Although emphasis will be placed on the southeastern flora, that is, south of the Ohio River and east of the 100th meridian, plants from elsewhere will be acceptable if they have some bearing on southeastern species. For example: if a species is represented only by a variety in the southeast, the typical form will be welcomed; or critically close relatives of southeastern plants will be eligible. Examples of interesting plants would be newly described species or varieties, plants from extremes of range, plants from their type localities, localized or poorly understood species.

Upon receipt of your list, I shall select a few species to be collected, and let you know the number of sheets of each to collect. This number will be determined by the number of persons who participate. If thirty botanists indicate intention to cooperate and a selection of three species is made from each list, then you will be notified to collect enough material for 45 sheets of each of your three species. When dry, these specimens are to be sent to me, and I shall sort them into sets, submit critical species to specialists, have suitable labels prepared, and send you, postage prepaid, a set of 90 interesting, authoritatively determined plants.

The 15 extra sets will be used in part to cover breakage and as recompense for expert determinations; the remainder will be offered for sale to defray printing and mailing charges. Any profit realized will be credited to the account of the Southern Appalachian Botanical Club.

The following stipulations will govern acceptance of specimens: good, normal material only is to be gathered, carefully arranged, pressed, and well dried. Ample material for generously filled sheets should be taken. Collections should be made at the time that the specific (or varietal) diagnostic characters are best displayed. Roots are to be carefully cleaned. Precise and full data should accompany all collections. In short, good, usable, attractive herbarium material is expected.

The advantages of the foregoing plan are:

1. It is flexible. Any number of contributors can participate, and any number of species, depending on the least that can be supplied by any collector, can be distributed.

2. The short period between collection and distribution. All of the summer's collection will be distributed during the coming winter.

3. The small number of extra specimens required. Fifteen is believed to be the minimum commensurate with economical operation, and is, in fact, much lower than usually required.

Arrangements for participation in the distribution may be made by addressing the Secretary, Southern Appalachian Botanical Club, Department of Biology, West Virginia University, Morgantown, W. Va.

III. FORAY INTO THE NORTH CAROLINA COASTAL PLAIN, April 18-19, 1953

B. W. Wells

Following the joint spring meeting of the Association of Southeastern Biologists and the Southern Appalachian Botanical Club, a field excursion was conducted on April 18, 1953, by B. W. Wells and Steve G. Boyce from the meeting place at Chapel Hill, N. C., to Fort Fisher on the sea coast below Wilmington, N. C. Fifteen cars were in the convoy which was in immediate charge of a Highway Patrolman who saved the party much time by the elimination of traffic light stops in the cities. Opportunity for collecting was given at all the stops. The following log is taken from the statement accompanying the map furnished each member of the party. (See Fig. 1.)

Rolling Sandhills, Harnett County. The uppermost of the sea terraces called Brandywine is characterized by extensive coarse sands laid down on Patuxent rocks of the Cretaceous, covered by the typical longleaf pine, turkey oak and wiregrass community characteristic of all coarse sands in the North Carolina coastal plain. Pyxidanthera brevifolia is endemic. (Fig. 2.) Xerism follows from low nutrient as well as low water holding capacity. Shrub bog occurs on lower slopes of hills maintained by water spilling over rim of elevated Cretaceous clay layer buried under the Pleistocene loose sand mantle.

The strict vertical leaf orientation of the juvenile turkey-oaks (Quercus Catesbaei) was observed, a proved adaptive character to the extreme xeric habitat. (Fig. 3.)

Attention was called to the Albrecht correlation of low calcium with high leaf fiber which obtains in the acid-soil coastal communities. The high fiber in turn is to be correlated with the high fire incidence in the coastal plain (10 times that of the piedmont and mountains). A diagram was shown setting forth the "vicious circle" of factors operating which keep the great sandhill areas dominated by the worthless scrub turkey-oak.

White Lake, Bladen County. (Lunch). A huge artesian-fed lake, developed in one of the numerous "Carolina Bays" is of probable meteorite origin, and notable for the extreme clarity of its water. It is 1.8 miles long; maximum depth 10.6 ft. (Frey). Non-inhabited shore-line of northwest side is an eroding bog margin. The visit here provided an introduction to the "Carolina Bay" problem.

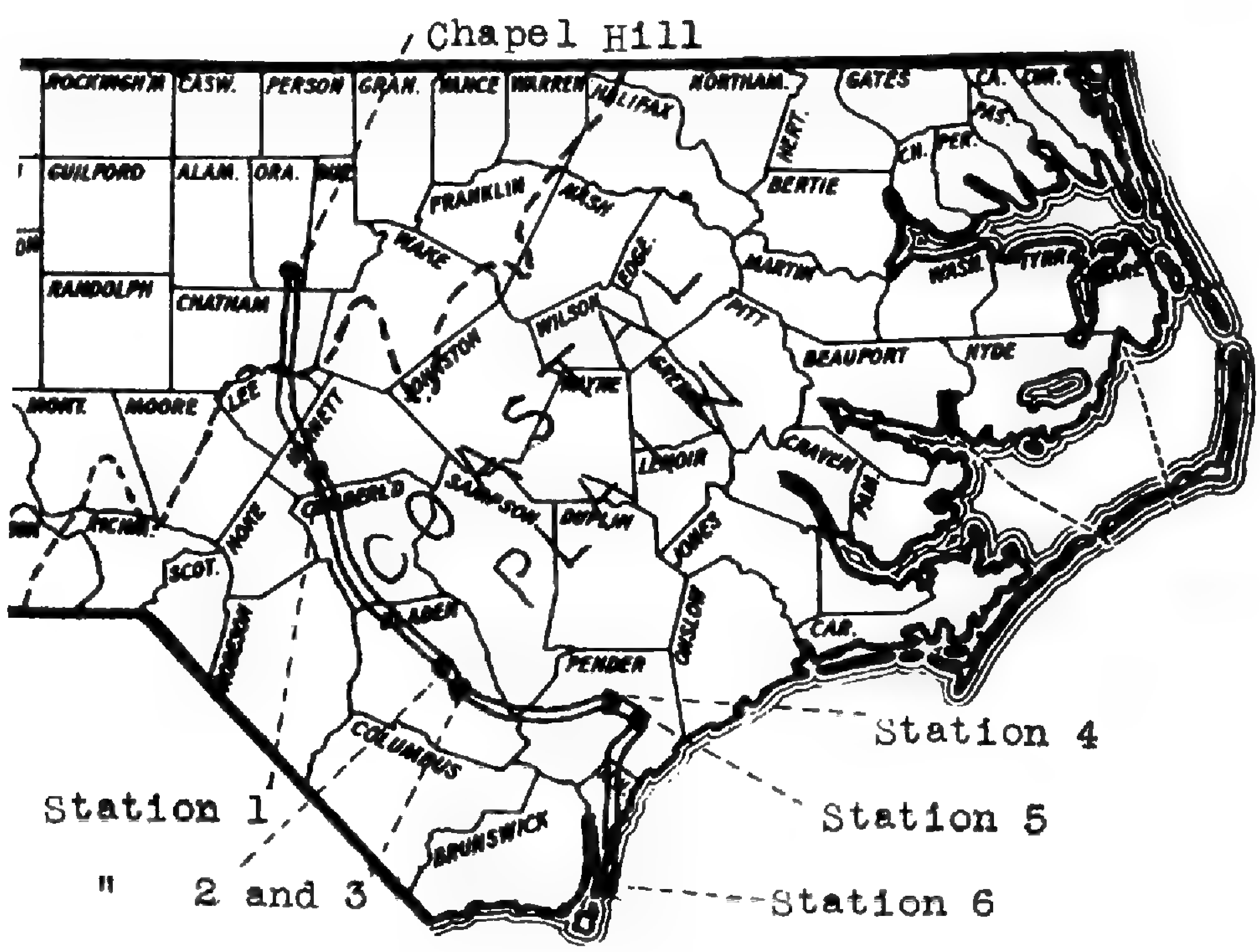

Fig. 1. Eastern North Carolina showing route of the Foray.

The Carolina Bays are elliptical shallow depressions with parallel axes ranging from a few hundred feet to seven miles in length. They occur by thousands on all the coastal plain terraces except the lowest (Pamlico). The vast majority of them are filled with peat and are dominated by evergreen shrubs similar to those seen at Holly Shelter Bay. Evidence is rapidly accumulating which will prove them to have been formed catastrophically by a great shower of meteorites.

Singletary Lake, Bladen County. A dark-water lake in a Carolina Bay, 1.5 miles long, maximum depth 11.8 feet (Frey). High organic detritus of the lake has resulted from increased erosion of the bog margin since a dam was installed which brought about loosening of the upper bog root layer from peat beneath. Bay lakes such as this are believed to have originated in fire-made depressions modified by lateral erosion and subsequent detritus disintegration. Based on evidence of buried peat in Blythe Bay near Wilmington, the meteorite-made depressions are believed to be at least 200,000 years old.

A State Park is maintained here and was an ideal place for the luncheon stop-over. The very dark water results from the constant erosion of the peat mass in the northwest end of the lake which has been going on for many millenia. The most remarkable feature of the dark water lakes is the complete absence of aquatic and marsh vegetation. No peat forms in them to replace that lost by erosion and disintegration.

Fig. 2. Endemic Pyxidanthera brevifolia Wells, in sandhills near Spout Springs, N. C.

Big Savanna, Pender County. Upland fifteen-hundred-acre fire area, a climax stabilized as seen for 100 years. The present vegetation was preceded by a cane brake and that by a swamp-gum forest with peat cover. Relict swamp gum trees are still present, with decumbent trunks. The soil is Portsmouth fine sand, non-draining below. Plants are adapted to water logging (wet seasons) and extreme drouth (dry seasons). About 100 species of herbs are represented. Thousands of acres in the southeastern coastal plain have gone from swamp forest (gum, white-cedar, cypress) through shrub-bog to highly stabilized fire-climax savanna. Prehistoric Indian fires were heavily involved in the beginning of such savannas.

The dominant plant is the grass Ctenium aromaticum. Associated with it are Panicum ensifolium, P. longiligulatum, Rynchospora

Fig. 3. Juvenile turkey-oak (Quercus Catesbaei) showing vertical orientation of the leaves. Sandhills near Spout Springs.

Chapmanii, Scleria ciliata and the relict Arundinaria. The numerous species of wild flowers and their abundance make it, where not disturbed, one of the most notable wild-flower areas in the eastern U. S. Something is in bloom throughout eleven months of the year. The earliest is Thyrsanthema semiflosculare and the latest is Aster elodes.

Of especial interest are the relict trees of Nyssa biflora and Magnolia virginiana. These consist of short, spreading, fire-repressed trunks partly buried in the dark soil, bearing at their blunt ends many vertical shoots which, projecting above the herbaceous cover, resemble shrubs. These shoots are renewed every year in response to the annual fires. The trunks below grow only by the slight increment made where these shoots are organized at their blunt ends. These relict trees are known to be well over a century old and maybe many centuries. No recent establishment of either of these trees has ever been observed.

Holly Shelter Bay, Pender County. A large shrub-bog fire-climax bay, peat-filled, 12 x 15 miles in area, located in an ancient elevated estuary cut off by the banks of the Penholoway Sea. There are eroded Carolina Bays in it. Cyrilla and Zenobia are the dominant shrubs with

22 others present. The area was formerly in swamp forest, as indicated by huge relict stumps. Fire has removed many feet of peat. In wet seasons large sections are under open water. The plants are adapted to extreme seasonal fluctuation of water table. Albrecht's "low Ca-high fiber" theory is applicable to this community and the preceding.

Salt-spray Climax at Fort Fisher, New Hanover County. This is the site of a famous fort, most of which has been destroyed by the rapid wave erosion associated with the N. E. storm winds. Droplets of sea water, carried by the wind, are deposited on the seaward side of the dune plants, causing the death of terminal shoots and resulting in the characteristic "espalier" form of the shrubs. Chlorine-induced hypertrophy of exposed shoots accounts for the increased succulence of dune plants other than grasses. The latter structurally prohibit the entrance of salt. The dominant species, Uniola paniculata, Myrica cerifera, Ilex vomitoria, and Quercus virginiana, are confined to definite zones according to their tolerance of salt spray. Wind, except as a carrier of salt spray, is of little significance in determining composition, form and zonation of the dune vegetation.

The high dominance of Cyrilla and Zenobia (32% and 28% respectively) is due to their ability to regenerate after fire which may destroy the peat soil. Cyrilla readily produces shoots from the roots and Zenobia from its deeply buried rhizomes. Next in order of dominance is Lyonia lucida (7%) and then ranging downward are Gordonia Lasianthus, Ilex glabra, Gaylussacia frondosa, Clethra alnifolia, Ilex coriacea, Arundinaria tecta, Vaccinium virgatum, and Chamaedaphne calyculata. Frequent and obstructing progress in the shrub mass is the bamboo-vine (Smilax laurifolia).

A remarkable feature of the shrub-bog species is the convergence noted among them as to leaf shape and texture. The leaves show only minor variations from the elliptical shape so prominent in the bamboo-vine, just mentioned, and like it are more or less coriaceous.

These shrubs have two origins: those species which have apparently split off from older mountain ones (Clethra alnifolia from C. acuminata) and those regional monotypes which are of sub-tropical distribution (Cyrilla).

The zonation of life forms related to salt spray intensity is notable here but excellent examples of the asymmetric growth response of the woody plants may also be observed. In the high intensity zone Uniola paniculata dominates. Tolerating the medium intensities are the shrubs, Myrica cerifera, Ilex vomitoria, Baccharis halimifolia and the one broad-leaved tree, Quercus virginiana. A wide range of species including Pinus Taeda is to be observed in the transition low intensity area. Well known in the high zones are a few coriaceous to

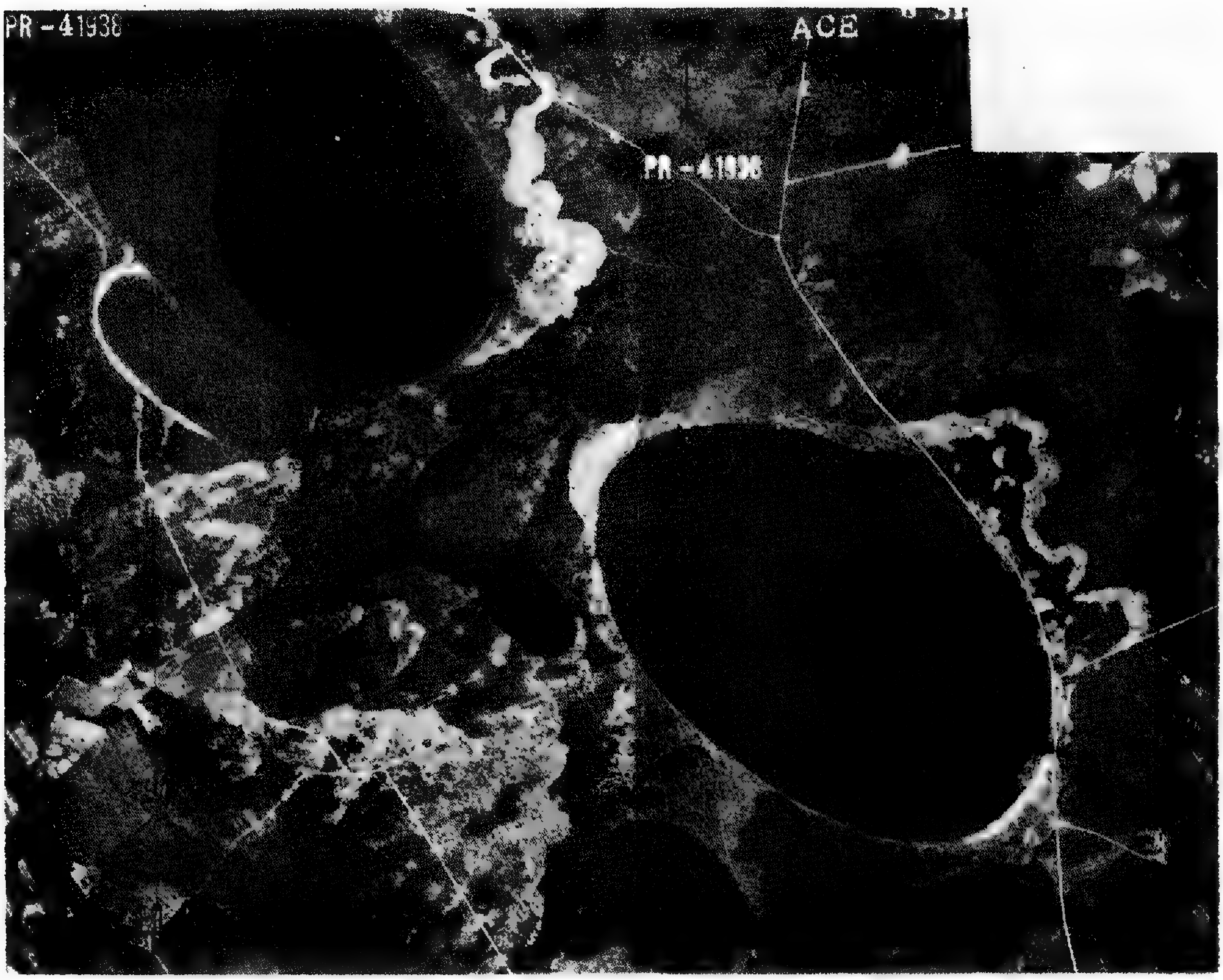

Fig. 4. Carolina bay lakes (Salter and Jones) of dark water type with eroding bog margins. Bog area covered with evergreen shrub complex, a fire climax preceded by swamp forest.

fleshy-leaved herbs. Boyce has recently shown that the degree of fleshiness is to be correlated with the amount of salt entering the leaf through breaks in the cutin, inducing hypertrophy in the leucoparenchyma cells. On the same Iva shrub the seaward leaves may be twice as thick as the protected landward ones.

The familiar asymmetrical shape of the seaside shrubs is due wholly to the salt killing of branches on the exposed side, the landward protected branches keeping the growth going leeward.

Wells and Shunk (Science, 1937) called attention to the major role played by salt spray in modifying the form of seaside shrubs, an asymmetry previously ascribed to wind. Later (Bull. Torr. Bot Club, 1938, 1939) the zonation and leaf injury pattern were described and the salt spray live-oak climax forest recognized.

Steve G. Boyce led the discussion at Fort Fisher presenting much new data from his doctoral thesis which has done much to clear up the problem of the adaptations to the high-salt environment. Boyce also worked out the origin of the salt-spray particles finding they are thrown in the air from the bursting bubbles from white caps and spume.

Following Boyce's discussion at Fort Fisher which was given on Sunday morning the 19th, the foray broke up. The leader wishes to express appreciation to Mr. Tom Moore, Patrolman, who saved the party hours of time in transit, and recommends the use of such patrol service whenever it can be obtained.

The foray party was made up of the following: Steve Boyce, State College, Raleigh, North Carolina; F. R. Burleson, Virginia Polytechnic Institute, Blacksburg, Virginia; E. C. Cocke, Wake Forest College, Wake Forest, North Carolina; H. T. Cox and wife, Virginia Polytechnic Institute, Blacksburg, Virginia; Dorothy L. Crandall, Randolph Macon Woman's College, Lynchburg, Virginia; Tom Daggy, Davidson College, Davidson, North Carolina; J. A. Doubles, Birmingham-Southern College, Birmingham, Alabama; Wilbur H. Duncan, University of Georgia, Athens, Georgia; Richard E. Garth, Emory University, Georgia; Netta E. Gray, Agnes Scott College, Decatur, Georgia; James W. Harden, University of Georgia, Athens, Georgia; John Haesloop, University of North Carolina, Chapel Hill, North Carolina; L. K. Henry and wife, Carnegie Museum, Pittsburg, Pennsylvania; J. D. Ives, Pinebluff, North Carolina; Herman Kurz, Florida State University, Tallahassee, Florida; Elizabeth League, University of North Carolina, Chapel Hill, North Carolina; Herbert A. McCullough, Howard College, Birmingham, Alabama; Fred H. Morris, University of Tennessee, Knoxville, Tennessee; Lois A. Nicholson, University of Tennessee, Knoxville, Tennessee; J. Elbert O'Connell, University of North Carolina, Chapel Hill, North Carolina; F. S. Orcutt, Virginia Polytechnic Institute, Blacksburg, Virginia; Paul M. Patterson, Hollins College, Virginia; Jane Philpott, Duke University, Durham, North Carolina; Robert B. Platt, Emory University, Georgia; A. E. Radford, University of North Carolina, Chapel Hill, North Carolina; L. W. Roberts and wife, Emory University, Georgia; Royal E. Shanks, University of Tennessee, Knoxville, Tennessee; L. R. Wyatt, University of North Carolina, Chapel Hill, North Carolina; Carroll Wood, University of North Carolina, Chapel Hill, North Carolina; Lillian Youngs, University of North Carolina, Chapel Hill, North Carolina.

IV. THE SPRING FORAY AT NUTTALLBURG, WEST VIRGINIA

Earl L. Core

As a tribute to the memory of Lawrence William Nuttall (1857-1933), mine operator and amateur botanist of Fayette County, West Virginia, a pilgramage was made to his old botanical collecting grounds on April 24 and 25, 1953. The group met at the Nuttall High School, at Lookout, on the evening of the 24th. Earl L. Core gave a brief account of the life and work of Mr. Nuttall, and exhibited a specimen from the Nuttall Herbarium, now a part of the Herbarium of West Virginia University. The specimen represented Carex Fraseri, an interesting discovery by Mr. Nuttall, and was collected on April 22, 1892, at "K. C.", which, local residents were quick to point out, meant nearby Keeney's Creek. Professor Core also announced the naming of a trail in the West Virginia University Arboretum for Mr. Nuttall. Mr. William Leeson, director of the Arboretum, gave an illustrated kodachrome lecture on wild flowers of the region. Greetings were presented from Mr. Nuttall's son, John Nuttall, of San Diego, California.

Next morning the party proceeded down Keeney's Creek, rediscovering Carex Fraseri and noting many other interesting plants, including an abundance of Halesia carolina in full bloom, near its northern limit in the Appalachians. In the deep canyon of the New River the party came to the Nuttall Station and the Nuttallburg Post Office, at the center of the ghost town which was once the site of the mining operations of Mr. Nuttall. Mr. H. B. Tully, of Edmond, who was the local guide, told many interesting stories of Mr. Nuttall and his times, and pointed out the sites of the old Nuttall home and of the old general store.

Among those making the trip were Floyd Bartley, Circleville, Ohio; Donald McBeth, Kingston, Ohio; C. T. Shackelford, Fayetteville, Ohio; Mrs. W. K. Kouns, Lookout, W. Va.; Mrs. R. L. Hughes, Oak Hill, W. Va.; Ada Hash, Lookout, W. Va; H. L. Morrison, Oak Hill, W. Va.; J. V. Holliday, Lookout, W. Va.; H. B. Tully, Edmond, W. Va.; J. Hyanes Miller, Fayetteville, W. Va.; William M. Leeson, Morgantown, W. Va.; E. Meade McNeill, Athens, W. Va.; Mrs. Clifford Allen, Fayetteville, W. Va.; Mrs. G. W. Bock, Fayetteville, W. Va.; John A. Goodno, Huntington, W. Va.; Ed. Goodno, Huntington, W. Va.; Mrs. John Goodno, Huntington, W. Va.; Blanche Thompson, Russellville, W. Va.; Mrs. Evan McKovr, Lookout, W. Va.; Earl L. Core, Morgantown, W. Va.; Elizabeth Ann Bartholomew, Morgantown, W. Va.; Ruth E. Geib, Bethany, W. Va.; Wilma Shaner, Bethany, W. Va.; H. A. Davis, Morgantown, W. Va.; Tyreeca Davis, Morgantown, W. Va.; Dorothy Parker, Beckley, W. Va.; Susan Parker, Beckley, W. Va.; Mary Ann Stover, Beckley, W. Va.; Joann Danko, Beckley, W. Va.; Bettina DePaulo, Beckley, W. Va.; and L. Bertram Rupert, Nuttallburg, W. Va.

V. THE NEW STATE FLORA OF WEST VIRGINIA

The first part of an illustrated "Flora of West Virginia", by P. D. Strausbaugh and Earl L. Core, was published by West Virginia University in 1952 and the second part is now in press. Two other parts, to complete the project, are in preparation and it is hoped they can be published during the next biennium.

This "Flora", treating the approximately 2000 species of vascular plants found without cultivation in the State, is the product of more than a quarter of a century of cooperation by the authors in field, herbarium, and library studies. It also represents the result of collections made by numerous botanists within the State, and careful studies made of specimens in the University Herbarium by monographers of numerous groups, especially the more difficult ones. An attempt has also been made to cite all pertinent literature dealing with the floristics of the State.

Each species is dealt with in a paragraph that covers the principal morphological features, blooming dates, ecological data, and detailed distributional records. In some cases economic data are also presented, and facts of a local nature are often included. A pen-and-ink drawing of each species is also given, in most instances on the page facing the description.

The first part covers the pteridophytes, gymnosperms, and monocotyledons, with 273 pages and 576 sketches. Part 2 includes the dicotyledons to the end of the legumes and will embrace about 300 pages. The pages will be numbered consecutively throughout the various parts and it is expected that the entire work will include around 1000 pages.

Keys are given to separate genera in the families and species within the genera. A general key to distinguish families will be published later and may be bound at the beginning of the work. A comprehensive index to the entire work will appear at the end of the publication program.

SYRUP FROM THE SAP OF VARIOUS TREES

Clarence R. Hanes

THE MAKING of maple syrup has always been a pleasant occupation with plenty of hard work thrown in. I shall not dwell on the details of syrup or sugar making since most people are familiar with the several operations around a sugarbush, — the tapping of the trees, the collection of the sap, and its evaporation until it has reached the proper consistency for syrup or for maple sugar.

The trees that are usually tapped are the rock maple, *Acer saccharum*, and the black maple, *A. nigrum*. As far as we could discover during our 20 years of experience there was little difference in the quantity or the quality of the sap of these two species. Individual trees of the two kinds varied in the sweetness and the amount of sap. Also individual trees, apart from exposure to the sun, differed in the time of the season or the time of the day when the sap began to flow.

Other maples which yield a sweet sap are the red maple, *A. rubrum*, the silver maple, *A. saccharinum*, and the box elder, *A. Negundo.* These, however, are not commercially profitable.

I remember a friend telling me many years ago of making syrup from the black walnut and also of tapping a yellow birch for drinking water when he was cutting wood in a tamarack swamp.

This friend had a habit of experimenting and finding things out for himself. Some considered him queer but we enjoyed his original ideas and inventions. For example, when he was cultivating corn and found the gophers had been doing a great deal of damage, he would pull hairs from the tails of his horses and set nooses at the gopher holes to catch the destructive pests.

In the early 1930's while we were boiling down the maple syrup, I remembered his story about making syrup from the black walnut, *Juglans nigra.* So pails were hung on two tapped trees. It was not long before the story was spread about that Hanes did not know the difference between a maple and a walnut tree. From this experiment we learned that, whereas the flow was less, it took about the same amount of sap from the walnut as from the maple to produce a gallon of syrup, i. e. around 40 gallons. Its quality was inferior to that of the maple. It was sweeter but did not have, contrary to what might have been expected, any flavor that could be associated with walnut bark or shucks.

In the spring of 1933 Dr. Edgar Anderson was living at Schoolcraft very near to the evaporator house and was interested in the walnut syrup. We sent him a small bottle after he had returned to the Arnold

Arboretum. Members of the botany staff at Harvard University were treated to this unfamiliar product of the walnut tree.

In Edible Wild Plants by Fernald and Kinsey, we read under the heading Sycamore, Platanus occidentalis, the following: "Waugh stated that the Abenaki used the sweet sap for preparing syrup and sugar". Our experience with this tree did not bear out the statement made above. A pail, with cover, was hung on a large tapped sycamore and after ten days we gave up since during that time not a drop of sap was found, although meanwhile the flow from maples had been abundant.

Testing the yellow birch, Betula lutea, was more successful. Two covered sap buckets were hung on trees of medium size in the middle of March, 1946. These trees gave six quarts of sap over a period of 18 hours. When boiled down to a somewhat thin syrup there was less than a half cup. The syrup had a slightly bitter taste. Its flavor could not be recommended. The sap of the birch comes more slowly than that of the hard maples and has such a low sugar content that we estimated more than 100 gallons would be required for a gallon of 11-pound syrup.

The product from the hickories is a different story. The two species with which we have dealt are the bitter hickory, Carya cordiformis, and the small-fruited species, C. ovalis. When the drops of sap from the maples almost formed a small stream, minutes of watching for a drip from the spile in the hickory was never rewarded, but at the end of several days we found on the bottom of the pail not sap, but a small amount of thick syrup, very pleasant to the taste.

Once in March I was fortunate in coming across the stump of a recently cut hickory on which the perimeter was thick with a delicious syrup, which had not yet been discovered by insects. Another time I noticed some hickory logs which had been piled for shipment near the Grand Trunk railway tracks. They had circles of large granules of sugar that had come out on the ends of the logs.

It has been interesting to have made these experiments near my home at Schoolcraft, Michigan, on several genera of trees. They have shown why Acer, the genus to which the maples belong, is pre-eminently with us as it was with the Indians, the source of our most delicious syrup.

THE DEATH OF CHARLES C. DEAM—The sad news has come of the death of Mr. C. C. Deam at Bluffton, Indiana, on 29 May 1953, only a few days after the death of Mrs. Deam. Their loss is deeply felt by many friends, one of them the writer of this note, who has prized their friendship for over half a century. The late Professor Ray Friesner began collecting letters and other materials for a biography of Mr. Deam a number of years ago, but how far the writing progressed we do not know. —H.H.B.

VOLUME II OF THE "FLORA DE CUBA" [REVIEW]

Grady L. Webster

THIS BOOK, the continuation (with the assistance of Brother Alain) of Brother León's Cuban flora, is issued unbound but in a colorful paper cover showing royal palms silhouetted against the Cuban landscape. The treatments of a number of difficult groups have been contributed by specialists: Peperomia by Truman G. Yuncker, Coccoloba by R.A. Howard, and Pilea by C. V. Morton; Dr. J. T. Roig and Ing. Julian Acuña of the agricultural experiment station at Santiago de las Vegas contributed the Phytolaccaceae, Lauraceae, Simarubaceae, Meliaceae, and Ficus. The first volume of the flora, comprising the gymnosperms and monocots, was published by Brother León in 1946; the third volume, covering the remainder of the Polypetalae, is in preparation and Alain (Contr. Mus. La Salle 11, 1952: 12, 1953) has already presented his observations on new taxa in the families Euphorbiaceae through Myrtaceae.

The present volume is executed on the same plan as the first. Unfortunately, however, the list of new binomials published has this time been omitted. This feature should be restored in subsequent volumes if the new names can not be published elsewhere. The illustrations will be of considerable assistance to the user but are of very unequal value. Many of the photographs of herbarium specimens scarcely represent the plants well enough to justify insertion. On the other hand, the photographs of living plants such as Peperomia, Ravenia, and Spathelia do much to enliven the work, and could well replace the stereotyped drawings of such weedy species as Chenopodium album and Lepidium virginicum. There is a mistake on page 409 which should be noted: a photograph of a specimen of Simaruba glauca has inadvertently been labelled Bursera glauca.

The format of the book suffers from the fact that the Flora has to perform double duty as a local flora of Habana province and as a general flora of the island of Cuba. In the treatments of most groups the species occurring in Habana province are keyed out and listed separately from those which do not enter Habana province. This means that if the user is not sure whether his plant is a "Habana" weed or an Oriente endemic he will have to try it in both keys; and in a genus like Cassia, where there are 16 "Habana" species and 42 "endemic" ones, this can be a serious handicap. Furthermore, the keys to the "endemics" are of a synoptic rather than dichotomous type, and the descriptions are usually so abbreviated that in the large genera it may be well nigh impossible to reach a decision.

The authors themselves have not remained unaware of this difficulty, and in the forthcoming volumes are, we understand, going to adopt a new style in which the species of Habana province will not be set off from the others. This seems a wise decision, for the violation of consistency in treatment will be more than compensated for in the increased utility of the work. Probably the best solution to the problem would be to issue a small handbook specifically for the flora of Habana province, if this could be done inexpensively and without great trouble. The space saved in the larger work might well be utilized to include more complete citations for the species such as reference to descriptions by Urban in the Symbolae Antillanae, etc. Or perhaps such citations could be brought together in an up-to-date checklist; this would be a valuable adjunct to the Flora.

In evaluating the work of León and Alain (which is based on a manuscript flora compiled by Britton, León, and others), it should be kept in mind that a flora such as Fernald's or Gleason's for the northeastern United States can not yet be expected for Cuba. The magnitude of the task that remains may be estimated from a glance at the table at the end of the volume, which indicates 276 genera and 1139 species for the families treated. The same series (Amentiferae through Meliaceae) in the eighth edition of Gray's Manual includes 339 genera and 1744 species, but this total is excessively swollen by numerous microspecies of Rubus and Crataegus. Taking into account the large number of escaped and exotic European species in Gray's Manual, the number of strictly native species may be more fairly compared to the Cuban total; these include 1313 species in 262 genera. Approximately the same ratio holds in the monocots, and when one recalls that a considerable number of taxa remain to be described from Cuba it seems safe to say that the spermatophyte flora of this island must be about as large as that of all the vast area included in Gray's Manual. Since the Cuban pteridophytes must number several hundred, one can agree with Brother León in his estimate of about 6,000 species for the vascular flora of Cuba; the final number may prove to be closer to 7,000.

However, since the death of that indefatigable pair, Urban and Ekman, in 1931, relatively few professional botanists other than Brother Leon have spent much time on the flora of Cuba. Brother Alain, Brother Marie-Victorin, and Dr. R. A. Howard have been the chief additional workers. More intensive collecting, particularly in Las Villas, Camaguey, and Oriente, is highly desirable; but the greatest present need is for critical revisions of characteristically Cuban and Antillean groups, to make possible accurate determinations and therefore ecological and evolutionary studies, which are still almost untouched fields in Cuba. Insofar as the Flora de Cuba provides stimulation for further research and more critical study its authors have earned the gratitude and appreciation of other botanists.

Flora de Cuba, por el Hermano León y el Hermano Alain. Vol. 2. Dicotiledoneas: Casuarinaceas a Meliaceas. Contr. Occ. Mus. Hist. Nat. Colegio de La Salle 10. 456 pp., frontisp., 171 figs. P. Fernandez, Habana. 1951. $5.50. Obtainable from the authors at the Colegio de La Salle, Vedado, Habana, Cuba.

NEWS ABOUT BOTANISTS AND THEIR PLANS FOR THE SUMMER OF 1953

ONE of the difficulties of editing such a semi-popular journal as the Asa Gray Bulletin is to keep it largely readable and likewise largely of record value. Even within the first year there was evidence that many subscribers and readers were reluctant to send as much personal news as we want, and must have if the Bulletin is to serve largely as a substitute for the private correspondence that most busy botanists neglect. So a few weeks ago we circulated a questionnaire asking for news notes, which brought a fairly good response. If readers who have not contributed enjoy the little budget of news that follows they should overcome some of their undue modesty and contribute to the next issue without needing stimulus from the editors.

One question asked on the questionnaire was designed to suggest that individual subscribers not wishing to keep a set might well pass the A. G. B. along to some library, thus insuring the preservation of a few more complete sets than our present distribution to institutions will provide for. The supply of Vol. I no. 1 is now almost gone. That issue was largely wasted by being sent out as sample copies, and since our total edition is only 350 copies, we shall soon be unable to supply full sets. Subscribers are urged to save their copies for institutions if they do not wish to keep them.

Chester A. Arnold is vastly enthusiastic in operating a new 24-inch diamond saw that has been acquired by the Museums of the University of Michigan, for it has been possible to commence sectioning the blocks of plant-bearing chert that he discovered in the Clarno Formation of Oregon in 1948. The most interesting plants are some exquisitely preserved aquatic ferns that have so far defied all attempts at identification. He is beginning to suspect that an extinct and heretofore unknown genus is represented. Last winter he consulted with a representative of "Life" about a forthcoming article on Devonian life, and contributed drawings of _Callixylon_ and _Archaeopteris_. On May 5th, Arnold acted as installation officer for the new Sigma Xi Club at Bowling Green State University, and gave an illustrated lecture entitled "A Glimpse of Northern Alaska". Plans are under way for a paleobotanical expedition into the Kaiparowits and Henry Mountains region of southern Utah in June. It is necessary to go early to avoid the excessive heat and flash floods that come later. Arnold will be accompanied by Dr. Rogers McVaugh, Herman Becker, of Brooklyn College, and Thomas Riley, of Eagle Point, Oregon. Riley is a veteran rock collector in out-of-the-way places, and has been there before. If our readers are surprised to learn that Rogers McVaugh is going along, they should know that Arnold hopes to make a paleobotanist out of him yet. Who knows? It is a safe guess, however, that lots of herbarium specimens will come back from the Henry

Mountains. Later in the summer, if the wanderlust still controls him, Arnold may head for British Columbia where there is some more fossiliferous chert similar to that found in Oregon.

Dr. Dow V. Baxter has finished manuscript for a book, "Cultural Practices and Their Effect upon Disease Incidence in American Forest Plantations", which is in the editor's hands. It deals with forest practices in the United States and Canada and relates the cultural methods to disease incidence. He is now pressing continuation of research on the resupinate polypores of North America and a first draft of a book is nearing completion. This survey covers actual field work in all states, provinces and territories in North America as well as both field and herbarium work abroad. This work will be continued during the coming season in Alaska with Mr. James Ward as assistant.

The reception of Dr. Baxter's revised textbook, "Pathology in Forest Practice" (John Wiley & Sons) by industry and in foreign sales is far exceeding expectation. It has been reviewed by newspapers as well as by technical journals. Excellent reviews have appeared in the "Journal of Forestry" and "American Forests", as well as "Soil Science", "Wood", "Trees", "The Forest Farmer", "California Lumber Merchant", "Forest and Park", "Forest and Outdoors", "Canada Lumbermen", "Agricultural Chemicals", "South African Journal of Science", and many others.

Dr. Baxter was host at the 27th annual class party of his course, "Forest Pathology in Forest Practice and Timber Pathology", given again this year at the Michigan League. There was a four-piece orchestra aided by soloist Bob McGrath (Town Hall talent) and Toni Bonadio on the accordian. The program was patterned after the chapters in the text, "Pathology in Forest Practice". In recent years, it has been the practice to give in absentia honorary memberships in these classes to one or two nationally known forest or timber pathologists. Dr. Perley Spaulding was elected for 1952 and this year's selections were Dr. E. P. Meinecke and Dr. Reginald H. Colley.

Dr. Baxter has presented a number of illustrated lectures and moving pictures during the past year, at New York, Philadelphia, Washington, D. C., Evanston, Illinois, and several Michigan cities. The subjects were varied, but "Alaskan Byways", "The Cassiar Trail", "Album Cubano", and "Wading thru Florida" were the chief ones. The last includes pictures from the Dry Tortugas.

Moving pictures of Alaskan caribou taken in Mt. McKinley National Park formed the nucleus of a television show during the past season in the Detroit Free Press program, Jack Van Coevering's "Woods and Waters". Additional television programs with other films taken in Alaska are now being scheduled for the fall. The pictures are now being prepared especially for television by the Detroit Free Press's "Woods and Waters" editors.

Dr. Albert J. Bernatowicz, who completed his dissertation on "Seasonal Changes in the Marine Algal Flora of Bermuda," is back in

Bermuda with a fellowship from the National Science Foundation and will remain there during the summer. He is making further collections, correlating developmental characteristics and associations of sea weeds with ecological data. He is recording data on concentrations of nutrients in various habitats from season to season. His plans for the near future are necessarily vague until he gets a job, but he hopes for opportunity to compare marine algal aspection at Bermuda with observations in other areas and to continue research on the Algae of the warm Atlantic. He works in collaboration with Dr. William Randolph Taylor and his collections are preserved in the University of Michigan Herbarium as well as in his own and Professor Taylor's private herbaria. Duplicates left with the University of Michigan have been distributed to several institutions in the United States and abroad, and Bernatowicz will have a large collection of exchange material available at the end of the present investigation. Although such an enthusiast about sea weeds, he looks at the land as well as the sea flora and writes that he will gladly pick up any other Bermudian plants (if he can find them) that may be needed for study by readers of this note. We hope for another of his well written and interesting articles for A. G. B.

Professor Ernst A. Bessey of Michigan State College continues his work of identification of fungi collected in 1939-40 during a year spent in the Hawaiian Islands, and is just now engaged with the Fungi Imperfecti. During April and May he is to be Visiting Lecturer in the Department of Plant Pathology at Cornell University.

Mrs. Marjorie T. Bingham spent last summer in a vegetational survey of Grand Island, Alger County, Michigan, and expects to continue the same project this summer. As in the past, her favorite family is the Orchidaceae. Since her transfer of chief residence to New Jersey she has also become active in the collecting of the flora of northern New Jersey in order to develop a herbarium at Centenary Junior College, Hackettstown, where she is the head of the Biology Department. Her time during the academic year is too full for much collecting unless it can be done in connection with teaching, but she takes students as far as fifty miles for field trips by chartered bus. She writes that Centenary College, established nearly a hundred years ago, is a privately and adequately supported junior college for a restricted number of women, which transfers its graduates to such leading women's colleges as Smith, Wellesley, and Mount Holyoke, as well as to the state universities. Professor Bingham's earlier collections are mostly preserved at the Cranbrook Institute of Science and the Northern Michigan College of Education. Her two books on the Michigan flora, the "Orchids of Michigan" and the "Flora of Oakland County" were both published as Bulletins of the Cranbrook Institute of Science.

Dr. W. H. Camp has made the suggestion that we redefine our too vague objectives and become a regional journal devoted to the botany of the mid-continent area. There is already the American Midland Naturalist. Moreover, the several state academies of science take care of many technical and lengthy local floristic contributions, which we could not afford to publish even if they came to us. We remain convinced that there is room for something similar to the old series of A.G.B. and the original "Torreya", which later grew out of, intergraded with, and was eventually absorbed (as a department) by the Bulletin of the Torrey Botanical Club. So the content of A.G.B. may be expected to continue to range from botanical trivia to subtechnical articles, with emphasis on what is readable but also of record value, geographically unrestricted but with considerable emphasis on our own Great Lakes and Michigan region.

Zane B. Carothers, graduate student at the University of Michigan, is interested in the anatomy of the Geraniaceae. He would gladly receive material of any genera not in our local flora.

Virginius H. Chase is actively continuing his collecting of Illinois plants, with especial attention to grasses, and will attend to getting particular living plants, herbarium specimens and seeds needed by others as they turn up. His chief collections are in the Herbarium of the University of Illinois, but for certain groups, or localities, or years, they are to be found also at the Gray Herbarium, University of Michigan, Missouri Botanical Garden, National Herbarium, the Peoria Academy of Science, and elsewhere. He has been interested in Illinois botanical biography and has written articles on his predecessors at Peoria, one entitled "Frederick Brendel, the Pioneer Botanist of Peoria" and another on Francis Eugene McDonald, an honored amateur who spent most of his life as a railway mail clerk, but made his mark in systematic botany by his contributions of beautiful and critically collected specimens to many herbaria. An interesting story of Chase's own life down to 1947 has been written by Harry L. Spooner. Since then Chase has received the honorary degrees of M. A. from Kenyon College and S. D. from Bradley University.

Dr. Elzada U. Clover has been absent from Ann Arbor on sabbatical leave during the Spring Semester of 1952-53, continuing her work on the cacti of Texas. Tracing the ranges of species across the southern boundary took her into Mexico during her field work, after which she worked in the Big Bend region of Texas, and is now farther west. She will be back to teach in the Summer Session at Ann Arbor or possibly at Douglas Lake, if she trades assignments with Dr. Warren H. Wagner, who may teach at Ann Arbor although he had planned to give courses in pteridophytes and aquatic plants at the Biological Station.

Professor Henry S. Conard is one of those who would "rather wear out than rust out". Having "retired", he writes that he finds himself busier than ever, collecting, identifying and teaching about mosses. During 1953 he expects to do field work in Iowa, Montana, Wyoming and Florida. He is likewise interested in the bryophytes of northern Europe and Siberia. The genus to which he is especially devoted at the moment is Amblystegium. During recent months he has read a paper at the Christmas meetings of the American Association for the Advancement of Science, and has lectured at North Carolina State College, Raleigh, and at Vanderbilt University, Nashville, Tennessee. The State University of Iowa has published his "Vegetation of Iowa" and he has reprinted the original English translation of the Braun-Blanquet "Plant Sociology" at his own expense, from the original plates of the edition published by the McGraw-Hill Co., hoping to sell enough to recover the investment. It will be remembered that he was one of the translators. It is greatly to be hoped that he will not be disappointed in his venture, for the book has been stimulating and important regardless of whether or not one likes the nomenclature. Professor Conard was formerly an active member of the Gray Memorial Botanical Association who did a great deal for it, but having dropped out he now regrets that he still has too many pressing current activities to allow of scattering his attention by becoming interested in it again! His collections are best represented in his own private herbarium, at Grinnell College, and at the State University of Iowa.

Professor Earl L. Core will be busy this year with the publication of Part 2 of the Flora of West Virginia but he is also working on a revision of the genus Scleria. Collectors should keep this in mind during the 1953 field season and get abundantly duplicated material of this genus so as to be able to send specimens to him at West Virginia University. He would appreciate viable achenes when available, in addition to herbarium material, for he grows plants in connection with his herbarium research. It would be a good idea for anyone who can contribute Scleria specimens to Dr. Core for identification to get plenty of material so that cited specimens may be available for distribution to several herbaria.

Alma Dietz reports that her research activity is primarily with Algae and Actinomycetes, but she is interested in the general flora of Kalamazoo County, Michigan. If time permits she will try to secure botanical material needed for study by others.

Professor Joseph Ewan of Tulane University has been granted a Guggenheim Fellowship for continuing his work in the history of American botany during the period 1780 to 1820. He is particularly interested in the European contacts of American botanists during that period and will work mostly in England, but will also visit Paris, Geneva, and Vienna. The fellowship is to be held for 1954-55, which will enable Professor Ewan to attend the meetings of the Botanical Society of America at Madison in September, where he will give an invitation paper entitled "Collectors in America for Linnaeus".

Mildred E. Faust has been preparing a flora of Onondaga County, New York. This is the county which includes Syracuse. Naturally her field work covers Central New York generally, and as a minute specialty she studies the rare and local hart's tongue fern, best known as Scolopendrium vulgare but found under the name Phyllitis Scolopendrium var. americana Fern in the last "Gray's Manual". This is the most notable localized plant in her region, of which Fernald said, in stating the range: "central New York (largely exterminated by quarrying and by federal 'conservation' activities". An up-to-date report on its present status will be looked for from Miss Faust. Her specimens are mainly preserved in the herbarium of the College of Liberal Arts of Syracuse University. Her non-local interest is in Arctic botany.

Mrs. Robert M. Frehse writes the column "Nature Now" which appears in the "Birmingham [Michigan] Eccentric". Her interests are largely in fungi and bryophytes, which she studies wherever she goes, and she has had opportunity to botanize on four trips to the Pacific coast. This summer she will spend August at Walloon Lake, Michigan, collecting fungi, of which the more unusual will go to A. H. Smith for identification. When at home, her activities include keeping up a wild-flower garden and a personal herbarium of flowering plants. Her excellent stand of Jeffersonia diphylla will provide seeds for other wild-flower gardeners, and correspondents should ask what other species may have produced enough seed for distribution. (Her address is 506 W. Maplehurst Blvd., Ferndale 20, Mich.) Mrs. Frehse has promised to contribute to A. G. B.

Dr. Eloise Gerry, authority in the systematic anatomy of both angiosperms and gymnosperms, continues her studies of the characteristics of foreign woods at the Forest Products Laboratory. She hopes that this work may be continued, when she retires a few years hence, by her new associate, Dr. Jeannette M. Kryn, who completed her doctoral work in the systematic anatomy of the Anacardiaceae last year at the University of Michigan.

Dr. Margaret Fulford of the University of Cincinnati will again teach the course in bryophytes at the University of Michigan Biological Station. She has been studying the regeneration of Hepaticae on formerly lumbered and burned over areas of the biological station tract that have subsequently become reforested. Although her chief areal interest is tropical America, she is now working on the hepatic flora of the Fiji Islands and a monograph of the genus Euosmolejeunea. Her own plant collections are represented in the herbaria at Harvard, Yale, New York Botanical Garden, and the Smithsonian Institution.

Dr. Frank C. Gates will continue this summer his usual activities in ecological teaching and research at the Biological Station of the University of Michigan, and in field work on plants of Kansas. He will also visit Colorado, giving especial attention to stock-poisoning plants, and weeds. If feasible he has taken care of requests for collecting of species needed by his correspondents, but he writes that his participation in work on the Kansas flora is "mostly on the receiving end, for the Kansas State Herbarium." His own former collections have chiefly gone to the Missouri Botanical Garden, the New York Botanical Garden, Kansas State College, and the College of Agriculture of the University of the Philippines. He will attend the Madison meetings of the Ecological and Botanical Societies of America in September, and will deliver his address as retiring President of the former.

Professor L. J. Gier has been devoting himself to a study of the bryophytes of the Central States generally, but especially of Missouri. Last summer he studied mosses at the Iowa "moss clinic" for six weeks and took part in the Lake Okoboji Foray of the Central States Section, Botanical Society of America. In his Missouri collecting he collaborates with the Chicago Natural History Museum. This summer he will work in bryologically unexplored parts of the state. Genera of especial interest to him are Fissidens, Thelia and Atrichum. The last he is studying in laboratory cultures under varied environmental conditions as a research project with his students. He works on the Kansas flora in cooperation with the University of Kansas. His past collections are mostly in the herbaria of William Jewell College, Duke University, and the Chicago Museum.

John Grayson is arranging for what ought to be a very interesting summer in Labrador and Quebec. He expects to work at several Geological Survey camps in Labrador and Northern Quebec, and will move from one to another with the plane that distributes supplies to these camps. He hopes to obtain peat samples for pollen analysis, herbarium specimens, and ecological notes, but will be somewhat handicapped by the small amount of baggage that he can carry. His plans also include much photographic work. This area is virgin territory for the naturalist, so he certainly should find enough work to keep him busy for the summer. We envy him this rich experience and hope it will be as productive as is anticipated and that the mosquitoes and black flies won't be too voracious. Without a doubt this trip should yield a good story for A. G. B.

Dr. Marion T. Hall of the Cranbrook Institute of Science will continue during the season of 1953 the same field projects that occupied him last year, namely the detailed study of strand vegetation in Michigan and the adjoining region. He is especially concerned with variation in Juniperus, Hudsonia and Elymus Hystrix. In his general collecting he proposes to fill gaps in the distribution record by counties and will gladly be on the look-out for specific desiderata of other botanists. His past collections are best represented at the University of Oklahoma and the Cranbrook Institute of Science.

Clarence R. Hanes, author (with Mrs. Hanes) of the beautiful Flora of Kalamazoo County, Michigan, writes that although his legs become less limber as the years pass he still had plenty of enthusiasm for botanizing last summer and continued to check up on a few questionable species in the private herbarium which vouches for the local flora. This private herbarium is kept in their home by Mr. and Mrs. Hanes and now contains about 1800 species, varieties and forms of vascular plants collected in Kalamazoo County. Little collecting has been done in neighboring counties and so attention will be more especially directed to them during the present season, as a continuing project begun last year.

Professor Thelma Howell, Department of Biology, Wesleyan College, Macon, Georgia, is the Executive Director of the Highlands Biological Station at Highlands, North Carolina, which has announced its program of 1953. It is to be open from 1 June to 1 September for investigators and graduate students only. Although there is no special instructional staff, younger investigators are welcomed if they arrange to work under supervision. The institutional members are the University of North Carolina, Vanderbilt University, and Duke University. Other institutions represented on the Board of Managers are North Carolina State College, the University of Georgia, the University of Tennessee, and Wesleyan College. The station is located in one of the most attractive regions of the United States on the southern plateau area of the Appalachian Mountains, at a center of endemism which has biological resources that "can not be duplicated in any other equal area in the southeast". The station celebrated its 25th anniversary in 1952, and by then 85 papers had been published, based wholly or in part on research conducted at the station.

Dr. O. E. Jennings has in active preparation a "Flora of Western Pennsylvania and the Upper Ohio Valley". It takes in the area within a radius of 125 miles from Pittsburgh. Most of the specimens are, of course, preserved in the Carnegie Museum, of which he is Director Emeritus, as is likewise true of Dr. Jennings' earlier collections, many of which were collected along the northern shore of Lake Superior at a time when his botanical localities were by no means as easy of access as they now are.

Mr. Roy N. Jervis and Mr. Grady Webster are sincerely thanked for much time and effort devoted to completing and correcting for your Editors the list of students who have done advanced work in Botany at the University of Michigan. The latest recorded addresses were secured by checking the list with the Alumni Record Office. Then a circular letter regarding the Asa Gray Bulletin was sent to all who had not responded to former similar letters (there have been four) as well as to some alumni who have had no notices before because incomplete or obsolete addresses were used. Our effort to contact former Michigan students has led to the mistaken idea that we are not interested in reaching all botanists who may be interested in such a semipopular journal as the Asa Gray Bulletin. This is not true. We expect to devote especial attention to preliminary work for a proposed new Flora of Michigan, but to welcome readable contributions dealing with any region whatever that our contributors wish to write about. In fact, we have been reproached for spreading so far and so thin as to have little excuse for being. On the contrary, the diversified content of A.G.B. is just what several readers have particularly liked. The test of our non-geographic limitation will come during the present year. If support does not measurably increase it will be clear that A.G.B. will have to change its ways if it is to survive. Naturally the nucleus of our support has been in Michigan and we shall try to keep up the local appeal of our journal.

Professor K. L. Jones will attend meetings of the Society of American Bacteriologists in San Francisco August 10-14 to give an invitational paper on "Variation in Actiniomycetes". Mrs. Jones will accompany him and they will spend about a month visiting botanical centers en route. Dr. E. E. Steiner will serve as Acting Chairman of the Department of Botany in Ann Arbor during Professor Jones's absence.

Volney H. Jones, in addition to his more conventional duties of a curatorial and instructional nature, is pioneering in a television course for the University of Michigan Extension Service, entitled "Progress of Mankind: Prehistoric to Present". A brief illustrated "Telecourse Syllabus" is issued for each lesson. As would be expected of an ethnobotanist he has correlated the American Indian culture areas and their peculiar resources, and includes his map of the American culture areas in one of the recent issues.

Mr. Haven Kolb is broadly concerned with the botany of the Appalachian area as well as that of eastern Maryland, but his collecting is largely confined to Baltimore County. One reason why we are particularly glad of his interest in the Asa Gray Bulletin is that the center of activity of the Gray Memorial Botanical Association was for many years in Baltimore. Mr. Kolb has cooperated with the committee which is concerned with the proposed new flora of the Washington-Baltimore area, and is active in the Natural History Society of Maryland, in whose herbarium (as well as his own) his chief collections are preserved. As time permits he will make a descriptive study of pine plantations which are to be used in bird population studies, and will also botanize the Chesapeake marshes. He writes that his past collections have been deficient in the midsummer flora of Baltimore County, and that repairing this deficiency will have some attention this summer, but will be subsidiary to other work. Baltimore was the type locality for *Oenothera gauroides* Hornem., the commonest representative of the group of *Oenothera biennis* in his area, and we hope that he will collect the whole group, critically. There are several markedly different kinds near Baltimore.

Carl D. LaRue has been busy during the present semester with teaching and research. Just before the semester began Elizabeth Pieczur Sternheimer came back to Ann Arbor from Brookhaven Laboratories to take her final examination for the doctorate. She now holds a postdoctoral fellowship there. Immediately after the semester opened Katherine Tryon, now an instructor at Wellesley, returned to pass her doctoral final. On the ground here both Walter Tulecke and Jacob Straus have been busy with the preparation of their theses. Other doctoral students, not so far advanced, have occupied a portion of his time as has the course in Experimental Plant Morphology. As a minor and enjoyable task, he has given lectures on the topic of plant propagation. Dr. LaRue and Dr. Thomas J. Muzik of the Federal Experiment Station at Mayaguez, Puerto Rico, have recently published a brief article on grafting of monocotyledonous plants of large size (bamboo, sugar cane, etc.), and have just completed a more extensive paper on the same topic which contains some remarkable pictures by Dr. Muzik of graft unions. They have also completed final revision of a paper for the Michigan Academy on the viviparous embryos of the red mangrove. The work with Dr. Muzik, who took his doctorate under Dr. LaRue, was done in the spring of 1951 when the latter spent a semester's leave in Puerto Rico.

Dr. LaRue states: "Recently I have followed up my idea that botanists have been misled by the statement that a cambium is requisite for grafting, whereas what they should realize is that a meristem is needed. Wherever a meristem exists, grafting should be possible and probably is. I have tested one additional meristem and have found that in _Philadelphus_ and _Euonymus_, parenchymatous grafts at least can be made through the use of the phellogen.

"I have been exposing a number of tissues to gamma radiation from one of our cobalt sources. Corn endosperm appears to require rather intense radiation to kill it outright. Other structures and tissues which have been irradiated are pawpaw endosperm, pollen of several species, and male gametophytes of several species of gymnosperms. No important results have yet been gained in these studies on radiation which will be continued during next summer and next year.

"Work has been going actively on the growth of male gametophytes of gymnosperms. Extra nuclei have formed in _Taxus_ and _Juniperus_. Cross walls have formed in pollen tubes of both these genera. It is believed that these phenomena represent an approach to the indefinite growth of the male gametophyte, so beautifully demonstrated in _Ginkgo_ by Walter Tulecke. Thus far I haven't secured a tissue of continuous growth in any of these gametophytes. Cultures of pollen of _Cryptomeria_, _Chamaecyparis_, _Cupressus_, _Juniperus_, _Abies_, _Picea_, _Pseudotsuga_, _Tsuga_, _Zamia_, _Ceratozamia_ and _Pinus_ have been made. Pollen of all these species has been lyophilized to be used for later cultures. Interesting results are anticipated as a result of this investigation.

"As an unexpected result of the gymnosperm work it has been found that the axes of the microsporophyllate cones of gymnosperms are very active in callus formation when put in culture. It has been found very difficult to sterilize pollen for culture once it has been shed. So microsporophyllate cones have been sterilized just before they are ready to shed their pollen and put into culture on nutrient agar. Callus has been formed on axes of such cones in Cryptomeria, Taxus, Cupressus, and Juniperus. No other part of these plants has been found to react so strongly in culture. Cryptomeria tissue has been transferred for a second time and promises to be a cultivable tissue.

"During the coming summer session I shall be in Ann Arbor, and for the first time in many years I shall teach the morphology of green plants. I shall continue research on gamma radiation, culture of male gametophytes, and of the new gymnosperm calluses.

"I have been invited to give a paper in the growth conference at Brookhaven, August 3, 4 and 5. Two of my former students will take part in the program also, Edwin G. Beck of Georgia, and Seymour Shapiro, now of Brookhaven.

"Between summer session and the opening of the fall semester I shall give a paper at the meetings of the A. I. B. S. at Madison, Wisconsin."

Dr. Robert K. Lampton, who was one of Dr. LaRue's students, has a new position at Virginia Military Institute for next year.

E. C. Leonard of the Smithsonian Institution continues his special studies of the Acanthaceae, and is now reading page proof on the second part of his Colombian Acanthaceae. He is now turning to the Argentinian members of the same family. Of course he is still interested in the whole flora of Hispaniola, where he has botanized extensively (collections at U. S. National Herbarium, New York Botanical Garden, Gray Herbarium, etc.), and whenever he can find time he collaborates with Dr. H. A. Allard in local studies of the Virginia-Maryland region. They have been investigating the flora of the Potomac Triassic area of Virginia.

J. Stewart Lowther, graduate student in paleobotany, working with Dr. C. A. Arnold, plans to look for more fossil plants this summer in Naval Petroleum Reserve No. 4 in Northern Alaska. He will be accompanied by William Maher, graduate student in zoology. The project is to be supported this summer by the Arctic Institute of North America.

Dr. Eileen W. E. Macfarlane is making a series of studies on the effect of mercurial poisons on plants, and has written half a dozen articles on the subject since 1951. She comes each summer to Ann Arbor to review the collection of wild roses at the Michigan Botanical Gardens, which she investigated cytotaxonomically during her studies for the doctorate. During years in India which followed she collected plants of South India (to be found at the University of Michigan; also at N. Y. Botanical Garden) and her still earlier collections from the Peninsula of Virginia are at the Gray Herbarium. Her residence in India gave opportunity to study the distribution of blood types among certain localized tribes and castes and to become acquainted with the social and ethnic background of the people in several parts of India and Pakistan, upon which she has lectured frequently, and in South Dakota as recently as the present year. Her connection with the Institutum Divi Thomae has led to division of residence between Cincinnati and Miami where the Marine Laboratory of that institute is located. At present her investigations are largely concerned with morphological and physiological strains of Nostoc muscorum.

Mr. C. V. Morton of the Smithsonian Institution plans to attend the forthcoming International Botanical Congress at Paris, and is looking forward to the experience with great expectations, for it will be his first visit to Europe. He writes: "I have just read your interesting article on the Braun-Blanquet system of nomenclature. I couldn't agree with you more. I hope that you had reprints made of the paper. I think that it should be in the hands of those who will be at the Paris Congress. Even if the nomenclature were perfect, I wouldn't be in favor of having it officially approved by a Congress."

Dr. Eugene C. Ogden, formerly of the University of Maine, where his former plant collections are preserved, is now State Botanist of New York, and engaged primarily in a survey of air-borne pollen grains and fungus spores in New York State. In 1953 he will carry on more or less systematic collecting of all groups of plants for the New York State Museum at Albany, and will attempt to secure specimens specifically needed for the study of others. He will lead the summer field excursion of the Northeastern Section of the Botanical Society of America in the Adirondack Mountain area of New York, 16-19 June, and will see that a report of the activities reaches the Asa Gray Bulletin.

Dr. G. W. Prescott really gets around and gets things done. In 1952 he ranged from Arctic Alaska, where he made a taxonomic and ecological survey of fresh-water Algae, to Ecuador, where he spent three months in the Andes studying alpine and high-altitude Algae and other aquatic plants. This summer he will do field work in the mountains of western Montana, the Grand Tetons, and the Olympic Mountains, extending investigations in high altitudes and latitudes which have been carried on under the auspices of the Office of Naval Research and the National Science Foundation. Prescott studies lichens as well as algae, and, in addition, is making a specialty of Lycopodium. He is well known to look out for the special wants of other botanists, and we hope that he will be able to pick up a few birches at various altitudes, high or low, during his summer, whenever he has a press along for collecting Lycopodium. The best sets of his past collections are to be found at the New York Botanical Garden, the Farlow Herbarium of Harvard University, the Chicago Museum of Natural History, and, of course, Michigan State College.

Miss Anna Reiskytl (1411 Kewaunee St., Racine, Wisconsin) is enthusiastically beginning a study of the local flora of Racine and will gladly correspond with other botanical amateurs. She will attempt to supply material (herbarium specimens, seeds, or living plants) needed by others from her area, and would like to participate in a local flora project with others.

Professor Jacques Rousseau, in past years, has made twelve trips to Arctic and sub-Arctic Quebec for botanical and ethnographic surveys of that region. He is now deeply engaged in writing monographs that will present the results of his work and therefore anticipates spending only a couple of weeks in the field this summer. He and others at the Montreal Botanical Garden make an effort to cooperate with correspondents everywhere by collecting specially needed material for study. So far as seeds are concerned, the Garden publishes a list every year (the Delectus Seminum) which offers whatever is available to those who wish to grow plants. In addition to his long series of travels in Canada, Dr. Rousseau has visited New England, Florida, New Mexico, Arizona, and other parts of the U. S., Mexico, Haiti, France, Switzerland, and Sweden, with botanical, ethnological and educational objectives. Everywhere he has kept journals illustrated by photographs, supplementing his botanical collections. His publications under a pseudonym between 1924 and 1929 have not been listed, but beginning with the latter year he has kept an unusually careful bibliographic record which, through 1952, included 375 titles, of which a single one covers 161 separate alphabetic entries in the "Encyclopédie Grolier" (Montreal), and two titles cover a series of 70 subtitled articles on the Indians of the Quebec forest. The list does not include 124 published preliminary abstracts of papers presented before various scientific organizations, all of which have not yet been followed by full publication, at least under identical titles. Dr. Rousseau is truly one of those exceptional botanists who has followed the motto of Linnaeus, "No day without a line."

Richard A. Scott, post-doctoral fellow at the University of Michigan, has been studying the silicified wood in the Clarno formation of Oregon. He takes an instructorship at Harvard this fall. Last year he was a Fulbright Fellow at the British Museum of Natural History.

Dr. Francis J. Scully belongs to a local association at Hot Springs, Arkansas, whose activities are devoted to the total natural history of the area of the Hot Springs National Park. In 1937, Dr. Scully published "Ferns of Hot Springs National Park" (Amer. Fern Journ. 27: 59-62) and he is now making a special study of the violets of the Ozark Region. His former collections are represented in the U. S. National Herbarium, Gray Herbarium, New York Botanical Garden, and Missouri Botanical Garden.

Seymour Shapiro writes from the Brookhaven National Laboratory under date of April 2, 1953: "Just a few words to let you know we are both fine and having a grand time here. We were able to rent an almost new house — 2 bedrooms, living-room and fireplace, modern kitchen, breezeway, garage and full basement for only $70 per month. Far cry from the Ann Arbor situation! The laboratory is grand and my job promises to teach me a lot. I am coordinating a project involving the use of radiations to induce somatic mutations in commercially significant woody plants. About 14 universities and experiment stations are involved and we have better than 4500 plants promised for this year's gamma field. This figure includes some 800 evergreens, 300 sour cherries, 300 peaches, 300 blueberries, 250 pears, 900 carnations, etc. This is all new to me but is lots of fun, so far. Regards to the family and my old friends in the Department."

Dr. Alexander H. Smith will teach a course on the higher fungi at the University of Michigan Biological Station at Douglas Lake. He is one of the most active botanists in the state in furthering the movement for preservation of natural areas in Michigan, and has been especially concerned with Tahquamenon State Park, where he continues intensive botanical study at every possible opportunity. He also does extensive field work on the higher fungi west of the Continental Divide and has a fungus flora of that region in preparation.

Professor Gilbert M. Smith of Stanford University will give the course in fresh-water Algae at the University of Michigan Biological Station this summer. The region is already known to have 600 species and surprises are constantly turning up. He will supervise a group of graduate students.

Professor F. K. Sparrow has devoted his time during the second semester of 1952-53 largely to furthering the interests of the Great Lakes Research Institute of the University of Michigan in the capacity of Senior Scientist. The Institute was established by the Regents for the encouragement and integration of studies of the physical, chemical, biological and other aspects of the Great Lakes and adjacent areas. Such projects have been undertaken as plankton studies on Lake Superior, the relation of ice formation to beach erosion problems, etc. This summer Dr. Sparrow will continue his present activities in promoting the Institute's program, while continuing, needless to say, his special research in aquatic and soil-inhabiting fungi.

Dr. Erich Steiner will be busy during the summer at the Botanical Gardens, Ann Arbor, continuing his studies of lethal genes in Oenothera, and their distribution throughout races of a specific phylogenetic grouping. He is also working on the cytogenetic analysis of races of Oenothera from Mexico.

Professor O. A. Stevens writes that he is approaching retirement, but, in continuation of many years work which culminated in the publication of his Flora of North Dakota, he will proceed with recording the geographic distribution of the plants of that state. This work will be carried forward by filling in the gaps in the record on a county basis. We are happy to present an article by Professor Stevens on a trip which he made last summer, and look forward to further contributions. His past collections are largely in the herbarium of the North Dakota Agricultural College, but are also represented at the U. S. National Herbarium, the Universities of Minnesota and California, the Herbarium of the Canadian Department of Agriculture at Ottawa, and the University of Basel, Switzerland. He states that the Michigan flora is represented in the North Dakota herbarium through the contributions of C. B. Waldron and L. R. Waldron, two of their early botanists who went there from Michigan.

William Randolph Taylor expects to spend the summer months at the Marine Biological Laboratories, Woods Hole, Massachusetts. He will continue his studies on the local algae, and begin the revision of his book on the algae of the northeast coast. As time permits he hopes with the help of Mr. Wilce to complete identification of Dr. F. R. Fosberg's collections of algae from Pacific atolls. Evenings will probably go to photography of dissections of small flowers for the teaching collection of the Department of Botany of the University of Michigan.

Mr. Paul W. Thompson has made great effort to bring us new subscribers to the Asa Gray Bulletin from the membership of the Michigan Botanical Club. We publish herewith his account of this large and flourishing organization, with which we shall cooperate in every way possible. It has not seemed desirable to increase the membership dues in the Michigan Botanical Club to cover individual subscriptions which will remain additional and voluntary, just as with the Gray Memorial Botanical Association and the Michigan Botanical Gardens Association, but we hope eventually to interest a larger proportion of the members. The M. B. C. has recently distributed a revised membership list of imposing length, including some 300 names, of which about 40 are now subscribers to A. G. B. We have been happy to modify our title and cover pages to indicate the interest of this third organization in the Asa Gray Bulletin.

Walter R. Tulecke, now of the Department of Botany, University of Michigan, has been very busily engaged during the Spring semester in finishing his doctoral dissertation, which deals with a curious tissue that has been derived repeatedly from pollen of Ginkgo biloba grown upon artificial culture media. This tissue presents phenomena of great significance from the standpoint of phylogeny and alternation of generations in the higher plants, and a preliminary publication regarding it will shortly appear in "Science". Tulecke has accepted a position as Assistant Professor at Arizona State College at Tempe for the academic year 1953-54.

Dr. Frank D. Venning is interested in tropical botany in general, but more particularly in the anatomy of tropical economic plants and their wild allies. His current work is on the anatomy of the bamboos and a monograph of Spondias, in the Anacardiaceae. For research material in many tropical groups he is able to draw upon the arboretum of more than 600 species which is maintained by the University of Miami, and from which he will gladly supply material that may be needed by other investigators. He also has access to other botanic gardens of the Miami area in which many important woody species of the tropics have attained fruiting size. He has completed a "Manual of Advanced Plant Microtechnique" which is to be published by the Wm. Brown Co., Dubuque, Iowa. Dr. Venning's earlier plant collections are at the State University of Iowa.

Siri von Reis will be a graduate student at Radcliffe next year, and we shall be sorry indeed to miss her from Ann Arbor. She had planned an elaborate program of summer travel and writing but may not carry it all out on account of illness following the June examination period. So she reluctantly gave up attending a four-weeks course at the Biological Station at Abisco, Lappland, which belongs to the University of Upsala. While abroad she will secure more data on the Swedish botanist Ekman, of whom she is writing a biography, which will require a visit to his relatives in Jonkoping, Sweden, and study of his field notes at the Riksmuseet in Stockholm.

Edward G. Voss has published an excellent article entitled "The History of Keys and Phylogenetic Trees in Systematic Biology" (Journ. Sci. Lab. Denison Univ. 43: 1-25. 1952) which will be wanted by those of our readers who are interested in the history of botany. Mr. Voss continues energetically his study of the northern Michigan flora, and is also active in systematic entomology.

Grady L. Webster, graduate Fellow at the University of Michigan, will leave Boston, June 12, by plane to Cuba. In collaboration with Dr. I. D. Clement, director of the Atkins Institution at Soledad, he will give a course in tropical botany based on the local flora of Las Villas province and the plants cultivated in the Atkins Gardens. Field trips will be made to plantations to observe economic plants, while other trips to the Trinidad Mountains and the serpentine barrens will give the students a chance to study the native vegetation. On completion of the work in early August, he will return to Ann Arbor to complete a dissertation on Phyllanthus. About September 15 he will go to Cambridge, Massachusetts, to spend a year working at the Gray Herbarium and Harvard Biological Laboratories on a taxonomic survey of Phyllanthus and related genera. He has been granted a postdoctoral fellowship by the National Science Foundation so that he may continue at Harvard the work which he began at Ann Arbor.

Lewis E. Wehmeyer has centered his research during the past few years about a taxonomic study of the genera Pleospora, Pyrenophora, Clathrospora and neighboring genera. The sub-alpine and subarctic Pyrenomycetes have also come in for a certain amount of attention, as they show an interesting distribution. More recently he has started work on the perithecial development of these fungi. Much of the modern rearrangement of these groups has been based upon the development of the perithecium and more accurate and detailed knowledge is badly needed. He will spend this coming summer in Europe. This will be largely a pleasure trip although he and Mrs. Wehmeyer hope to see a few mycologists, and to do some collecting in the Alps or any other interesting area that they may visit.

Miss Helma L. Wolff, Librarian of the Milwaukee Public Museum, writes that several botanical works are now being prepared for publication at that institution. Botanists will remember that A. M. Fuller's "Studies on the Flora of Wisconsin, Part I, the Orchids", published a number of years ago, soon went out of print, but the same author's "Saving Wisconsin's Wildflowers" (48 pp. with 70 figures) is still in print and obtainable for $1.00. Most of the publications of the Milwaukee Museum have been in ethnology and archeology. Two of the volumes by Huron H. Smith on the ethnobotany of several Indian tribes (those on the Menomini and Meskwaki) are out of print, but those on the Ojibwe and the Forest Potawatomie are still available at $2.00 and $2.50, respectively. Other available botanical contributions are two on Wisconsin bogs, by H. P. Hansen and Joseph W. Rhodes, both of 1933. To the general naturalist in the Great Lakes region it would seem that several of the publications in geology and zoology should be very attractive.

Dr. Carroll E. Wood, Assistant Professor of Botany at the University of North Carolina, will give the course in Systematic Botany of Flowering Plants at the 45th session of the University of Michigan Biological Station this summer. The Station is located near Cheboygan, Michigan, occupying a tract of 8850 acres fronting on Douglas Lake and extending to Burt Lake. The region has a diversified flora of over 1000 species of flowering plants and over 100 species, varieties and hybrids of conifers, ferns and fern allies.

Dale A. Zimmerman spent 7 weeks of the summer of 1952 making a good plant collection mostly in Oscoda, Crawford, and Roscommon Counties, but got some specimens in all of the counties of the northern part of the Lower Peninsula of Michigan. He and his wife Marian also went over into Algoma County toward Sudbury but did relatively little collecting there. Dale is interested in more accurate mapping of the jack-pine plains than has hitherto been attempted, and is, of course, concerned with the whole vegetational assemblage. His work, aside from its own value as a study of one of the most characteristic plant associations of the state, will contribute greatly to the data for a new state flora. He will continue similar work during the 1953 field season.

TO BE EXPECTED IN FORTHCOMING ISSUES

Botanical Collecting in Grant County, North Dakota, by O. A. Stevens

Ethnobotany of Popcorn, by Volney H. Jones

Botanizing in the Tahquamenon Area of Upper Michigan, by Alexander H. Smith

Geography of Tradescantia ohiensis in the Region of the Great Lakes, by Donald S. Dean

A Letter on Collecting Hawaiian Bryophytes, by H. A. Miller

The Allen Walnut of Middleville, Michigan, by H. H. Bartlett

Biographical Sketches of Louis H. Jordal, W. G. Waterman, Ray C. Friesner, and Charles C. Deam

Preparation of Pinus Specimens for the Herbarium, by Roy N. Jervis

An Autobiography for his Family and Friends, by Cornelius L. Shear

Letters from India, by Walter N. Koelz

Ekman, Botanical Explorer in the West Indies, by Siri Von Reis

Glimpses of the Natural History of Koror, by Peter J. and Alma Hill

Letters from Okinawa, by Robin Drews

Round Robin from Alaska, by Gertrude Frohne

A Botanizing Trip to the Henry Mountains of Utah, by Rogers McVaugh

A Wyoming Newsletter and Report of the Curator of the Rocky Mountain Herbarium for Twelve years ending 1953, by C. L. Porter

History and Philosophy of Japanese Flower Arrangement, by Mary Cokely Wood

The Bicentenary of Linnaeus's "Species Plantarum," by H. H. Bartlett

A Botanist's Visit to Mount Sisipitan in the Bontoc Subprovince of Luzon, by José Vera Santos

Observations on the Edwards Plateau Region of Texas, by Winifred O. Moore

The Botanist's Account of Hoogstraal's "Second Mexican Biological Expedition", by Virginius H. Chase

Oxalis in Michigan, by C. M. Rogers

The Everett G. Logue Collection of Hybrid Oaks at the Botanical Gardens of the University of Michigan, by H. H. Bartlett

Observations on Oenothera in the Northwest, by H. H. Bartlett

A Locality Sampling of the Tall-Grass Prairie in Osage County, Oklahoma, by Lloyd Schairer

THE ASA GRAY BULLETIN, NEW SERIES. -- A quarterly publication devoted to more or less informal communication among the members of the Gray Memorial Botanical Association and the Michigan Botanical Gardens Association. Appropriate contributions from members of either group or from subscribers will be accepted. For the present, progress reports of current field, garden, and herbarium work, with readable and relatively nontechnical articles in the fields related to systematics, botanical history, biography, and bibliography, will be preferred. There will be special emphasis upon preparatory work for a new "Flora of Michigan". Free use will be made of letters to the Editors (if released for publication by their writers) and of current news notes regarding botanists.

Items for publication should be addressed to either of the Editors at the Department of Botany, University of Michigan, Ann Arbor, Michigan. Contributors of major articles may secure 150 copies of their contributions, at a cost of $1.25 per page or fraction thereof. Covers furnished without additional charge.

Address subscriptions to Dr. Ruth B. McVaugh, Business Manager, 403 Arbana Drive, Ann Arbor, Michigan. Subscription price for Volume I is $3.25 ($1.00 for Vol. I, No. 1 separately, other numbers $0.75 each). Vol. II, $3.00.

THE GRAY MEMORIAL BOTANICAL ASSOCIATION, FOUNDED 1887. — This organization sponsored publication of early volumes of the Asa Gray Bulletin. Later it issued a mimeographed "Bulletin". Its object is to commemorate the life and botanical work of Asa Gray and to assist its members in botanical activity by furthering friendly correspondence and cooperation among them. Interested persons are invited to communicate with the Permanent Secretary, Professor R. Lee Walp, Department of Biology, Marietta College, Marietta, Ohio.

MICHIGAN BOTANICAL GARDENS ASSOCIATION. — Founded in 1925 to include persons interested in promoting the development and current activities of the Botanical Gardens of the University of Michigan. There are no dues, but subscription to the Asa Gray Bulletin is invited. For further information, communicate with Dr. Frieda Cobb Blanchard, Secretary, 2014 Geddes Avenue, Ann Arbor, Michigan.

MICHIGAN BOTANICAL CLUB. —— The membership is about 350, made up of persons interested in the Michigan flora, nature-study, wild-flower protection, preservation of natural areas, and conservation. It has members at large and the following chapters: Southeastern, Bay County, Marquette, Wild-Life (Houghton). For information address the President, Mr. Paul W. Thompson, 17503 Kirkshire, Birmingham, Mich.

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THE GRAY MEMORIAL BOTANICAL ASSOCIATION,

BOTANICAL GARDENS ASSOCIATION
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and
THE MICHIGAN BOTANICAL CLUB

by

Harley H. Bartlett and Rogers McVaugh

C O N T E N T S

(Continued over

ANN ARBOR, MICHIGAN

CONTENTS
(Continued)

A Call for News Notes

Our subscribers are requested to send notes on their recent activities and plans for the coming summer. Since the last number was issued very few notes have come to hand. The Asa Gray Bulletin is intended for correspondence as well as articles and we hope for more spontaneous and informal use of it. Our readers seem to be much more inclined to send articles than news. We are very happy to have the articles, but would like to preserve a balance by having a few pages of informal notes for each issue.

HAKKA GIRL'S PATH TO BOTANY

Su-Ying Liu

Among the Chinese there is a race known as Hakka (客家 literally translated as Guest Race), which is said to have migrated from the North of China to two southern provinces, namely Fukien and Kwangtung, at the time of the Yüan Dynasty (1206-1368 A.D.). Their dialect is very different from the southern tongue, as are their customs, but the speech is a little more like Mandarin. My family, which belongs to the Fukien Hakka, settled in a little village near Tingchow and 武彝山 Bohea mountain where the famous Bohea tea belt is located. My grandparents had been devoted to Buddhism by tradition for a long time. Later, the family moved 90 miles south to Shanghang city, the border line between Fukien and Kwangtung provinces, in order to obtain better tutors for the boys in the family. According to the old tradition, girls of the family were not allowed to study, not even to listen if a teacher was giving their brothers instruction. About fifty years ago, Christianity was introduced into the city by American Methodist missionaries. Both my father and my uncle decided to study in the missionaries' Theological Seminary, and both graduated after a course of three years. Soon the whole family was converted. Fortunately I was born during the peaceful period after this transition of our family religion, which ended the tradition of giving all the baby girls away in child-marriage. I was lucky to be the first girl in many

Fig. 1. Part of the large family group of Liu, from a picture taken in Shanghang about 1924. From left to right, back row, a cousin holding her baby, the second aunt, the fourth aunt, mother and father. Front row, grandmother, grandfather (after his "first death") and myself.

generations saved for formal schooling. Probably I am the only girl among the Fukien Hakka who has had the opportunity to go through college and have further education in a foreign country.

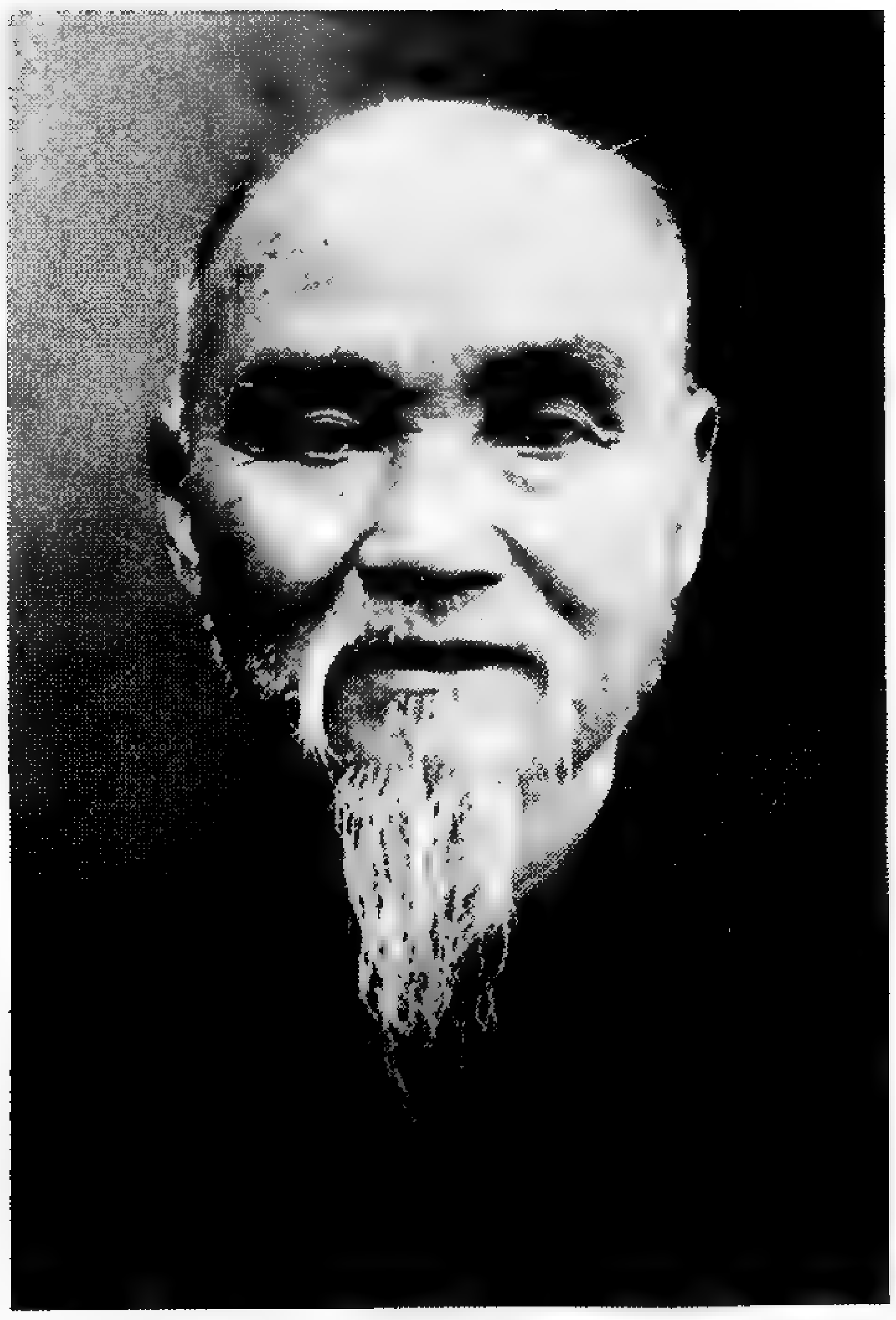
I had been interested in plants since I was a little girl, for my mother was considered quite a skillful herbalist in our village. Our neighbors often came to her asking for different kinds of medicinal herbs. The small garden in our backyard was not only a hobby for my mother, but also provided kitchen vegetables and various medicinal herbs. Some of the plants were: *Artemisia vulgaris, Prunella vulgaris, Acalypha australis, Allium Bakeri, Ipomoea aquatica, Zingiber officinalis, Duranta repens, Polygonum* sp., *Chrysanthemum* sp., *Amaranthus* sp., *Jasminum* sp., *Berberis* sp., *Boehmeria nivea, Musa Cavendishii, Eriobotrya japonica,* and *Citrus* sp. All of these were useful for some purpose, for food, or medicine, or textile.

I learned a crude classification of plants at first hand from my mother when watering those plants with her every evening in our garden, a routine task which led to close contact and careful observation. Besides I had to search for wild plants, used as food for our fifty or sixty rabbits, who had to have an amazing amount to eat. It was common for all the children of the village to go out every afternoon after school to gather baskets of certain kinds of plants for home-raised rabbits, which provided food for the family table and skins for various purposes. I was interested at an early age in the inheritance of color shown by the rabbit progenies. Later, the rabbits were used for demonstration of the principles of heredity in school, because they were at hand and familiar to the children and young people. As a child I really enjoyed these daily field trips for rabbit food. Out of curiosity, I often found and brought home for the rabbits, new kinds of weeds, even poisonous ones, which my mother sorted from the basket. Some of these with medicinal properties she picked out to plant in the garden plot. I began to notice their morphological and ecological aspects, which helped me to locate them again whenever they were needed.

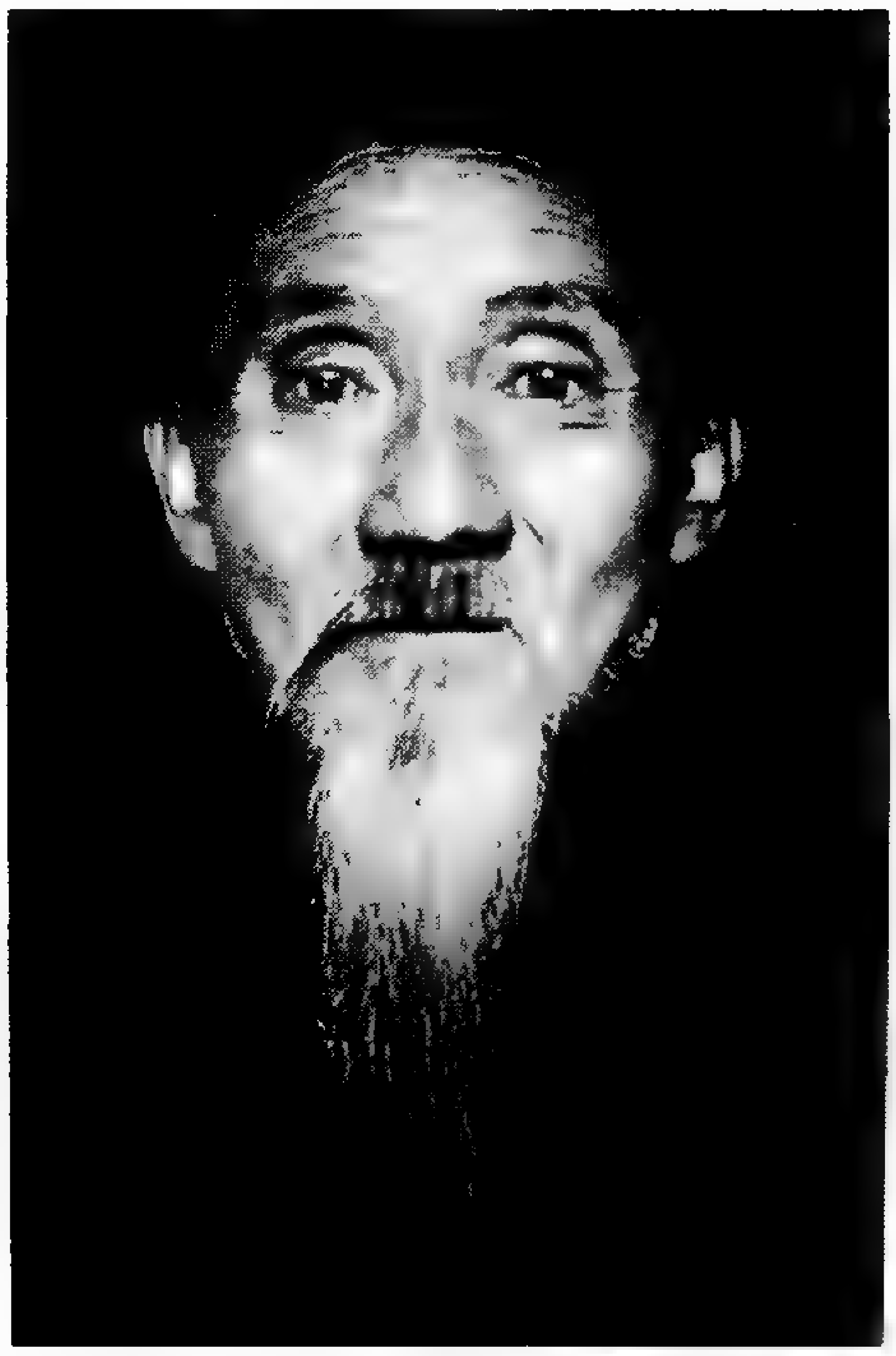
My parents hoped that I would go on to study Pharmacy. My father taught me, and my cousins as well, to recite the "Poem of the Pharmacopoeia" by Hu Shih-Ko of the Yüan Dynasty. This song (it was chanted rather than actually sung) was called " 八珍湯 Eight Precious Things in a Draught," and, as will appear, these particular "things" were all herbs. It ran:

> "Four kinds, Ti, Shao, Kuei, Kung, 地芍歸芎
> make the best prescription for blood disease;
> If the composition, 'Four Virtuous Princes' is added,
> the circulation and the spirit are strengthened by
> this exalted medicine."

To make proper rhythm, however, each of the herbs had to have a one-syllable name in the poem. The first four are as follows:



My father, 劉書麟 Liu Shu-Ling



My uncle, 劉書逡 Liu Shu-Ch'un

Fig. 2. All brothers have the same first character or last character in their names. Thus my father and my uncles were all "Shu" and in all the Liu families in our tribe if the persons were supposed to be of the same generation as my father they had "Shu" as part of the name. Even if younger than myself, one bearing the name "Shu" had to be respected as one of my uncles.

Ti (or 熟地 *Shao Ti*, which is the full name) is *Rehmannia lutea.* This, in our village, came from the druggist. The root is used, and is precooked, then dried for sale by the druggist.

Shao (白芍 *Pai Shao*) is *Paeonia albiflora.* This was a garden plant, and the root was used.

Kuei is *Ligusticum acutilobum,* for which the whole name is 當歸 *Tang Kuei,* and the best came from Szechuan. The root is used. It has a strong odor like celery, to which it is related, and is often used to boil with chicken, rabbit or other meat. By itself it is hardly considered a medicine, for it is used by the whole family as a beneficial and special dish, but only occasionally. When students were refugees in Szechuan during the Second World War they returned to their homes laden with bundles of *Tang Kuei.*

Kung (川芎 *Ch'uan Kung*) is *Conioselinum univittatum.* The best came from Szechuan.

As for the " 四君子 Four Virtuous Princes," they were *Panax Ginseng, Angelica anomala, Glycyrrhiza glabra* and *Pachyma Cocos.*

These had the reputation of being like the men of complete virtue who were looked up to in Confucianism.

So our medical instruction began, and if it progressed beyond what was common knowledge, we knew that one learned in the lore of simples would be looked up to as an herbalist by others. The tradition was so strong that villagers in those days trusted their native herbalists more than they did the so-called western physicians. One should note that according to an old Chinese custom, no prescription should contain an even number of herbs; so the herbalist always added an extra one in order to make the number odd. Nine was especially propitious. It was a superstition that one would get sick again if the prescription had an even number of drugs. For this reason *Glycyrrhiza* (甘 草 licorice) or 狗 杞 *Lycium* (a plant of the Solanaceae, with sweet berries) would often be added to any prescriptions which lacked them. These herbs would not disturb the action of the main drug, and at the same time would sweeten the brew, for sugar was omitted. There was a common saying that a person who was very popular and sociable among any group of people, was "the licorice among the drugs." In this prescription of the " 八 珍 湯 Eight Precious Things," berries of *Lycium chinensis* were added as a ninth item because licorice was already included. So nine kinds of herbs were cooked with four cups of cold water for one to two hours. Since this medicine was made up of drugs that came from far away, the constitutents were bought already mixed and packaged at the drug store. My father would examine the mixture carefully, although it was already cut up, to make sure that the eight essentials were there plus the ninth for good luck. Small amounts of rice wine and meat were added to give flavor to the draught. "Eight Precious Things" has been a popular and traditional decoction for those anemic ones who need special nourishment, — maybe the Chinese equivalent of our present day vitamin mixtures.

Pharmacy was learned by apprentices and the children of pharmacists, but was not generally taught in Chinese schools at that time, so my brother was sent to the Western Medical College in Canton, but, being a girl, I was not supposed to go so far from home.

Some of my early recollections before I left home for school are not botanical at all, but nevertheless formed part of the cultural background of those who grew up in the village of 上 杭 Shanghang. When I was very small, maybe four or five, I used to watch an old man, the temple curate, at the deserted neglected temple, only three blocks distant from my home, carrying on the age-old tradition of making rubbings from certain anciently inscribed stones. These were looked upon with reverence as examples of the calligraphy of ancient times. The old man who made the rubbings, using an ink or perhaps more properly speaking a black paste of soot mixed with tung oil, could make about three sets (12 big sheets) of rubbings each day. These, sold to pilgrims and literary visitors, provided his living.

Later, I found that these same rubbings, having been pasted on scrolls, were sold as prized antiques in book stores. These folios were often used as models to copy in some middle schools. It was told that these were the handwriting of the great scholar 王守仁 Wang Shou-Jen, styled "陽明 Yang-Ming," of the Ming Dynasty, in 1472-1528 A. D. He was a great philosopher and calligrapher. His writing typified one of the orthodox styles of Chinese handwriting. This temple was called by villagers "陽明祠 Yang-Ming Tz'u," the temple for worshiping 王陽明 Wang Yang-Ming. After I came down to Swatow for High School, my class was told to copy Wang Yang-Ming's style for daily exercises. I felt very proud to tell my classmates that the folios which were to be copied came from my village, 上杭 Shanghang, Fukien. So we learned without being conscious of it that writing and literary composition were fine arts which we were to perpetuate.

Three years before our family moved from Shanghang to 饒平 Jao-Ping, Communists had killed the high school teachers and several of our family. They had also burned out the big temple's interior, and it stood, just a gutted ruin, neglected and weed-grown. When I went to primary school it was to this same old, neglected temple, rebuilt enough to convert the ruin to the purposes of a school. So here I learned to read and write, where a couple of years before I had stood and watched the old man making rubbings, practicing one of the oldest printing crafts of China. I studied in this public school only for one year. It was a very big, stone temple, an architectural treasure built in the old time. One could judge from the window screens, some of which remained. These were made like the rood-screens of a medieval European church, filling the window apertures with a foliated design surrounding figures of two war gods constructed of glazed tile. Such screens fulfilled the function of solid windows, admitting light and air through the openings between the tiles making up the design, for in that mild climate the building could be essentially open. Such tile window screens were works of art that would not be equalled in these later degenerate days. In the front yard there was a big well with seven round holes in a circle, that villagers called "七星井 Seven Star Well." It seemed that this big well was a complex of seven small ones, where seven people could draw water at the same time. The big front yard was used as a play ground by the pupils. Every morning we had our flag-raising ceremony there, the star flag of the Republic. There was only one big censer left in the main building. In the back yard lay those four big, long slabs with the old and beautiful inscriptions from which rubbings were treasured by scholars and antiquaries throughout China.

Our text books came from Tingchow city, where wood block books were still made. These were not type-set, but printed from wood blocks on which all the characters and illustrations were carved in mirror-image of what was to be printed. Our exercise paper for writing and other lessons was printed at home from blocks owned by the family, from which supplies of the printed forms could be prepared when wanted, and the same blocks would do for all the children as they grew to school age. Shanghang village belonged to Tingchowfu which was a Prefectural city in the old days. The Prefectural examinations of students took place in Tingchow city, which was the industrial as well as governmental center. European books such as Bibles and Hymn books were imported at Shanghai and brought from there. After translations (into different dialects) were made in Shanghai, these books were transported to different cities. All books except elementary school books came from Shanghai by way of Chekiang province. Tingchow city was an important transportation center in the old days, and is also in a strategic position today. During the Second World War Japanese occupied the coastal cities of Fukien, and Amoy University was evacuated to Ch'angting, this old city of Tingchowfu, for several years. Gazetteers were printed here by order of the governmental offices in different periods.

Our daily food was mainly vegetable including rice, taro (*Colocasia antiquorum*), sweet potatos (*Ipomoea Batatas*) and wild yam (*Dioscorea japonica*). People living inland could secure fresh-water fish, but sea foods were always dried or pickled when purchased from the grocery stores. Almost every family had its own garden vegetables to provide for daily consumption. Those who needed or wanted to preserve more than their gardens provided of certain kinds of vegetables could always go to the early morning market where there were stalls for the sale of different kinds of vegetables of the season. Some vegetables were pickled, such as mustard greens (*Brassica cernua*), cabbages, radishes (*Rhaphanus sativus*), turnips (*Brassica campestris*), and various kinds of beans. Most common foods were mungo beans (*Phaseolus Mungo*), string beans (*Phaseolus* sp.), edible-pods of "sweet" peas (*Pisum sativum*, not the sweet peas of American flower gardens, which are *Lathyrus odoratus*) and soy beans (*Glycine hispida*). From the flour of mungo beans transparent noodles were made. The species of *Phaseolus* which provided our "string" beans is called "chicken-intestine beans" because each pod reaches a length of about 3 to 4 feet, but the diameter is only that of a pencil. We call the string beans of the American garden "spring beans." *Pisum sativum* was picked before the peas were mature, because the young pods were the best. From soybeans many different things were made. Bean curd, bean cheese, bean milk, bean cake, bean paste and soy sauce were manufactured.

There were two kinds of radishes. The skin of one was pure white and the other was white mixed with purple. Some were round, and some were oblong in shape. The average size was about 6 inches in diameter and 10 inches long. The green leaves were cut off and pickled separately. One could buy these big radishes with the green top off, in the market or from pedlars, in units of fifty or one hundred catties (the catty is about a pound and a third). Preparing radishes for eating was a long process.

The first step was cleaning. Villagers used to carry loads of radishes to the river or nearby stream to wash off the soil and then dried them in the sun on bamboo mats along the sandy beach. The sunning continued until the roots lost their turgidity and began to wilt. It was best to preserve the whole root, but it would hasten the process with very huge ones if they were cut into a few pieces. When the sunshine was strong, a day's sunning would be enough, but often it took two days until these radishes were softened.

Second step was rubbing with salt and pressing with heavy stones. Large quantities of salt were used. The roots were rubbed with rock salt granules (not fine table salt, but the rough salt as it came directly from the salt field) in a big wooden tub. Then the radishes were transferred to a big porcelain jar about 4 to 5 feet in diameter or to a big wooden barrel of the same size but about 4 feet deep. Heavy weights or big stones were put on top to press them tight. A few days later water had been drawn out and fermentation followed. After three weeks they became edible, and could be eaten directly as taken out from the salty water or cooked with meats, but mostly they were processed farther by drying. Very often the Japanese and Koreans completed their pickling of radishes in this wet stage. But in my village, the dried kind was considered the best.

The third step was drying. The salty water was squeezed out from the pickled roots. Then they were sunned on bamboo mats for one or two days and finally steamed in a big bamboo crate. They were very soft and strongly odorous. Again dried in the sun for one day, again steamed, and the process repeated until the roots turned to the right shade of dark brown, and they were done. The longer the steaming and sunning processes, the better the color that would finally be obtained. The average single root at the end of processing was flattened, and about 1 to 1-1/2 inches wide and 12 inches long. It was eaten after cooking, or as it was. When prepared, it was cut into small pieces or little strips according to the shape of the other articles which it accompanied in cooking. In Chinese culinary practice, cutting up materials was considered an art. One could cut the radish root into very thin slices transversely and stretch it into a larger piece, to wrap up meats for dumplings. If it was cut in an oblique direction, it gave narrow strips, which could be used as strings to tie the meat roll. Radishes or other vegetables thus preserved could be used in various recipes.

A last step was storing away these radishes. They were packed very tightly into a narrow-mouthed earthen jar and covered with rice straw on top. Big, dry bamboo leaves covered the mouth opening of the jar and these were tied with straw string. Yellow mud paste was coated over the outside of the leaf covering. Finally the jar was inverted in a heap of dry ashes to prevent moisture getting into the jar. Thus carefully preserved, one could usually keep the pickled and dried radishes for five or ten years.

Shanghang village is well known in Fukien for her pickled and dried radishes, a product which is one of the nine famous dry preserved foods of Fukien (such as Tingchow's dried persimmons, Lien-Ch'eng's dried sweet-potatos, San-Ho-Pa's dried cakes of bean curd, etc.).

In most places the bean-curd cakes were thick, perhaps when dried, a third or a half inch thick. In San-Ho-Pa they were made very thin, and travellers liked to carry them as a special treat. They were often going-away gifts. Sometimes in China local industries depended upon special skills and sometimes more upon local abundance of some agricultural or horticultural product for which the soil and climate were especially favorable.

The trade in agricultural seeds is not so standardized in China as in America, for each family saves its own seeds. Good strains are passed about by gift to relatives and friends or by exchange if especially good, and so it comes about that particular horticultural varieties and forms are distinctive of a place. Everyone is willing to pass along good seeds to a fellow-villager who needs them. Sometimes they get into the shops for sale, but local people do not depend upon that, but ask for what they lack and need. Very few people buy seeds, and everyone is curious about trying a neighbor's variety if it seems better than his own. Thus, a rigorous system of plant selection and adaptation to locality prevails.

I went to a boarding school in Tingchow city with my three sisters-in-law, who were brought up in our family through child-marriage, and we went to school together. Tingchow (now known as 長汀 Ch'ang-ting) was one of the paper manufacturing centers in Fukien province. There were many primitive little paper factories near Nai Yang T'ang village which is only 30 li away from my home. My grand-uncle owned several paper mills in this village, which I visited with my brother.

Bamboo (*Arundinaria* sp.) was the main raw material. After the bamboo was cut down and brought back to the factory from the forest nearby, each stem was split into halves and they were soaked for weeks with alkali solution in a big square basin or reservoir perhaps fifteen feet long, ten feet wide, and ten feet deep. Big stone weights were put on top to keep these bundles of bamboo submerged. When they were soft and decomposed they were transferred to another square basin of running water in order to wash out the alkali. Paper factories were always located on slopes near little brooks or streams where fresh water was available for supplying the basins. After the treated bamboo turned soft, the basins were drained. A mallet and wooden club were used to pound and stir the pulp. Then the soupy pulp was sieved through screens into thin layers. Several of these were superposed on each other to be pressed and dried afterwards. The sieve was made from very fine bamboo sticks tied together to look somewhat like the modern bamboo place-mat found in gift shops in this country. One could always see the transparent lines or stripes on bamboo paper of Chinese make. The size of the sieve and therefore of the sheet was about 28 x 14 inches. A big castle-like stove, equal in size to a little house, was built for drying paper. It was built from clay or mud bricks with a big chimney on top. Pine wood was the main fuel. Outside, the stove was coated with plaster, polished smooth and shiny. A single sheet of paper from wet pulp was picked up by stamping a wooden board, which was rubbed with starch or plaster powder, on the pressed pile of wet sheets. The separate sheets, until picked off singly, could not be distinguished in the mass. The single sheet was then pasted on the wall of the stove. A bamboo ladder was used by the workers to dry paper on the stove wall. They kept the sheets in very good order, line by line. A few seconds after being placed on the stove, the dry paper peeled off itself and dropped down to the floor, ready to be picked up and stacked away. It was very interesting to see those men working on ladders on one side to paste on the wet sheets and on the other side some one helping to peel off the dry sheets from the wall if they adhered and did not drop off themselves. One hundred fifty sheets were piled together and then the whole bundle was folded together into thirds, with ends overlapping. Four bundles of this size were placed together, and a similarly folded but thinner and more flexible bundle of 75 sheets was added at each of the two ends of the stack. Four middle bundles plus two side bundles made a stack unit. A small, thin, strip of bamboo string was used to tie the stack together. A big seal or trade mark was stamped with red ink, on top of this stack and it was then ready for the local market or for shipping to other cities.

Some factories used rice straw instead of bamboo to make paper. Rice straw yielded the common paper, but bamboo furnished the better grades, used for printing and for window panes. Paper made from the bark of Mulberry trees (*Morus alba*) was often used for painting, and that made from *Broussonetia papyrifera* and *Broussonetia Kasinoki* was used for wrapping. In some villages people produced and dried bamboo pulp, and then sold it to the factories for the rest of the paper making process. Along the road-side in the sea coast villages of southern China one always saw dried bamboo pulp in numerous lump-like mounds, a yard high, like the salt mounds in the salt field along the sea coast.

Hakka women were the principal burden carriers engaged in transporting the raw material for paper and the bundles of the finished product in the villages of 連城 Lien-Ch'eng and 峯市 Feng-Shih.

These women were always dressed in blue gowns and black trousers, just as if they were in uniform. Each wore a round, flat, straw hat with a big hole on top through which a pin fastened the hat to the hair. Four rectangular pieces of blue cloth, about 7 x 5 inches each, were sewn along the edge of the hat, two on each side. These rectangles served as a sun visor and were blown by wind while walking. Also, the motion of walking would make them flap like fans or punkahs, so they were a cooling device. This costume is still characteristic among Hakka tribes. Blue was the most popular color, but cream, gray and black were colors of mourning. Red and other gay colors were for young girls. One could hardly find small, bound-footed ladies among Hakka people, because women had to go out and share all the work with men.

Ch'angting 長汀 was not only a paper-manufacturing center, but also was considered one of the chief silk filatures in Fukien. In almost every family in this city the raising of silkworms was a vocation for women. Early in the morning one found groups of young girls and women carrying baskets full of fresh mulberry leaves which they picked either from their own gardens or from nearby hills. Silkworms were raised in round, open, bamboo baskets or trays. White and yellow cocoons were sorted and later sold to the factory by the catty. After the silk was reeled off from cocoons, silk threads were made in various shades from different dyes. These silk threads were used in embroidered works all over the country. Nowadays besides Hangchow, Ch'angting still maintains her fame of being a silk-thread producing city.

I have pleasant recollections of my childhood days whenever I see mulberry trees growing in the neglected, open places in this country. We all enjoyed mulberry fruits, and mulberry wine was made from different varieties. I used to raise a few dozen silkworms in the drawer of my desk when I was in boarding school. Out of curiosity, I picked some big, fresh leaves from the mulberry tree and tried some experiments in intra-vitam staining. Two groups of leaves were smeared with different colored dyes on the lower side of leaves before they were fed to the worms. One group of leaves I brushed or dusted with aniline-red powder and the other group smeared with black soot or painted with Chinese black ink. When these were fed to the worms, colored silk was ejected afterwards. Pinkish silk was obtained from the group which was fed with aniline red and a grayish silk resulted from the worms fed with black ink-smeared leaves. As a result these worms did not look as healthy as other normally fed ones. Whether these worms had received too much harmful dye, is still in doubt. I was scolded for raising silkworms in the dormitory at that time, so I did not try this experiment again, but I have always wanted to do so, using more scientific procedures. It is still uncertain how the insoluble carbon could have got into the silk glands, if it did, but maybe the gray color was derived from some incompletely carbonized constituent of the soot. It became known during the war that the Japanese were using for some unknown purpose caterpillars reared on camphor leaves, and the cocoons of these were gray. It reminded me of my girlhood experiments in *intra vitam* staining.

The Hwa-Ying boarding school was founded by the British Presbyterian Mission. Besides schooling in the three R's, handicrafts were a specialty in the curriculum and considered as very important for girls. Every Wednesday afternoon four and a half hours of handwork was taught in the whole school. Knitting, crocheting and tatting were taught as occidental crafts but the native handiworks such as embroidery, sewing, weaving, and making shoes were also practiced. Materials were prepared by students themselves. Yarn was very expensive in those days; most students just learned how to make the native products such as linen cloth, for which thread was made from ramie fibers (*Boehmeria nivea*); to braid fans, purses, baskets, hats and all kinds of utensil covers from wheat straws and bamboo strips; to make soles of shoes from sheaths of bamboo shoots. These things, common in every household, students would bring to the class for use as models whenever needed.

Summer vacation started early in the first week of June and lasted for three months. During this season boys from school were all supposed to go home to help in the harvesting, and the girls had to help with the drying, threshing, winnowing, polishing and rewinnowing rice for family consumption. There was no heavy harvesting work for our family, because we lived in the city. Mother would take all the girls in the family to the farm to collect wheat straws, and sheaths of bamboo in order to get ready for school in the fall. Wheat straws were selected and tied into bundles which were cut about one foot long. These were put into a porcelain jar. Hot rice water (rice broth) was poured into the jar and then covered. The material was soaked for three days. It was washed with clear cold water several times and then dried in the sun. This simple way of bleaching straws still prevails in some villages. It was amazing to see how white and clean these straws were at the end of the process. Each straw was cut twice, lengthwise, into four strips. The split straws were tied together ready for making braided articles. Some were dyed for making different woven patterns.

On our way to collect the deciduous bracts or sheaths fallen from bamboo stems in the forest, bamboo shoots were often found at the same time. These bamboo shoots were used a great deal among Chinese for food, being cooked, dried, and preserved in jars or cans. Species commonly used were: *Phyllostachys Quilioi*, *Phyllostachys puberula*, and *Phyllostachys mitis*. The ovate sheaths were very hairy outside, smooth and shiny on the inner side, about 18 inches long, 6 inches wide at the base and gradually narrowed toward the apex. When picked up they were all folded together into pleats. These were soaked in water for three to five days and then pressed with a hot iron. They became flattened and stiff like a piece of cardboard. Only certain kinds were good for shoe soles. Several pieces were criss-crossed on each other in different directions. Ramie threads were used to sew them together and then different shapes were cut for different sizes of soles. The whole thing was covered or wrapped with good heavy cloth. Final binding was made by sewing in uniform stitches with ramie cords in various patterns. The top part of the shoes could be put on later.

Ramie (*Boehmeria nivea*) and hemp (*Cannabis sativa*) were used a great deal for making cloth (especially for mosquito netting), sacks, threads and cords. Young leaves of ramie plant are edible and were often used to mix with rice to make ever-so-good puddings. This plant was propagated by rootstocks and grew rapidly in waste ground. At the end of July ramie plants were harvested by cutting down the stems and leaving the rootstocks untouched. In some warmer places two or three crops were obtained every year. The average plant was 4 to 5 feet high and 3/4 inch in diameter. From a plot six feet square, about one pound of processed fibers could be obtained. Almost every family in our village grew a small plot of ramie plants in the garden. Leaves were stripped from the stem by holding the tip of the plant taut with the left hand and ripping off the leaves from top to the base with the right hand. These leaves if too coarse for greens were saved for rabbit food. Clean stems were tied in bundles and submerged in pond water for three days. Microorganisms helped to decompose and loosen the bast fibers from the xylem. Then the bark was easily peeled off from the inner cylinder. We dried the woody cylinders and used them for fuel. A special kind of iron scraper was used to scrape off the green cortex from the bast. White, soft, and strong fibers were thus obtained. One could preserve fibers for years and whenever threads were needed one just moistened them with water before twilling or spinning. The fibers were separated, then rolled into thread with the hand on a piece of roughened tile. Nearly every girl in our village learned how to make threads, for the ancient tradition required each girl to make certain things for marriage gifts, whether she would ever do so again or not.

Among the Hakka, girls traditionally learned about sewing, weaving and embroidery, besides cooking. To prepare the marriage gifts, a girl started to make a few articles several years before reaching the age of marriage (16 to 19 years) although she would have been betrothed while still a small child. These articles were five:

1. Skeins of white- and indigo-dyed ramie threads, of nine ounces each. The number "九 nine" read as "久 chiu" has the same tone as the character which means "to last for a long time." Some girls started this long task at the age of 12.

2. Cotton straps of two different sizes (1/2 and 1 inch wide), and of three different colors (white, red, and black; plain or with patterns), but of the same length (100 feet each) were prepared with the help of the mother or other relatives in the family. One could always buy these straps from the stores, but it was considered to bring bad luck. These straps were wound into different patterns. In Chinese "strap" is "帶子 tai tzu" which has the same tone as the expression "to bring up children." If one bought straps from the store, that meant descendants would come from outside, as, for example, by adoption of someone into the family. Straps were used a great deal, as strings for making children's clothes, because there were no elastic cords in those days, and for decoration of clothing. Those made in patterns with cats, dogs, or flowers, were very pretty.

3. The girl's own embroidered wedding shoes in the very best style. Also three pairs of plain, black shoes (no embroidery) were made by the bride-to-be. One pair for the husband and the other two pairs for the mother-in-law and the father-in-law. These gifts were very important, because all the relatives used to judge to what extent this girl had been properly brought up during her girlhood days.

4. An apron was made with an embroidered front piece, usually a spray of *mutan* flower (tree peony), which symbolizes future prosperity. Either a fruiting branch of pomegranate (*Punica Granatum*) or of lychee (*Litchi chinensis*) was often embroidered in the front, symbolizing "to have plenty of offspring," like those fruits.

5. A pair of pink, silk pillow cases were made by the girl. Always a pair of Mandarin ducks were embroidered as a symbol of good luck. These birds always stay together and it was hoped that the young married couple would also do so, which would mean good luck for the family.

To earn some pocket money for schooling, girls used to prepare "candlesticks" for factories when at leisure during the summer vacation. Candle wicks were made from small bamboo sticks wrapped with white soft pith of rush, Juncus. *Juncus effusus* was the main raw material for this purpose. The slender pithy stems of this plant came from Kiangsi province, where marsh plants grow abundantly. Little round bamboo sticks served as the central axis and two or three strands of soft pith were rolled around it. A few raw silk fibers were used to glue the cut end in order to prevent the pithy strands from ravelling out. Five hundred sticks composed a single bundle. In general seven to eight bundles were completed in a day's work. Cheap labor was common in the Orient. It was surprising to see the small wages one would get from the factory after handing in thousands of pith-wrapped candle sticks. One usually earned 20 to 30 cents per day. Seeds of *Sapium sebiferum* were used in large quantities to make candles. Wax was prepared from the seeds. Candles of all sizes and colors were used in different ceremonies.

Summer days were employed in collecting plants, especially those used for medicinal purposes. I enjoyed every field trip with mother and we were always loaded with all kinds of herbs when we returned home. Fifty species which were often gathered for medicinal and economical uses are listed as follows:

Name of Plant	Part Collected	Economical or Medicinal Uses
1. *Diospyros peregrina* Gurke (persimmon)	unripe fruits	used to dye fishing nets.
2. *Gardenia florida* L. (Gardenia)	fruits	used to dye white cotton cloth for boy-scout uniforms in khaki-color.
3. *Phyllostachys* sp. (bamboo)	thin membrane lining the hollow stem.	used for covering one hole of a flute to produce a tremolo note.
4. *Ginkgo biloba* L.	seeds	food and medicine
5. *Rhodomyrtus tomentosa* Wight	fruits	used for food
6. *Melia japonica* Don	fruits	medicine (in measles)
7. *Momordica Charantia* L. (bitter melon)	leaves & fruits	medicine for fever and food
8. *Acalypha australis* L.	whole plant	to cure dysentery
9. *Agrimonia pilosa* Ledeb.	roots	internal medicine for tuberculosis
10. *Siegesbeckia orientalis* L.	flowers	for cuts (as iodine)
11. *Xanthium strumarium* L. (cocklebur)	fruits	internal medicine for hives.
12. *Vitex Negundo* L. (chaste tree)	young leaves	used for beverage
13. *Verbena officinalis* L.	whole plant	medicine (for colds)
14. *Scirpus cyperinus* var. *concolor* Makino (bulrush)	stem	for weaving mats
15. *Livistona chinensis* Br. (fan palm)	leaves	for making fans
16. *Trachycarpus excelsa* Wendl. (hemp palm)	fibers around petioles	for making raincloaks, brushes and ropes.
17. *Apios Fortunei* Maxim. (potato bean)	tubers	for food
18. *Asparagus officinalis* L. (Asparagus)	roots	medicine (used internally for cure of sore eyes)
19. *Eleocharis dulcis* (Burm f.) Trin. (Chinese water chestnut)	corms	food and medicine in measles.

20. *Punica Granatum* L. (pomegranate)	entire fruit with the peeling	food and cough medicine.
21. *Eucalyptus globulus* Lab.	leaves & bark	for mosquito repellant
22. *Castanea vulgaris* var. *japonica* DC. (chestnut)	seeds	for food
23. *Duranta repens* (pigeon berry)	fruits	medicine (for malaria)
24. *Lespedeza juncea* var. *sericea* Hemsl. (bush clover)	roots	medicine (for malaria)
25. *Plantago major* var. *asiatica* (plantain)	whole plant	medicine for kidney troubles and diabetes.
26. *Pinellia tuberifera* Ten. (Jack in the pulpit)	corms	with vinegar for a lichen disease of skin.
27. *Arisaema japonicum* var. *serratum* Engl.	corm	insecticide
28. *Eclipta alba* Hassk.	whole plant	poultice for bacterial infections and boils
29. *Nepeta Glechoma* Benth.	whole plant	medicine for colds
30. *Sapindus Mukurosi* Gaertn. (soap berry)	fruits	used as soap
31. *Prunella vulgaris* L. (self heal)	whole plant	medicine for colds
32. *Clerodendron squamatum* Vahl.	leaves	poultices of leaves (pricked with silver needle) for boils
33. *Buddleja japonica* Hemsl.	flowers	used for stupefying fish.
34. *Pteris serrulata* L. f. (fern)	leaves	medicine for dysentery
35. *Geum japonicum* Thunb.	root	external medicine for boils
36. *Artemisia vulgaris* L. var. *indica* Maxim.	whole plant	medicine for rheumatism and arthritis
37. *Quisqualis indica* L. (Rangoon creeper)	fruits	medicine for round worms (*Ascaris*)
38. *Lonicera japonica* Thunb. (honeysuckle)	whole plant	medicine for fever and beverage
39. *Prunus Armeniaca* (apricot)	seeds	medicine for sore throat
40. *Thuja orientalis* L. (Arbor vitae)	fruits	medicine for measles, used externally.
41. *Sesamum indicum* L. (sesame)	fruits	medicine for malaria.

42. *Lycium chinensis* Mill. (boxthorns)	fruits	medicine for blood and circulation
43. *Smilax China* L.	roots	cooling medicine for fever
44. *Polygonatum officinale* (Solomon's seal)	roots	external medicine for shingles "neck-snake" and "waist-snake"
45. *Gnaphalium multiceps* Wall.	leaves	for food
46. *Ricinus communis* L. (castor-oil plant)	seeds	medicine
47. *Polygala japonica* Houtt.	roots	internal medicine for tuberculosis
48. *Althaea rosea* (L.) Cav. (marsh mallow)	leaves & root	as shampoo and medicine for fever.
49. *Sedum bulbiferum* Fisch. (stone crop)	whole plant	external medicine for burns
50. *Capsicum* sp. (red pepper)	leaves	used for tooth ache with a blue-shelled duck egg.

If medicines for the stomach appear to be absent, it is because charcoal prepared from rice and pig's stomach, cooked in a ritualistic or magical manner with peanuts, is used for this purpose.

Since I did not know all of these scientific names when I went away from our village to the middle school, or even when I went to college, I have secured them from the Chinese dictionary, by looking up the Chinese names, which in the course of centuries have become almost as standardized as scientific names, for of course the Chinese names with the generally indefinite made-up English names would signify little. I can only say that the identifications are generally correct, at least so far as the genus is concerned.

Because of the turmoil caused by Communists, who often came over from Kiangsi province to Shanghang, it was no longer safe for students and Christians to stay there. Our large family of 40 people had to separate for the first time after living together for generations. My parents decided to move down to Jao-Ping, Kwangtung, seeking safety for their children. Only my grandparents stayed in the original home at Shanghang with one of my uncles. It was quite remarkable that both grandparents lived long over a century. Grandpa died at the age of 104 and Grandma died a few years later at the age of 105.

My grandfather died on October 27, 1930 at the age of 104. My sister-in-law and I could not attend his funeral for we were in the boarding school at Swatow, Kwangtung, and it would have taken a week or ten days by boat to go back to Shanghang, Fukien. The funeral procession was one or two li long. Almost everyone in our village came

Fig. 3. This picture of an aged double-petaled pinkish-flowered apricot, more than 300 years old, was taken in a little temple at Jao-Ping, Kwangtung. Background was a window screen of ancient architecture, made of red tile, and resembling those of the old temple at Shanghang. The receptacle in which the ancient dwarfed tree grew had a dark-green glaze.

to the ceremony and participated in the feast. The procession was headed first by a horizontal wooden tablet gilded with gold on one side. This honorary tablet was about 9 feet long and 4 feet wide and had been granted by the government in honor of my grandfather's 100th birthday. On the tablet, a horizontal inscription of four big Chinese characters were written " 蔚為人瑞 Wei Wei Jen Jui," which means "your auspicious age a good example to our people." Besides this tablet a decoration and certificate were also given to grandpa. We were very proud of this recognition of our family directly from the President. After my grandfather died my father donated this tablet to the ancestral temple of our tribe. The last I knew it was still hanging there as a memorial to my grandfather. Being a woman, my grandmother did not receive any honor from the government, even though she made the same record as my grandfather did. She died five years later at the age of 105. They were both buried in the same Tomb, at a beautiful site which my grandfather had chosen for their own during his life time.

This grave was located by the 汀江 T'ing River, facing the 馬鞍山 Mountain Saddle. It was not far from my home, only three li east of the city. A shelter or an arbor was erected over the stone tablet. Trees and flowers were planted around the place. Bamboo and chestnut (*Castanea mollissima*) trees were grown in the background. Every year at Easter time, (清明節 Ts'ing Ming Festival, when the Chinese worship at the graves) my father would take all the children in the family to this grave and he would conduct a short service there. In the summer time when the chestnuts were ripe, we would go there again to harvest the fruits and at the same time, to do a little weeding work around this arbor.

There was a very miraculous event which happened to my family, which I shall never forget. One day when I was about three years old, we had a religious service at home in our big court yard. Everyone was dressed in a white gown. Even though I did not understand what had happened, I remember the occasion very well for I was deeply impressed. Everybody was mourning for the loss of our grandpa. A big black coffin, which was made of four very heavy long wooden boards and square end pieces, coated with several layers of black lacquer, was laid on the platform of our front court room where we used to have our daily family evening worship. In that coffin lay my grandfather, very formally dressed with a long navy-blue gown and black jacket. He had seemed to be dead for three days, but was only unconscious. Rev. Frank J. Wiens, of California, the Baptist minister, who was a very good friend of my family came to conduct the funeral service that afternoon. My mother carried me high in her arms in order for me to see. After the minister finished the benediction and said "Amen," everybody arose, and suddenly my grandfather sat up in the coffin and talked. Oh, everyone was scared and ran away! Only my father and the minister stayed. They helped my grandpa out of the coffin and onto a chair. Of course the coffin was carried out of the room right away. My grandpa would not sit still and walked straight to our backyard garden. He did not even carry his cane while he walked, and said he was going to meet Jesus Christ on Mount Olive, outside the east gate of Shanghang city. Hot tea and ginger soup were prepared to quiet him. So he was a guest at his own first funeral service at the age of 94. He told his friends about all his wonderful dreams during those two to three days, so he was not strictly unconscious all the time. He lived ten years longer until his "second death" at the age of 104. During those ten years, he was quite healthy, and of course no one in the family ever dared to mention his "first death" in front of him. Needless to say we all were very happy, especially my grandma, to have grandpa with us again.

The custom in the village when one lived over 60 years was to prepare those things needed for his own funeral. A coffin, or four separate heavy wooden boards, a tomb, grave-clothes and shoes, all were prepared during his life time. A woman always saved her precious head-dress after her wedding and finally it was put in the coffin at her death. It was not easy to keep such things so long. I remembered that my grandmother used to air and dry her "壽衣 shou-i," meaning "clothes of longlife" once a year. Most people selected the 6th day of the 6th lunar month, a festival when stored clothing was inspected and dried for the year.

When a baby was born to the family, the custom in the Hakka village was quite different from that in other places. According to the old tradition people gave attention and favor to boys only. Great celebration and feast were given when a boy baby was born, but not so if it was a girl. Three months before the baby's birth, usually the paternal grandmother-to-be began to prepare foods and gifts to be distributed among relatives and neighbors: such preparations were necessary as grinding rice flour (80 to 100 lbs.), raising chickens (12 to 15 roosters), growing ginger, brewing wine from glutinous rice. The maternal grandmother-to-be prepared clothing (about 10 pieces) for the coming baby. It was a superstition that this clothing should be sewed by the grandmother herself to ensure good luck.

On the day when the baby was born, gifts were sent to the wife's mother to tell her about the news. Large quantities of rice dumplings were cooked in chicken broth which was flavored with rice wine and fresh ginger, enough to pass around as gifts. If a girl baby was born, a little red color was added to the dough to make pink dumplings. A big, cooked, whole chicken on top of a large bowl of dumplings, and a decanter of rice wine, were sent over to the wife's mother in a big lacquer basket by a professional woman messenger. In return, the baby's clothes, the same for boy or girl, would be put in this basket. Sometimes jewelry, like a little silver Buddha, gilded with gold, was sent over to be put on the baby's bonnet. As a polite custom, only a half of the chicken was accepted; the other half was returned to the sender. If both families were too busy to observe the traditions, they would agree with each other to send a live chicken with rice powder; in return, a piece of yard goods would be put in the basket instead of ready-made clothes. Usually the cloth was 10 feet long, with blue and white flower patterns. The messenger woman would receive a certain gratuity from the wife's mother for her services.

Three days after the baby's birth, boiled red eggs were prepared (50 to 100, dyed like Easter eggs). Ten red eggs were sent by the paternal to the maternal grandmother, to inform her of the good condition of the new-born one. Relatives and neighbors again would receive a pair of red eggs to celebrate "三旦 San Tan," meaning the "third day" of the baby.

When the baby was one month old, a feast would be given to the friends and relatives. Each one would bring some gift when the baby was presented to the guests during the party for the first time.

If it was a boy baby, a big celebration would be given for his first birthday, but not so with a girl. A big feast would be held in the house, with sometimes more than 100 people attending the party, and birthday presents were received from these guests. After the party a little ceremony followed. The future occupation of the child would be foretold by the selection, by the child himself, of one group of special things displayed on the table. On a table were displayed three groups of things which represented three different types of occupation. The first group, including a book and a writing brush, indicated the scholarly class. The second group, including a pair of scissors and a ruler represented the working class, of which the tailor was an example. The third group, including an abacus and a piece of silver money, represented the business class, the merchants.

There was no indication of the farmer's class here. It was understood that everyone, whatever else he might be, might be a farmer in this great, ancient, agricultural country, in which the population has about 85% of farmers. One would learn naturally all about farming if he was brought up properly.

One of the grandparents would hold the baby and walk toward this table. When the baby saw these things he would grasp one thing which attracted him the most. It was superstitiously believed that this would foretell the child's future occupation. It was not surprising that most babies would grasp either a book with pretty red pictures on its cover or a shiny piece of money.

Many traditional festivals were celebrated. Almost every month there was one particular event to be remembered, either of historical or agricultural significance. Our calendar was based upon the solar system, or the so-called "Farmer's calendar," including 12 lunar months in a year, with an extra "leap month" every third year. Besides the ordinary numerical names, literary names for the months were used among scholars, and I assume that such ancient ways have not changed among village people even after the changes brought by Communism. So I shall speak of them in the present.

First month is also called "Spring Month," or also "孟月 Men Yüeh." The word "Men" originated from the name of Mencius, in respect for this great scholar. "Men" means first, senior, and great in everything. So the first month of the year is called "Men" month. In this month we used to celebrate Chinese New Year from the first day to the seventh day, and also a Lantern Festival, on the 15th day. "元宵 Yüan Siao" Festival is celebrated at the first full moon of the lunar year, when dumplings and spring rolls were eaten at the Lantern Feast. Lanterns were made of different colors of paper in various shapes, such as dogs, goats, deers, butterflies, goldfish, horses, dragons, lotus flowers, tree-peony (*mutan*) flowers, roses, plum flowers, sailing boats, and others representing historical legends. (Nowadays, air-planes and steam-boats are added to the list.) Every household bought a big lantern and hung it in front of the house as a decoration and a symbol of good luck. Children would receive many lanterns as gifts from the elder generations among relatives. A parade would be held on the night of the 15th day. After this festival, farmers were supposed to resume their work for the coming new year.

Second lunar month is called " 杏月 Almond Month," on account of these trees blossoming during this month. On the 12th day a Flower Festival called " 花朝 Hua Chao," meaning the birthday of flowers is observed. Every woman in the village wears some flowers in her hair, no matter what kind, just to join the celebration.

Third lunar month is called " 桃月 Peach Month." Every child in the village knew the song "Little peach fairy is wearing her red garment on the third day of the third month." The 清明節 Ts'ing Ming Festival is observed, at which Chinese worship at their ancester's graves. A special kind of rice pudding, stuffed with sweetened raddish strips, is prepared for this festival. Ts'ing Ming means clear and bright, for all plants are then in fresh green leafage. So the rice pudding is also dyed green by mixing the dough with young leaves of ramie (*Boehmeria nivea*) or cudweed (*Gnaphalium multiceps*). It is a very pretty green in color and pleasant in taste also. Now this festival has been modified by the government to be a festival of tree planting.

Fourth lunar month is known as "Wheat-harvest Month," and " 槐月 Huai Yüeh," month of Sophora trees (*Sophora japonica*). This resembles the American locust tree. Its flowers are used for yellow dye, and its timber is useful in many ways. This kind of tree grows abundantly in the northern part of China.

Fifth lunar month is also called either " 榴月 Pomegranate Month" or " 蒲月 P'u Yüeh," the latter name from a kind of rush (*Scirpus lacustris*) used for making kneeling mats, fans, and bags, and sometimes "full month," because of the 夏至 summer solstice which occurs in this month (June 21 in Western calendar). We celebrate " 端午節 Tuan Wu Festival" with the dragon boats' race on the 5th day of the 5th month. " 粽子 Tsung tzu," glutinous rice dumplings or puddings, are wrapped up in two broad bamboo leaves, forming an angular cone about the size of a pine cone, and tied with a string of rush or palm-leaf straps. These are boiled, and eaten at such a feast. The traditional celebration is held in much the same manner all over China, in memory of " 屈原 Ch'ü Yüan," a great officer of state in the Ch'u Dynasty. Children receive many perfume-sachets from relatives. They were made very skillfully and embroidered in novel ways. The reason for the dragon-boat race was that Ch'ü Yüan gave good advice to the Emperor which the latter disregarded. So Ch'ü Yüan committed suicide by drowning to emphasize the importance of his admonitions. The people loved him and many sped in their boats to rescue him, but were too late, because the boats were not fast enough. So now the very swift dragon boats race in his honor. These boats are kept stowed away as the property of certain temples or clubs (nowadays chambers of commerce) to be redecorated when brought out for the annual event. Puddings prepared as described are traditionally dropped into the water for the spirit of Ch'ü Yüan.

Sixth lunar month is called " 蓮月 Lotus Month." On the 6th day of this month, a festival known as " 天貺節 T'ien Huang Tsieh" is celebrated. On that day clothing is dried and aired and meats are eaten. It is considered a special day on which Heaven bestows virtue upon man.

Seventh lunar month is " 桐月 T'ung Month." T'ung is *Aleurites cordata*. It is also called " 蘭月 Lang Month" (*Epidendrum*, an orchid). On the 7th day of this month, known as the " 巧日 skill day," women used to gather around the house to show their skill in needlecraft by competition. The same evening the family would observe the festival of "double seven," in memory of the union of the constellations of the 牛郎 Herd-boy and the 織女 Spinning Damsel (the star Vega in the constellation of Lyra). My father used to tell us the story of the Milky Way and other astronomical legends. On that day of the year there should always be a little bit of rain or at least scattered rain drops, symbolizing the tears of the Herd-boy and the Spinning-girl, who met only once a year on that day. Cooked or roasted broad beans (*Vicia Faba*) were eaten, to signify strengthening of friendship with one another. In the evening of the 14th day, instead of the 15th day, a ghost festival was observed (corresponding to Halloween Day in this country). Villagers set all kinds of meats and vegetables on the ground as offerings for evil spirits in the hope that they would not disturb the family during the year. A special dish was used for this occasion. Taro (*Colocasia esculenta*) was the main raw material, from which different recipes were derived. Cakes, pies, puddings and noodles were made in every household in this month of the year.

Eighth lunar month is known as " 桂月 Kuei Month." *Osmanthus fragrans* is in its full bloom during this time of year. The biggest occasion of this month is the " 中秋節 Mid-Autumn Festival" on the 15th day. To observe the full moon, special gifts are to be obtained in all the stores as in this country before Christmas. Like the Dragon-boat festival, one would find people observing the Mid-Autumn festival almost in the same pattern all over China. In our village, besides making big " 月餅 moon cakes," another special dish was always found in every home, a steamed duck, stuffed with Chinese chestnuts (*Castanea japonica* or *Castanea mollissima*). Moon cakes of different sizes were made, ranging from little molded carp-fish two inches long up to the giant, round moon-cakes three feet in diameter and about one inch thick, which were beautifully molded with various designs. These cakes were made of pre-cooked rice flour, water and sugar. The molds were carved wooden blocks of different shapes, such as carp-fish, symbolizing good luck and success, 銀兔 silver hare, a name for the moon; and a figure of "嫦娥 Ch'ang O," the lady in the moon; the rest were mostly historical figures and beautiful scenic designs. These cakes were in two different colors, one plain white and the other pink. The cake was placed on a sheet of square paper with contrasting colors and then carried on a bamboo tray. Everywhere one found people receiving and giving away these cakes as gifts. In the evening of the 15th day, the cakes were displayed in the front court of the house. All family members would sit around to enjoy the moonlight. Later, tea would be served and moon cakes were eaten in enjoyment of this Mid-Autumn Festival.

In our family various kinds of small molds made of carved wooden blocks were kept for generations. These were used for shaping the puddings or cakes to celebrate different festivals. On birthdays, the puddings were shaped like a peach, about the size of the hand. Peach is the symbol of longevity, and originated from Lao-Tzu, the god of longevity. Birthday cakes and puddings are given out as gifts to relatives, friends and neighbors during this occasion.

Ninth lunar month is the " 菊月 Chrysanthemum Month." On the 9th day of this month, we have a "Double-Nine Festival" and children play kites everywhere. One may see kites of many designs in the sky, such as birds, dragon-flies, butterflies, lanterns, air-planes, fish, and even miniature little houses. The weather during this month is mild and the breeze is just strong enough to float the kites.

Tenth lunar month is known as month of the " 小春 Little Spring" (equal to Indian Summer here). The other literary name is " 梅月 Mei Yüeh," "Apricot Month." Double-Ten Festival is the biggest National holiday observed by every Chinese on the 10th day of this month.

Eleventh lunar month is called " 葭月 Chia Yüeh," after a kind of reed-grass (*Phragmites* sp.), harvested during the winter. " 冬月 Winter Month" was the common name among the villagers, because winter solstice occurs during this month (December 22 in Western calendar). We always celebrate this " 冬至 Tung Chih" festival, meaning "winter arrives" three days before Christmas. Glutinous rice dumplings, coated with brown sugar and peanut crumbs, are eaten in every family and symbolize the gathering of family members. It is a custom to have the whole family help make these dumplings together around the table. Part are given away to the neighbors, and we also recieve some from them. Exchanging gifts is very common in our villages.

Twelfth lunar month is called "臘月 Wax Month," on account of the wax-like flowers of *Chimonanthus fragrans* and *Chimonanthus praecox*, which flower abundantly in the winter season in the south of China. Another name, "嘉平 Chia P'ing," means good, or excellent month. In the old classical books one always encounters this term for the publication date. The ways of celebrating Chinese New Year are almost the same in every part of the country. Different kinds of rice puddings and meat puddings are prepared by each family. In some villages the celebration is started by cleaning and decorating the houses, preparing foods, sending out gifts to relatives, sewing new clothes for their children, etc., right after the 15th day of this month. During the New Year, special things are eaten by villagers to symbolize good luck and prosperity in life. Among these, ten common fruits are: oranges (*Citrus sinensis*), tangerines (*Citrus reticulata*), signifying good luck; Chinese olives (*Canarium album*) signifying money; lychees (*Litchi chinensis*), longans (*Euphoria longana*), watermelon seeds (*Citrullus vulgaris*), and jujubes (*Zizyphus vulgaris*) signifying fertility and children; peanuts (*Arachis hypogaea*) signifying everlasting fruits; sugar cane (*Saccharum officinarum*) signifying growing higher every joint, gradually rising; carambola (*Averrhoa carambola*) signifying a smooth and peaceful life.

The four seasonal flowers 四季花 as depicted by artists are: Epidendrum indicating the spring, bamboo indicating summer, (lotus, *Nelumbo nucifera*, is sometimes used but its flowers are rarely kept), chrysanthemum indicating autumn, apricot and Chimonanthus indicating winter. Also "歲寒三友 three friends of winter" are often painted on scrolls, i. e., the 松 pine, the 竹 bamboo, and the "梅 mei" (including both apricot and Chimonanthus flowers; apricot flowers are white and Chimonanthus flowers are yellow).

"梅蘭竹菊 *Mei, lang, chuh, chü*" are known as four seasonal flowers: *"Mei"* is *Prunus Mume*, *"lang"* is *Cymbidium ensifolium*, *"chuh"* is *Bambusa* sp., and *"chü"* is *Chrysanthemum sinense*. Although bamboo is seldom seen except sterile, artists always paint bamboo twigs to symbolize the summer.

After our family moved down to Kwangtung province, I was transferred to the Presbyterian Mission School in Swatow. This is a city of linen, laces and citrus fruits. Delicately embroidered handiwork is exported to foreign countries. A woman sitting beside the doorway of her home, working deftly with needle on a piece of fine linen or grass cloth, was Swatow's chief symbol of trade and industry. Walking through the side streets or visiting the surrounding villages one would find hundreds of women and girls thus employed.

Our new home in Kwangtung was located within one of the extensive citrus and lychee belts in the South. Our beautiful Shanghang garden was finally deserted and overgrown with weeds. To abandon the rare and valuable plants that had been grown with great care for so many years was a keen sorrow to my mother. It was very hard to start over again, especially in this strange new city. Mother died not long after from anxiety after being threatened by the Communists.

After graduation from primary school I studied in the Christian Mission Society Girls' School in Foochow. This school was located by the Min River. The whole 300-mile portion of the Min which is navigable to shallow-draft vessels, possesses unusual charm and has been compared to the Rhine, so the region it flows through was known as the Rhineland of China. Foochow leaped into prominence in the fifties, sixties, and seventies as a source of 武彝茶 Bohea tea (*Thea* (*Camellia*) *sinensis*) grown in the northern part of Fukien province. Tea grown in Assam, Ceylon, and elsewhere has caused a serious decline in the Foochow trade. Merchants were more recently turning their attention rather to green teas, so popular with the Chinese, than to the black teas for export trade.

Thea (*Camellia*) *sinensis* L. grows abundantly in the northern part of Foochow. In the second edition of the "Species Plantarum" Linnaeus judged it better to distinguish two species, *Thea Bohea* and *Thea viridis*, which he believed to correspond to the commercial distinction between black and green teas. It has since been proved scientifically that there is but one species, comprehending several varieties, from all of which either black or green tea may be obtained according to the process of manufacture. Various types of teas and their terms (e.g. Pekoe, Seuchong) resulted from different periods of plucking, size of leaves, and the subsequent treatment, whether "fired" or fermented. From *Thea Bohea* the black tea was supposedly manufactured from *Thea viridis* the green. " 行 Hang," the firm or business warehouses, were grouped in the city. Hundreds of women and girls were employed by the factories. Sorting out stems and petioles from tea leaves after processing was the main job for these workers. Wages were paid according to quantities, in pounds, of stem ends and leaf stalks, which had been sorted out from fragrant tea leaves at the end of the day. This was the main vocation of women and girls of the working class in this city. Various kinds of fragrant flowers were used in giving modified flavor to tea leaves; these included *Jasminum Sambac*, *Gardenia florida* var. *radicans*, *Citrus pompelinus*, and *Magnolia conspicua*. Early in the morning one would see groups of villagers carrying loads of fresh flowers in flax bags, rushing along the streets toward the tea factories. Fresh and fragrant odor made the atmosphere enjoyable to everyone who passed along the street.

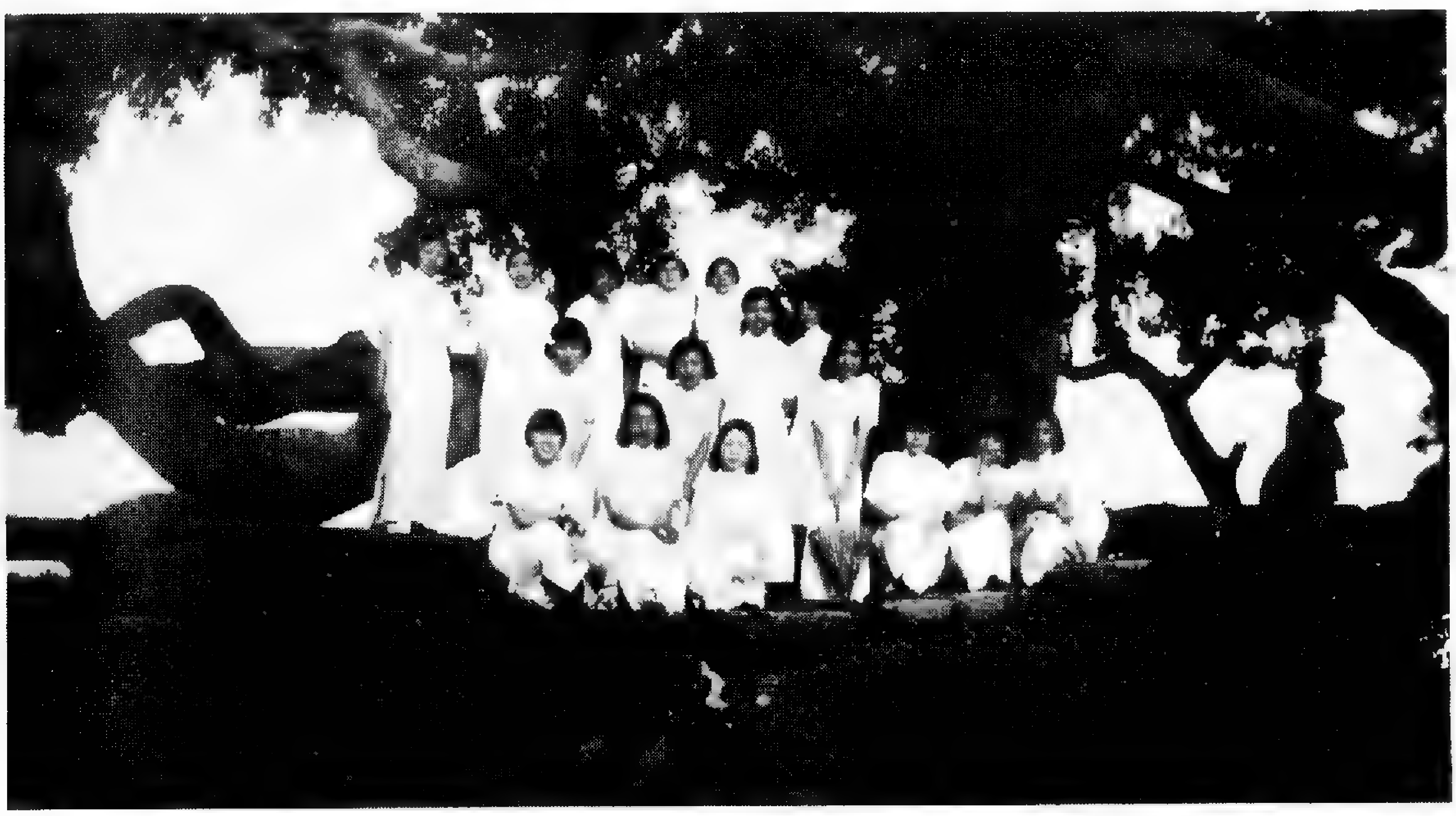
Lacquer-ware was also an important industry besides tea trade in this city. Lacquer was produced from *Rhus vernicifera* which grew in great abundance in the northern part of Fukien. Foochow was the only city that exported the famous lacquer-ware to other countries. The sap of the Chinese lacquer tree is as poisonous as that of its American relative the poison sumac. Even the 漆器 lacquer-ware is poisonous for a few days until completely dry, but the hardening and oxidizing take less time if "precooked" lacquer is used. According to Foochow tradition the most poisonous lacquer is that from the "seven-leaved lacquer" but I have never had a chance to look into the botany of this supposedly different species and do not know how well established the belief may be.

A visit to 長樂 Ch'ang-Loh was one of the memorable experiences of the class excursion after my High School graduation day. Deaconess C. J. Lambert, the principal of our school, was the group leader. The whole class, only eight students, took this trip for the first time as a special entertainment arranged by the school. We stayed in one of the girls' dormitories of the British Mission School there for five days. Every day we enjoyed our sight-seeing tour.

Ch'ang-Loh is a small city located south-east of Foochow. It is situated on the coast and all kinds of sea food are exported from there. We travelled from Foochow by a small steamboat, and when we arrived it was low tide, and the steamboat could not reach the shore. A little ferry boat came to our rescue. During the low-tide hour we saw numerous jelly-fish of the kind called "Portuguese-Man-of-War" pulsating in the muddy water near our boat. One could catch a dozen of them very easily. These jelly-fish were used as a common dish by the villagers there. They were hardened by soaking them in alkali solution for seven days, and then in fresh cold water several times, in order to wash out the excess lime. The white "sail" part or the "float" of these jelly-fish was sold separately from the reddish tentacles. The former was more expensive and the latter cheap. They were eaten both raw and cooked especially with the morning rice, or as one of the delicate dishes of a feast.

In the deep water we saw schools of cuttle-fish and squids swimming around our steamboat. Each school numbered about fifty to seventy. A kind of coelenterate called "sand-worm" or "sea worm" was used by villagers for making soup. These long hollow creatures were about the diameter of the little finger and a foot or so long. They were cream-color when fresh, and contained a good deal of sand. When prepared they were turned inside-out to free them from sand, and then cut into short pieces. They were a much appreciated seasonal delicacy but could be preserved by drying. King crabs were often seen all over the sandy beach. These crabs, and especially their bead-like eggs, were sold on the market for food. Scrambled with duck eggs they appeared frequently on the menu of the girls' boarding schools. The shell was used for making water dippers or ladles, used as kitchen utensils. It was a superstition that these crabs always swam in pairs, and if a person saw one crab only on shore, that was a bad omen. It would be thrown back into the sea.

Fig. 4. A visit to one of the most famous graves (Chen Wan-P'o) in eastern part of Foochow. This class picture was taken in front of the honorary arch (above) facing the big grave, that was surrounded by many lychee trees (below). Possibly these lychee trees were aged enough to verify the history and legends recorded in 1059 A.D. by Ts'ai Hsiang, in the ancient monograph "Li Chih P'u" and repeated centuries later in "Kuang Ch'un Fang P'u" by Liu Hao (edition of 1708 A.D., volume 18).



We visited all famous temples in very beautiful scenic settings. Aged planted trees added to the naturally attractive landscape. In the ancient days Ch'ang-Loh was famous for certain fruits such as a long variety of the peanut (*Arachis hypogaea*) and a few distinctive local varieties of Lychee (*Litchi chinensis*). The latter were mentioned in the early monograph "Li Chih P'u" by 蔡襄荔枝譜 Ts'ai Hsiang in 1059 A. D., and were also recorded centuries later in " 廣群芳譜 Kuang Ch'un Fang P'u" by 劉灝 Liu Hao, edition of 1708 A. D., volume 18. We saw many aged lychee trees there and probably those were the relics which might verify the history and legends. While reviewing the ancient literature about lychee recently in my research, my memories of this old city certainly helped me to understand better the geographical distribution of this plant.

After graduation from High School I majored in Botany at Hwa Nan College. College life there was varied during the different periods of our national affairs which ended up my refugees' life in 南平 Nan-Ping, an inland city in the northern part of Foochow, to which we were evacuated for eight years. We borrowed some buildings from the Methodist Mission to be used as our class-rooms and dormitories. Later, a few temporary buildings were put up within the campus of Nan-Ping Methodist Mission. Classes were conducted in irregular hours, because we had to share with Nan-Ping (劍津 Chien Chin) Middle School all of their class rooms. Hwa Nan High School was also evacuated to Nan-Ping at the same time. So three schools had to arrange their schedules differently in order to fit all the classes into those limited rooms. Three schools shared one assembly hall. If one group could not finish the lecture or meeting hour on time, another group had to use the play ground or tennis court instead. Classes were given early in the morning from 6:00 to 9:30 A. M., and later in the afternoon from 3:00 to 6:00 P. M. Because of the interruption caused by air raids, often ten times a day, each time taking from half an hour to two or three hours, our studies were much broken. Early morning in Nan-Ping is always very foggy and that time was considered safest from the bombs. Very often we had to conduct our classes in front of the dug-outs even in early morning or in late afternoon. Every student carried her own little bamboo or wooden stool, and so we could hold our classes anywhere, in the open or under big trees for shelter. Mostly all the senior-class students and graduates carried their theses with them to the dug-outs for safety's sake. One thought that the work she had put into her thesis could be less easily replaced than any other possession. Besides carrying her own stool, each student also carried limited and stipulated articles of clothing in a bag, which had been inspected by the class advisors. When we had air-raid drills, each group would run to its own dug-out which the school officers had assigned to it. Various ditches or little woods nearby outside of the campus were also assigned to each group. So if any great calamity occurred inside the campus, we would know where to seek refuge. Our science laboratories were always located on the ground floor of buildings, to avoid vibration, which could easily damage the equipment. Sometimes the apparatus for some experiment would have been just set up as the siren sounded. We would have to give up and to leave the laboratory at once. One time a bomb exploded so near the campus that I was deaf from the concussion for some time.

Malnutrition and sickness (malaria) affected almost every student during those years. Fruits of pigeon berry or dew berry (*Duranta repens*) and roots of *Orixa japonica* were used in hope that they would be a substitute for quinine which was scarce and expensive. Those students who belonged to the Biology Club were allowed to have plots of land in the vegetable garden for experimenting with growing flowers and vegetables as part of their practice in plant physiology, and we managed to get something to eat from our plots. Also to raise rabbits for the experiments in genetics, all members of the Club took turns in searching for plants for rabbit food, and in watering vegetables. We all enjoyed such special projects as a kind of recreation.

In Nan-Ping, soils are very fertile for vegetables and very little care is needed. Acid soil prevails, as one might judge from the gorgeous blooming of Azalea in the spring time. Mushrooms (*Cortinellus shiitake*), red mushrooms (*Russula* sp.), ginkgo (*Ginkgo biloba*), chestnuts (*Castanea vulgaris* var. *japonica*), bayberry (*Myrica rubra*), kumquat (*Citrus Fortunella*), and hazel nuts (*Corylus heterophylla*) were the famous edible products of Nan-Ping city.

The temporary campus of our college was situated on top of a hill and Hwa Nan High School was located on another hill. Only five minutes walk along a horseshoe path took us from one to the other. In the campus of Nan-Ping there are plenty of trees, such as *Eucalyptus*, spruce, banyan, fan-palms, bamboo, *Citrus* sp., *Diospyros Kaki*, *Sapium sebiferum*, *Cunninghamia sinensis*, and *Pinus* sp. It was very convenient to take students out for botanical field trips, for there was a great diversity of plants at hand.

Inside the campus there were four cycad trees (*Cycas revoluta*). The largest one was about six feet high, with trunk one foot in diameter, and feather-shaped fronds with prickly edged petioles. The frond was about five feet long and fifteen inches wide, with numerous separated, stiff, narrow leaflets or pinnae. These were glossy above and with whitish bloom underneath. The whole frond was very strong and flexible. People used to make funeral wreaths from the fronds, by bending them around and tying the ends. The tip of the single pinna was very sharp and stiff. A whole ring of young fronds were produced in early spring, and were then very pubescent. This Cycas is a dioecious plant, and we had only a male tree on the Foochow campus. I only saw the fruits once, during my stay of eight years in Nan-Ping. The very hard, shiny, and vermilion to scarlet seeds, each about the size of a walnut, were very pretty and attractive. The whole group of sporophylls nested at the top of the tree and each sporophyll had several seeds, which children used to pick from the brownish, hairy

Fig. 5. The Hwa Han College Biology Club. After the traditional dedication of a small flowering tree to the school campus (a small plum tree was planted by the Club), this picture shows the group with their adviser Dr. Ruth Chou (with plaid jacket). An apricot tree on the left beside the water tower. Behind, was the faculty's residence. On the right a double-petaled flowering plum tree was in full bloom during winter season. I was standing second from the right.

sporophylls and play with, as they did with colored stones. I was told that they were not edible but some literature records the contrary. I collected some seeds for our botany department, for this plant was said to fruit only once in maybe 15 years. These plants and their leaves were larger than the plants ordinarily cultivated, which come from Japan, and in my experience the starch of the trunk was never used for a famine food. The trunks were a foot or more in diameter, and one of which the history was known had grown to be five feet high in thirty years. A big specimen which blew down in a typhoon proved to be very shallowly rooted. When propped upright with poles it went on growing.

After graduation from Hwa Nan College in Foochow, I worked in the College Biology Department as an assistant for several years. I tried to learn how to collect plant specimens in my own interest. I

Fig. 6. Four Biology majors with our Professors Dr. Ruth C. Y. Chou (center left) and Dr. Doris Y. M. Hsu (center right). Both were University of Michigan graduates, and Dr. Chou took her doctorate in 1944. Her dissertation, done under Professor Wm. Randolph Taylor, was entitled: "Pacific species of Galaxaura." Dr. Hsu took her doctorate in 1935. Her dissertation, done under Professor George R. LaRue, was entitled: "The Life History and Morphology of Macravestibulum eversum sp. nov. (Pronocephalidae trematoda).

was there for eight years as a refugee, collecting and identifying most of the flowering plants in the Hwang Chin Shan area of Nan-Ping. I wrote an article (in Chinese) published in the Hwa Nan Bulletin, 1944, under the title of "How to identify plants as food for rabbits." Rabbits were commonly raised for food during the war. Then I became interested in economic botany, especially in the extensive fruit tree plantations in the southern part of China.

After World War II, I was anxious for a chance to go abroad for further study. In 1947 I received a Barbour Scholarship from the University of Michigan for which I was most grateful. Although much interested in food plants and medicinal plants, I had never seen, until I came to America, a complete set of the great Chinese Materia Medica, or herbal entitled the " 本草綱目 Pen Ts'ao Kang Mu," written by 李時珍 Li Shih-Chen in 1595 A. D. Much to my amazement in 1948,

Fig. 7. Mrs. W. N. Brewster (front row, center) addressed the Hwa Nan Alumni Meeting in 1947. Her husband, Rev. William N. Brewster, former missionary of the Methodist Church in Hengwa District, Foochow, introduced the Fukien "Chen-Family-Purple" lychee, now the so-called "Brewster" variety, into the United States between the years 1903 and 1906.

Professor H. H. Bartlett showed the complete set of 52 volumes from his personal collection to the History of Botany Class! Needless to say I was overwhelmed with joy when he assigned it to me for formal study. Although the "Pen Ts'ao Kang Mu" is very old and might not be considered scientifically written by modern standards, Chinese herbalists still refer to it as an authority. In the past two years, in connection with my work at the University Botanical Gardens, I have visited Florida twice to study cultivated Chinese plants, especially lychee (*Litchi chinensis*), which was introduced into this country between 1903 and 1906 from Fukien and Canton. This is the fruit tree which I most wanted to study even before I came to America. In Florida it was my privilege to work with Professor G. W. Groff, the sole American authority on the lychee industry, and to publish with him an article "Describing Florida Varieties of Lychee" in the Proceedings of the Florida State Horticultural Society, Volume LXIV, 1951, [1952]. I intend, during my stay in the United States, to learn as much as I can about the science and techniques of botany, which will apply, I hope, to the future development of plant industry in my own country, China, the Mother of Gardens!

OXALIDACEAE IN MICHIGAN

C. M. Rogers

This is the first of a proposed series which is undertaken with several hopes and aims. The need for a published flora of Michigan in keeping with those of many other states is well known. This need is particularly cogent for our own state since it lies near the periphery of the region included in the manuals treating the northeastern United States. In the preparation of these manuals relatively little Michigan material has been examined, and it is highly probable that a careful study of Michigan collections will reveal varietal or specific differences in many groups.

Many are also aware that a relatively small amount of collecting has been done within the state. Distribution maps, such as those which are found in Billington's *Shrubs of Michigan* and elsewhere, serve to emphasize this lack and also indicate those areas from which little or no material has come. Those who would procrastinate in the compilation of a Flora of Michigan on the basis of the paucity of preserved material must keep in mind that a "complete" flora is but a myth and that an "incomplete" one, if it makes clear wherein it is incomplete, becomes an important step in the development of a better state flora. It is hoped that clearly indicating the conspicuous gaps in distribution records will encourage further work in those parts of the state where nearly every collection will be a "new county record." This should offer a splendid opportunity for the local amateur botanist, as well as the professional, to contribute. The addition of well prepared and annotated specimens to one of the local herbaria would aid greatly the final preparation of a published state flora.

The distribution records in the following token contribution, the Oxalidaceae in Michigan, are based on herbarium specimens seen by the writer. Published records which are without substantiating specimens are excluded.

The symbols used to designate herbaria are as follows:

ALBI	Albion College, Albion, Michigan
AQ	Aquinas College, Grand Rapids, Michigan
BLH	Cranbrook Institute of Science, Bloomfield Hills, Michigan
F	Chicago Natural History Museum, Chicago, Illinois
GH	Gray Herbarium, Harvard University, Cambridge, Massachusetts
MICH	University of Michigan, Ann Arbor, Michigan
MO	Missouri Botanical Garden, St. Louis, Missouri

MSC	Michigan State College, East Lansing, Michigan
MSNC	Michigan State Normal College, Ypsilanti, Michigan
ND	Notre Dame University, South Bend, Indiana
NY	New York Botanical Garden, New York, New York
PH	Academy of Natural Sciences, Philadelphia, Pennsylvania
US	United States National Herbarium, Washington, D. C.
WAY	Wayne University, Detroit, Michigan
WMC	Western Michigan College of Education, Kalamazoo, Michigan
CRH	Personal Herbarium of C. R. Hanes, Schoolcraft, Michigan
RRD	Personal Herbarium of R. R. Dreisbach, Midland, Michigan

Oxalidaceae

Low herbs with sour juice; leaves palmate, alternate or basal; leaflets three, obcordate; sepals 5; petals 5, separate or barely united; stamens mostly 10; ovary superior, 5 celled; fruit a capsule with several to many seeds.

In Michigan the family is represented by the single genus *Oxalis*.

Key to the Species

1. Leaves all basal, flowers whitish to pink or purple.
   2. Scaly bulb present, flowers in umbels, tips of sepals thickened, orange . . . . *O. violacea* (see excluded species)
   2. Creeping by slender scaly rhizomes, flowers solitary on peduncles, tips of sepals not thickened nor orange . . . . . 1. *O. montana*

1. Stem leafy, flowers yellow.
   3. Stems prostrate, rooting at the nodes . . . . 2. *O. corniculata*
   3. Stems erect or ascending (sometimes decumbent at the base, not rooting at the nodes.
      4. Flowers in umbels, stipules evident, stems appressed hairy . . . . 3. *O. stricta*
      4. Flowers cymose, stipules obsolete, stems glabrous or variously hairy, occasionally with appressed hairs . . . . 4. *O. europaea*
         5. Leaves glabrous above . . . . *O. europaea* var. *europaea*
         5. Leaves appressed hairy above . . . *O. europaea* var. *Bushii*

1. *O. montana* Raf. White Wood Sorrel. Map. I. Closely related to and often combined with the European *O. Acetosella* L. Petals whitish with purplish lines. This is a northern species, frequent in both evergreen and deciduous woods throughout the upper peninsula and in a few counties in the northern part of the lower peninsula. Cleistogamous flowers are often produced late in the season.

Newf. to Man. s. to N. E., O., Mich., and Minn., s. in the mts. to N. C. and Tenn.

Specimens examined:[1] ALGER: *Cain*, July 11, 1947 (BLH); CHEBOYGAN: *McVaugh 9395* (BLH); CHIPPEWA: *Dodge*, June 14, 1914 (MICH); DICKINSON: *Dodge*, July 7, 1915 (BLH); EMMET: *Ehlers 3259* (MICH); GOGEBIC: *Beal and Darlington 2942* in pt. (MSC); GRAND TRAVERSE: *MSC 50583*, June 20, 1888 (MSC); HOUGHTON: *Hermann 648* (MICH); IRON: *Grassl*, August 9, 1934 (MICH); KEWEENAW: Cliff, *Farwell 367* (BLH); Isle Royale, *Cooper 44* (GH); MACKINAC: *McVaugh 9385* (BLH); MARQUETTE: *Bingham*, July 14, 1942 (BLH); MENOMINEE: *Grassl 3339* (MICH); ONTONAGON: *Messner*, July 15, 1949 (BLH); SCHOOLCRAFT: *Dodge*, July 7, 1915 (MICH).

2. *O. corniculata* L. Creeping Lady's Sorrel. Map. I. This has been confused in the past with *O. stricta* and *O. europaea* and some prefer to reject this name in favor of the later *O. repens* Thunb. It is most like *O. stricta*, but can be easily distinguished from that species as well as *O. europaea* by its creeping habit as well as its more conspicuous brownish or purplish stipules. It is a weedy plant, common in greenhouses, infrequent elsewhere in gardens, lawns, and waste places in the southern part of the state. An interesting collection is that of Shaddick and Skeels from Grand Rapids (MSC), which is similar to other material of the species in most respects, but which has a large compound inflorescence with as many as ten or more flowers. Typical specimens have 1 - 3, occasionally as many as 5 flowers in a simple umbel.

Semi-cosmopolitan weed; waste places in s. U. S., occasional northward.

Specimens examined: GRATIOT: *Davis*, October 20, 1892 (MICH); KENT: *Fallass*, October 17, 1880 (ALBI); ST. CLAIR: *Dodge*, July 31, 1916 (MICH); WAYNE: *Billington*, September 24, 1917 (WMC).

3. *O. stricta* L. Lady's Sorrel. (Including the scarcely separable var. *piletocarpa*). Map II. This species has been frequently confused with *O. europaea* from which it is readily distinguished by the evident stipules and by the umbelliform inflorescence. It is a common weed in sandy fields, lawns, roadsides, and waste places throughout most of southern Michigan, occasional in disturbed areas northward. A form with greenish flowers occurs infrequently.

S. Can. throughout most of U. S. and into Mex.

Specimens examined: ALLEGAN: *Fallass*, July 23, 1926 (ALBI); BARRY: *Rogers 8050* (WAY); BERRIEN: *Rogers 7738* (WAY); CALHOUN: *Gilbert 49220* (ALBI); CASS: *Pepoon*, July 1906 (MICH); CHARLEVOIX: Beaver Island, *Sister Marcelline 3065* (AQ); EATON: *MSC 50605* in pt. (MSC); EMMET: *Ehlers 1204* (MICH); GOGEBIC:

[1]Ordinarily one specimen is cited from each county; the counties are considered alphabetically.

Beal and Darlington 2942 in pt. (MSC); GRATIOT: *Davis*, August and September, 1897 (BLH); HOUGHTON: *Arnold 698* (MICH); INGHAM: *Skeels*, May 27, 1894 (MSC); JACKSON: *Rogers 7573* (WAY); KALAMAZOO: *Hanes and Hanes 1589* (CRH); KENT: *Shaddick*, May 14, 1896 (MSC); KEWEENAW: *Farwell 11719* (BLH); MONROE: *Farwell 8090* (BLH); OAKLAND: *Billington*, July 19, 1924 (MICH); OSCEOLA: *Ledd*, June 20, 1912 (MSC); ST. CLAIR: *Dodge*, June 9, 1915 (MICH); ST. JOSEPH: *Rogers 7830* (WAY); VAN BUREN: *Pepoon 220* (MSC); WASHTENAW: *Farwell 7663* (BLH); WAYNE: *Farwell 8715* (MICH).

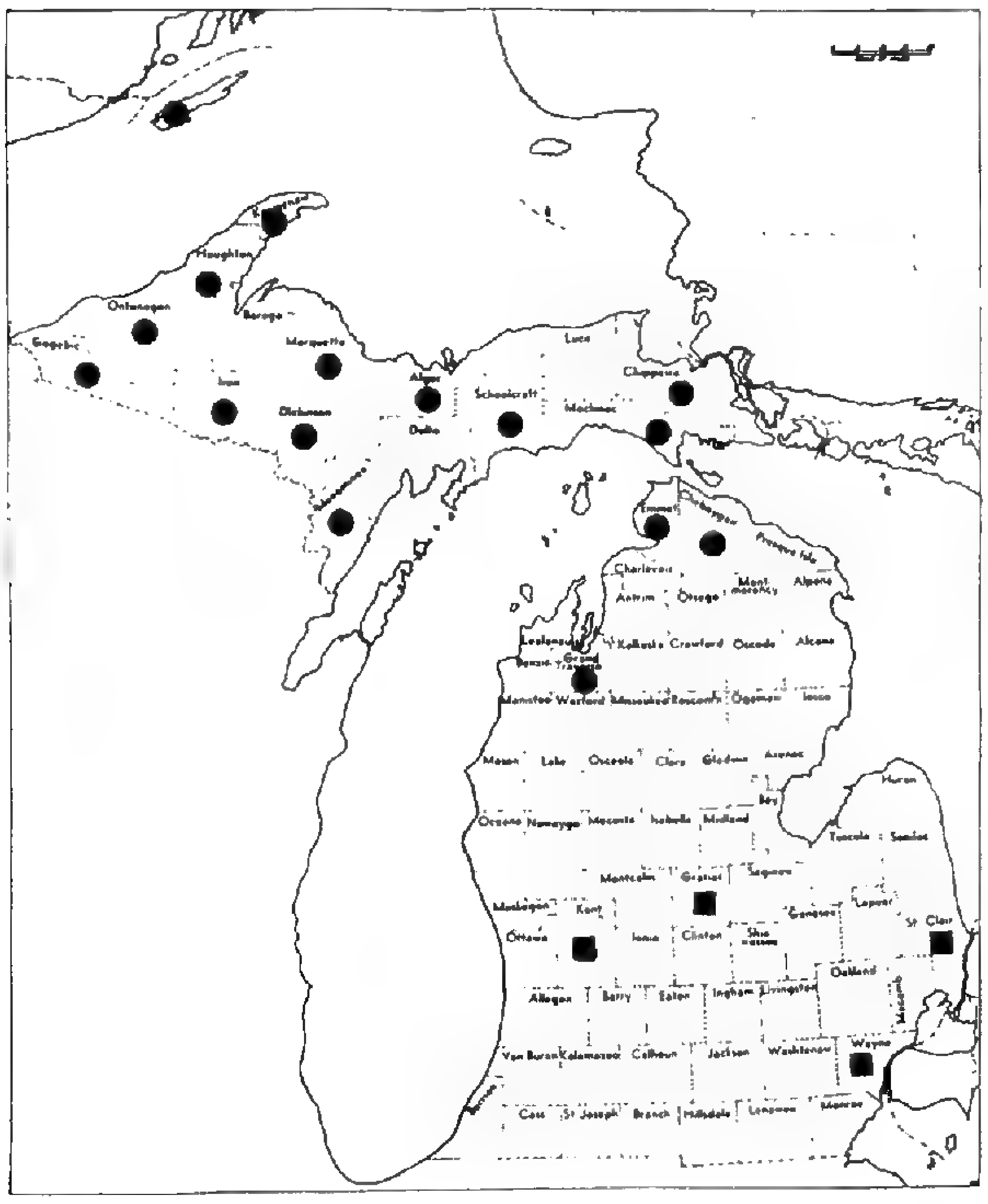
4. *O. europaea* Jord. Yellow Wood Sorrel. Map III. The ranges and habitats of this species and *O. stricta* overlap and the two may be found in close association. *O. stricta* prefers dry exposed areas, however, while *O. europaea* is more frequent in damp shaded places. It is a very common weed in the southern part of the state, becoming infrequent northward. *O. europaea* var. *Bushii* is distinguished by the pubescence on the upper surface of the leaves, a feature easily discerned, but probably hardly worth varietal status. In Michigan it is found over the same range as the typical variety, but is much less frequent. Most of the forms of *O. europaea* and its variety, arbitrarily designated by Wiegand, seem to be represented in our flora with *O. europaea* f. *cymosa* the most common type. The pubescence of the stem, pedicels, and leaves, upon which the forms are based, shows considerable variation on individuals from different habitats, of different ages, or often on different parts of the same plant.

N. S. to N. D., s. to Fla. and Ariz.

Specimens examined: ALLEGAN: *Wight 40* (US); BERRIEN: *Billington*, September 11, 1920 (MICH); BRANCH: *Rogers 7688* (WAY); CALHOUN: *Barr 1836* (ALBI); CASS: *Rogers 7703* (WAY); CHARLEVOIX: Beaver Island, *Ries 734* (BLH); EATON: *MSC 50605* in pt. (MSC); EMMET: *Ehlers 2566* (MICH); GRATIOT: *Davis*, July 15, 1892 (BLH); HILLSDALE: *Rogers 7643* (WAY); INGHAM: *Wheeler*, June 25, 1901 (MSC); IONIA: *Rogers 8083* (WAY); KALAMAZOO: *Hanes and Hanes 4587* (CRH); KENT: *Bazuin 4975* (BLH); LENAWEE: *Rogers 7474* (WAY); MACOMB: *Rogers 7885* (WAY); MONROE: *Farwell 8088* (BLH); MUSKEGON: *McLouth*, July 22, 1899 (MSC); OAKLAND: *Billington*, July 19, 1924 (MICH); ST. CLAIR: *Dodge*, July 25, 1914 (MICH); VAN BUREN: *Pepoon 774* (MSC); WASHTENAW: *Farwell 1159* (BLH); WAYNE: *Rogers 7986* (WAY).

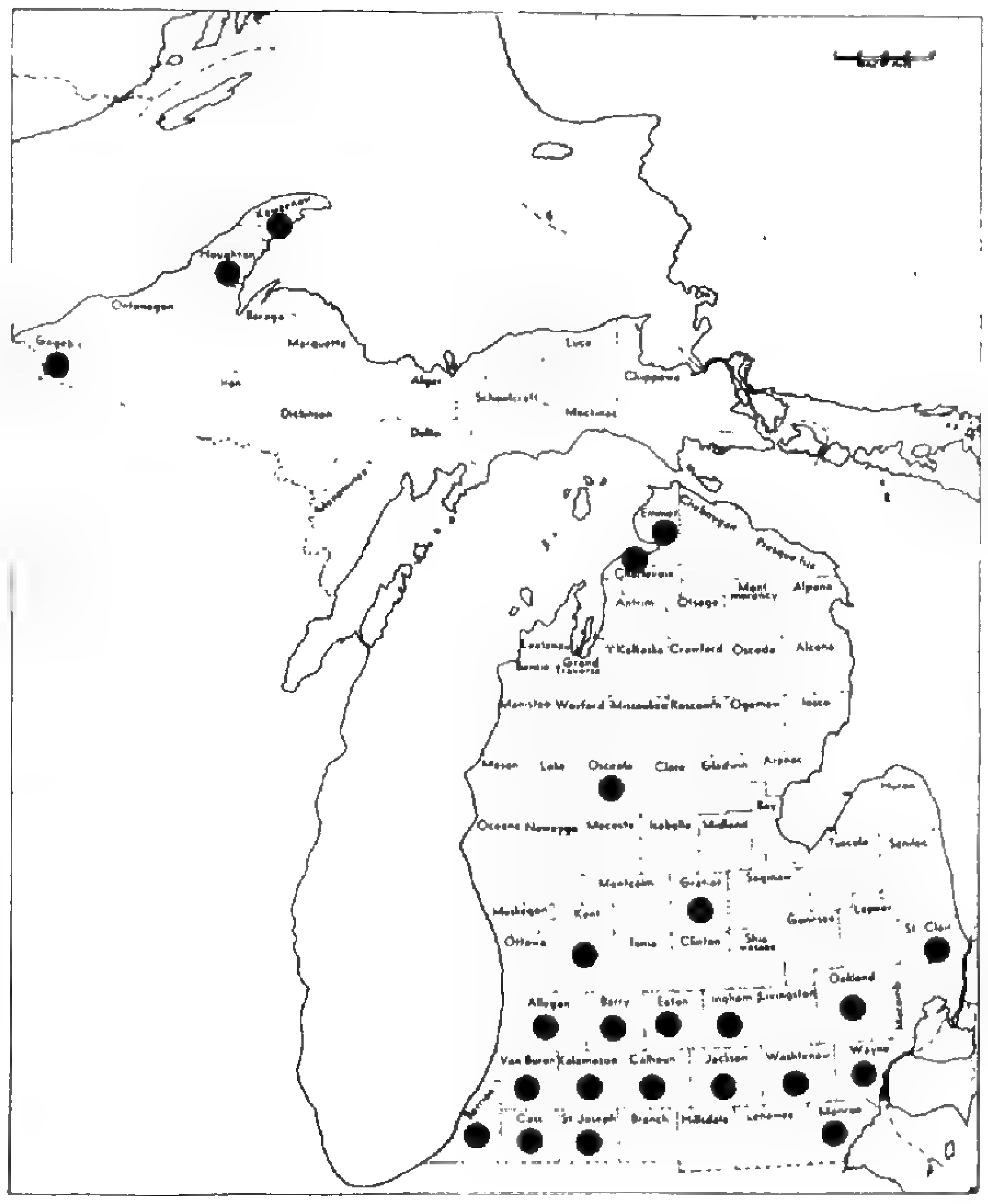
Variety *Bushii*: KALAMAZOO: *Hanes and Hanes 14741* (CRH); MENOMINEE: *Grassl 2549* (MICH); MONROE: *Farwell 8089* (BLH); OAKLAND: *Farwell 1524* in pt. (BLH); ST. CLAIR: *Dodge 40* (GH); WASHTENAW: *Podolski*, July 27, 1917 (MICH); WAYNE: *Farwell 1125* (BLH).

MAP I



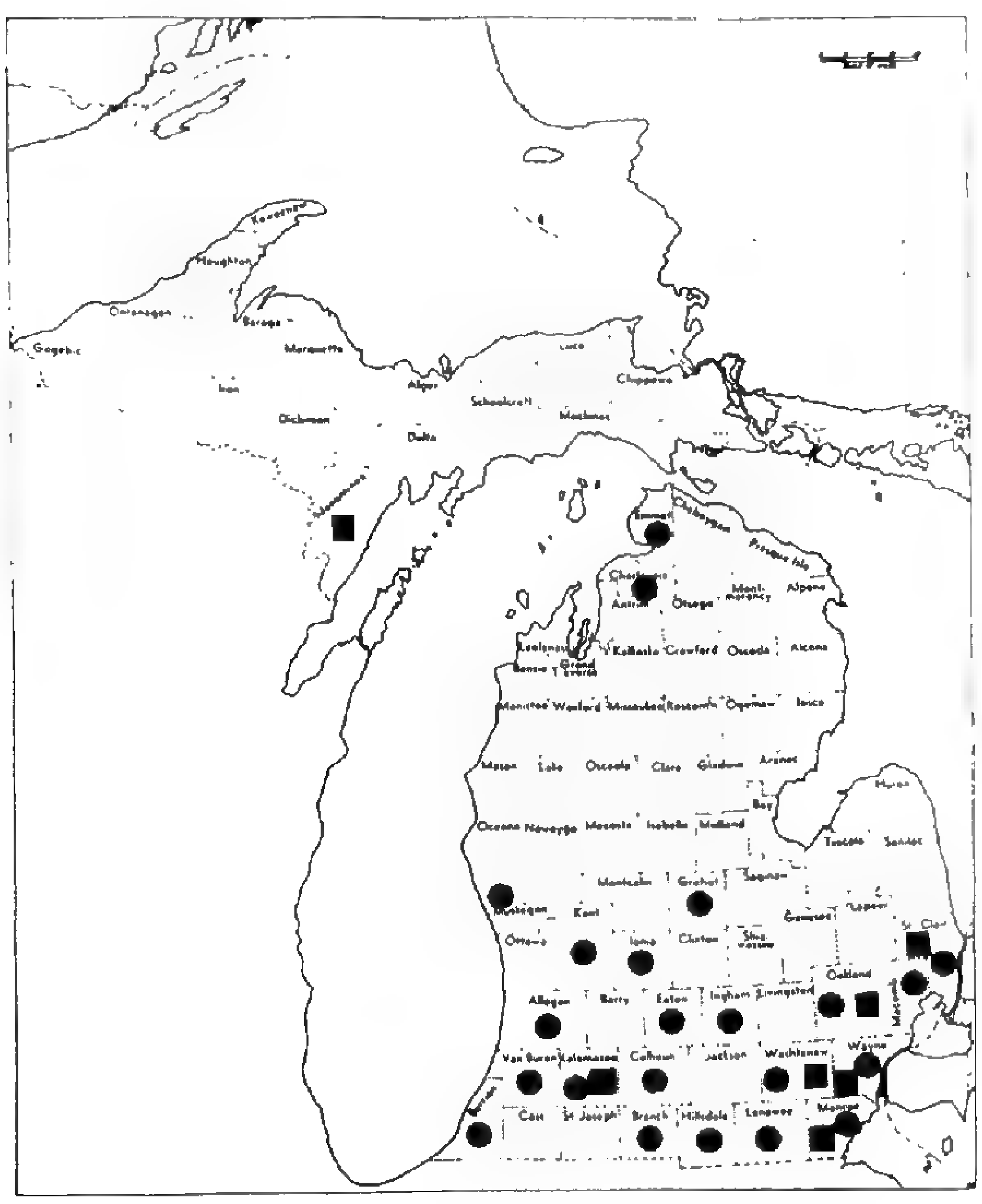
● O. montana Raf. ■ O. corniculata L.

MAP II



O. stricta L.

MAP III



● O. europaea typical variety ■ O. europaea var. Bushii

Excluded Species

O. violacea L. Winchell, in his "Catalogue" (in the First Biennial Report of the Progress of the Geological Survey of Michigan, 1861), was the first to include this species in the Michigan flora. The report was based on a specimen in the "Univ. Herb." Succeeding catalogues (Wheeler and Smith, 1881, Beal and Wheeler, 1892, and Beal, 1904), retain the species on the basis of Winchell's citation, Beal including also a sight record by Pepoon from southwestern Michigan. Gleason includes *Oxalis violacea* in his *Plants of Michigan* and also places Michigan within the range of this species in his recent revision of Britton and Brown's Flora. A search through the herbaria listed at the beginning of this paper revealed, other than a specimen of a doubtfully wild plant from Lansing, only a single specimen, *Houghton*, June 21, 1838, from damp, sandy soil at Monroe, in the herbarium of the New York Botanical Garden. Since, in spite of the fact that there has been from time to time a considerable amount of work in the Monroe area, the plant has not been collected for 115 years, it should probably be excluded from the present Michigan flora. As this species is found in Ohio and northern Indiana, a search in the southernmost tier of counties in Michigan might well be rewarded with the rediscovery of *O. violacea* within the state.

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THE MICHIGAN FORAY OF THE AMERICAN FERN SOCIETY AUGUST 30 TO SEPTEMBER 5, 1953

Rogers McVaugh

Twenty-two fern enthusiasts assembled in Alpena for the foray, on Sunday, August 30. The group disbanded six days later, after more than a thousand miles of travel together in Michigan. During the entire trip the weather and the scenery were delightful, and all the participants in the foray felt that it had been an unqualified success. More than 60 species of ferns and fern allies were seen and studied in their natural habitats. Principal credit for the success of the entire expedition goes to the leader, Dale J. Hagenah, whose hard work and inspired planning in the weeks before the foray enabled him to arrange a schedule that was readily followed, that allowed plenty of time at each stop and easy travel between stops. The details of organization were handled by the chairman of the foray committee, Warren H. Wagner, Jr., and by the secretary, Mrs. Kathryn E. Boydston, and as a member of the party I can testify that their very competently planned arrangements were much appreciated by all of us. We were all sorry that Herb Wagner was unable to be with us, as he had originally expected to take an active part in the foray.

Bright and early Monday morning the six-car caravan left Alpena for the lime-sink area in the northwestern part of the county. There are several large sinks, some a hundred feet deep or more, caused by the falling in of the limestone strata after solution of the underlying layers. Some of the sinks are entirely surrounded by perpendicular cliffs and are almost impossible of access; in others the walls have broken down on one or more sides, and the bottom can be reached after a scramble down a near-vertical slope. As might be expected, the bottoms of these sinks are relatively moist, and provide a habitat which is ideal for many lime-loving ferns. In the sinks are the only known stations in Lower Michigan for *Asplenium trichomanes*, *Camptosorus rhizophyllus*, and *Dryopteris filix-mas*. *Cystopteris bulbifera* is very abundant in the sinks, and in some of them are found *Athyrium pycnocarpon*, *A. thelypteroides*, *Dryopteris goldiana*, and other calciphiles.

After lunch at Hillman the group spent an hour studying various species of *Botrychium* in a maple woodland west of Johannesburg, then stopped north of Gaylord in a wooded grassy swamp where a hybrid *Dryopteris* (*clintoniana* x *intermedia*) is common. The last botanical stop for the day was in the jack-pine plains near Indian River, where

Selaginella rupestris is abundant in an unusual habitat, the sandy plains among the pines.

The day had been hot, and everyone was glad to reach Douglas Lake, where we spent the night at the University of Michigan Biological Station. We were welcomed by the director of the station, Dr. Alfred H. Stockard, and after completing rooming arrangements several of the party went for a welcome dip in the lake, which for once was something less than icy cold. As the Biological Station had completed its summer session, the dining room was closed, and the members of the foray got their meals in nearby Pellston or Cheboygan during the two-day stay at the Station. Our number increased by one after supper: Don Brown, who is studying the genus *Woodsia* as his specialty, had driven up from Ann Arbor and joined us at the station.

Fig. 1. Dale Hagenah consulting his timetable, with interference from McVaugh. Photograph by Clair A. Brown.

Tuesday was spent in Emmet and Cheboygan counties, in visiting localities known to the botanists of the Biological Station. After breakfast at Pellston our party hurried over to the welcome shade of the woodlands west of Burt Lake, where gametophytes of *Equisetum sylvaticum* had been found a few years before, and observed again more recently by Dr. Wagner. Unfortunately, in his absence we were unable to find the exact spot, but further along the lake we did see several species of *Dryopteris* in the wet woods, and still further on, in Reese's Bog at the north end of the lake, we visited the station for *Gymnocarpium robertianum*. This is an interesting locality, where this species grows actually in the Sphagnum mat under arbor vitae.

As a final jaunt this morning the group visited a cut-over woodland now grown up to young maples; apparently this habitat is ideal for Ophioglossaceae, for we found here in addition to *Ophioglossum vulgatum* no fewer than three species of *Botrychium*: *B. dissectum*, *B. multifidum*, and *B. matricariaefolium*.

After lunch in Cheboygan we assembled on the shore of Duncan Bay a few miles east of the city. The low sandy swamps here, as in many similar habitats along the shores of Lake Huron and Lake Michigan, support lush growths of *Equisetum hyemale*, *E. variegatum*, and the peculiar intermediates which are supposedly of hybrid origin. Here we saw also, for the first time on our trip, some good examples of the interesting flowering-plant associations of the lake shores. Blue gentians (*Gentiana procera*) were abundant, and the characteristic late goldenrod (*Solidago houghtoni*), and the trailing juniper (*Juniperus horizontalis*) was everywhere under foot.

For a final trip this day the foray returned to Cheboygan and continued westward by way of Levering and Carp Lake to the Lake Michigan shore. Near the shore of Sturgeon Bay, on the high old wooded dunes, is an admirable habitat for various species of *Lycopodium*: *L. lucidulum* is found in the moister woods, and on the dry sandy steep dunes are great patches, abundantly fruiting, of *L. clavatum*, *L. obscurum*, *L. annotinum*, and *L. tristachyum*.

On Wednesday another early start from the Biological Station enabled us to cross the ferry at the Straits of Mackinac before the day's heavy traffic was well under way. In spite of our early start, however, the morning was well along by the time we had crossed the Straits (always a scenic and memorable trip) and made our arrangements for lodging in St. Ignace, where the party intended to spend the coming night. One of the original party, Mrs. Stanley Simon, who had been with us the first two days, returned this morning to her home in Cincinnati with her husband and her two daughters, but the rest of us met for lunch in Cedarville, some 40 miles north and east of St. Ignace.

Here north of the Straits one enters a different country. The underlying limestones are closer to the surface, and occasional outcrops break the monotony of the level fields. Spruce and arbor vitae bogs in the lowlands alternate with deciduous woodlands on low hills, and some of the more level stretches are cultivated or put into hay. The woodlands often have low limestone ledges scattered about through them, and these look as if they might support ferns. In this our party was not disappointed. Not far south of Pickford we entered a dense woodland in which a 10-minute walk brought us to an elevated area of ledges which were evidently perennially moist, and covered with a great variety of mesophytic ferns. Here were *Camptosorus* in abundance, *Dryopteris marginalis*, *Polypodium*, and most exciting of all, both *Asplenium viride* and *Polystichum lonchitis* in profusion. The *Asplenium* was hardly known in Michigan until 1950, and the *Polystichum* usually is scarce and local in this state, so it was quite an event to see both of them here and perfectly at home.

After this, which proved indeed to be one of the high spots of the entire foray, we were promised a Botanical Surprise (complete with capital letters). At the last scheduled stop of the day the Surprise was unveiled, and it lived up to all our expectations; apparently no one had suspected what actually transpired, but Michigan's newest fern, which we all saw growing today, was the hart's tongue, one of North America's greatest rarities. It had been found on July 22 by Dr. Marion T. Hall when with Dale Hagenah he was exploring an area near Trout Lake, in Chippewa County. Of course this discovery was made to order as a Surprise for the coming foray, and the secret was so well kept that it really was a complete surprise to most of us.[1]

Fig. 2. The entire group, assembled for lunch at Cedarville. Front Row: Mr. Swendsen, McVaugh, Mrs. Swendsen, Mrs. Hagenah, Maysilles, Lommasson, Clair Brown. Second Row: Morton, Diddell, Clarke (white shirt), Mrs. Lord, Boydston, Howells, Mrs. Lampton. Back Row: Mr. Lord, McAvoy, Knobloch, Don Brown, Mr. Hagenah, Neidorf, Emory, Mr. Lampton. Photograph by Clair A. Brown.

After much walking on Wednesday, our group spent most of Thursday on the road. We made a brief stop in the scenic Cut River gorge west of St. Ignace, to see *Dryopteris spinulosa* var. *fructuosa* and other things. Some 17 miles further west we stopped again to hunt (and find) *Selaginella selaginoides* in the calcareous flats above the Lake Michigan beach. This drive westward from St. Ignace along U.S. highway No. 2, which follows the north shore of Lake Michigan, is one

[1]Actually the news of the discovery of the hart's tongue in Michigan had been published before the foray, but most of us had failed to notice it. The Cranbrook Institute of Science News Letter for September, 1953 (Volume 23, pages 2-5), had carried Dale Hagenah's account of the discovery, with photographs of the fern at this new locality.

of the most beautiful in the State, and we all enjoyed it thoroughly. We lunched at Manistique, and then made an unscheduled stop a few miles west of Nahma Junction to see a thick stand of *Lycopodium inundatum* which Conrad Morton and I had found there in 1949.

This was our last stop on the Lake Michigan side of the Upper Peninsula. We drive straight north across to Munising and went first to Miner's Castle, where we saw *Polystichum braunii* and had a hurried view of the grand cliffs of the south shore of Lake Superior. We followed this by a quick trip to Tannery Falls at Munising; here we saw *Cryptogramma stelleri* among other things. Our last botanical stops were at Scott's Falls, the famous Michigan locality for the luminous moss *Schistostega*; and finally at an unnamed spot in the jackpines near Marquette. We stopped here to see some fine colonies of *Lycopodium tristachyum* that Dale Hagenah had marked down from a previous trip, but I fear that most of us will remember longer the humorous aspects of this particular stop. As our caravan pulled to a hasty halt along the road, in response to Dale's wave and his flashing stoplight, we set out hastily across the pavement, in the fading light, to hunt for the *Lycopodium*. As we did so two following cars squealed to a stop near us and the occupants popped out and ran after our assembled group, evidently expecting to view a freshly mangled body or at the very least a driver hurled unconscious from a speeding car by his drunken companion. Not easily described are the emotions which showed plainly on their faces when they hurried in for a thrill and found a group of biologists calmly discussing the variations of *Lycopodium tristachyum!*

On Friday, the last full day of the foray, the first morning trip was to Presque Isle (now a municipal park), at the northern outskirts of the city of Marquette. We took the trail through fine primeval woodland which makes the park so charming, out to the famous Black Rocks which extend along the Lake Superior shore for some distance. The rock-strata are contorted and eroded, with numerous crevasses and water-holding depressions, and here we found an interesting flora of ferns and flowering plants. Many species growing here on rocks are the same as those found on the marly flats of Lake Michigan; these include *Lobelia kalmii*, *Pinguicula vulgaris* and *Primula intercedens*, but we searched in vain for *Selaginella selaginoides*. The most interesting ferns found were *Gymnocarpium robertianum* and *Woodsia cathcartiana*.

Our principal afternoon stop this day was along the road just north of Lake Michigamme, about 35 miles west of Marquette. In the woods above the road, on the rocky bluffs which could have come straight out of New England, there is a fine colony of *Dryopteris fragrans*, associated with plenty of *Polypodium*, *Woodsia ilvensis*, and *Cystopteris fragilis*. In the lake itself, on the other side of the road, we found plenty of the unbranched forms of *Equiseum fluviatile*, and an *Isoetes* which proved to be *I. echinospora*.

Just before reaching Iron Mountain, our destination for the night, we stopped on a side road near Felch to see the glandular variety of *Cystopteris fragilis*, var. *laurentiana*, at its only known locality in Michigan. Here also, on the low limestone ledges, we found what appears to be a hybrid *Cystopteris*, with the aspect of *C. fragilis*, but bearing tiny bulblets in the manner of *C. bulbifera*.

Saturday morning the caravan travelled to three localities near Iron Mountain, each for a rather special objective. East of Quinnesec, near a convenient roadside park, *Pellaea glabella* has become abundant along an old railroad cut, and is associated here with *P. atropurpurea*, which occurs also on the ledges back in the woods. At our other stops this morning we saw a second locality for *Woodsia cathcartiana*, and finally a bluff on which *Woodsia obtusa* is abundant, many miles north of its nearest known locality in Wisconsin.

After the stop for *Woodsia obtusa* came the official breakup. Some of the party were turning back eastward toward Detroit and New York, some were intending to continue toward Madison, Wisconsin, for the annual meetings of the American Institute of Biological Sciences. We went our several ways with the often-voiced feeling that the foray had been a huge success, and that we should begin at once to plan for another next year.

We append a list of those who took part in the foray, so that some of our readers may find it easier to keep in touch with others:

Mrs. Kathryn E. Boydston, Fernwood, Route 3, Niles, Mich.
Clair A. Brown, Dept. of Botany, Louisiana State Univ., Baton Rouge, Louisiana.
Donald F. M. Brown, Dept. of Botany, Univ. of Michigan, Ann Arbor, Michigan.
Miss Gladys Clarke, Takoma Park, Maryland.
Mrs. W. D. Diddell, 8092 Hawthorne St., Jacksonville 6, Florida.
Dave Emory, 150 N. Professor St., Oberlin, Ohio.
Mr. & Mrs. Dale J. Hagenah, 164 Westehester Way, Birmingham, Michigan.
Mrs. Elsie Howells, Howellshaven, Route 4, Niles, Michigan.
Irving W. Knobloch, Dept. of Natural Science, Michigan State College, East Lansing, Michigan.
Mr. & Mrs. Robert Lampton, 153 E. Green St., Westminister, Maryland.
Robert C. Lommasson, Dept. of Botany, Univ. of Nebraska, Lincoln 8, Nebraska.
Mr. & Mrs. Arthur R. Lord, Arlenwood Lane, Route 1, Box 113, Palos Park, Illinois.

Dr. Blanche McAvoy, Illinois State Normal Univ., Normal, Illinois.
Rogers McVaugh, Herbarium, Univ. of Mich., Ann Arbor, Michigan.
James H. Maysilles, Hanover College, Box 163, Hanover, Indiana.
Conrad V. Morton, Dept. of Botany, Smithsonian Institution, Washington 25, D. C.
Charles Neidorf, 127 Cannon St., New York 2, N. Y.
Mrs. Stanley Simon, 1030 Elm Park Dr., Cincinnati 16, Ohio.
Mr. & Mrs. H. L. Swendsen, 2129 E. Kenwood Blvd., Milwaukee 11, Wisconsin.

A BOTANICAL TRIP TO THE HENRY MOUNTAINS OF UTAH

Rogers McVaugh

For years I have been intrigued by the place-names of southern Utah, and by the possibility of botanizing in the footsteps of Ward, Jones, Rydberg, and the others who have collected on the Aquarius Plateau, Mt. Linnaeus, in the San Rafael Swell, the Capitol Reef, and the Waterpocket Fold. Until very recently, however, southeastern Utah has not been accessible to the casual traveler. This is perhaps an understatement. It is a country of blowing sand, brilliant rock formations, and sheer canyons, but it is nearly waterless. It is almost uninhabited, and much of it is still without roads. It is, however, rich in uranium ore. In the last 5 years the necessity for truck roads on which to haul ore has resulted in the improvement of a great many miles of tracks in the sand, or tracks which followed the dry stream beds. Cattlemen have taken advantage of these "uranium roads" to improve the side roads which branch off at intervals, so it is now possible to reach a number of points that were formerly rarely visited.

In May of this year Dr. C. A. Arnold invited me to accompany him on a trip into this part of Utah, and on May 29 we left Ann Arbor in a University of Michigan "carryall" equipped with heavy duty tires and an extra low gear for the back roads we expected to travel. Our fellow traveler was Mr. Herman Becker, an instructor in geology at Brooklyn College. Arnold and Becker hoped to find a great many plant-fossils in the Jurassic and Triassic rocks which are exposed so abundantly in southern Utah, and I went along chiefly because of Arnold's assurance that he planned to work a part of the time in the vicinity of the Henry Mountains.

Marcus E. Jones had spent a few days in these mountains in July, 1894, and had climbed above timberline on Mt. Ellen, but as far as I knew no other botanist had worked anywhere in the Henry Mountains. Because of the isolated position of this range, which is surrounded on all sides by miles of treeless deserts, it seemed to offer a unique opportunity for exploration.

On June 2 our party reached Salt Lake City, and on the following day we took off for the desert, guided by a pair of veteran "rock hounds," Thomas M. Riley and Carroll D. Watson, who had come from Oregon in Riley's jeep to meet us and show us certain localities for fossil cycads and other plants. Our combined party reached a temporary headquarters at Fruita, in the Capitol Reef National Monument, late in the evening of June 3. We had come by way of Greenriver, Utah, and thence across the desert to Hanksville, on the graded highway which had recently been improved for the traffic in uranium.

Here it may be mentioned that the flora of the Greenriver Desert, north and east of Hanksville, and south along the eastern side of the Henry Mountains, proved to be one of the most interesting assemblages of plants we saw anywhere. I managed to collect a few species on the way through, on June 3, and returned for a longer visit on June 15. On both occasions I was impressed by the richness of the vascular flora. Because of the unusually dry year in southern Utah, very few flowering species were in evidence in the juniper-pinyon belt in the foothills around the desert. Most of the plants were dormant or sterile, or poorly developed because of the unusual lack of water. In the sandy desert proper, however, where trees are entirely wanting, the drought seemed to have made relatively little impression, and at the time of our visits the sandy wastes were showy with flowers.

Probably the showiest of all is the so-called "purple sage" (*Dalea thompsonae*), a bush about half as high as a man, which forms the principal plant-cover over thousands of acres, and turns the whole desert a deep rich purple. Somewhat less showy is a smaller but equally abundant shrub (also called "purple sage" in some places), the fragrant lavender-flowered *Poliomintha incana*. Associated with the *Dalea*, and sometimes co-dominant with it, is the blackbrush, *Coleogyne ramosissima*, anomalous in the rose family because of its small opposite leaves. Also flowering in June was a sunflower-like composite, *Wyethia scabra*, which grew in huge clumps in the blowing sand. In much of this desert country one gets the impression that yellow flowers predominate. Here in the Greenriver Desert, in addition to the *Wyethia*, common and conspicuous yellow-flowered species included *Eriogonum inflatum*, *Hoffmannseggia repens*, *Linum aristatum*, *Mentzelia pumila*, *Cryptantha flava*, *Gaillardia pinnatifida* and *G. spathulata*, *Hymenopappus pauciflorus*, and *Thelesperma subnudum*. Yellow, of course, was not the only color represented. A pink-and-white *Aster*-like plant, *Townsendia incana*, formed little rosettes in the sand, and the same colors appeared in the flowers of *Oenothera pallida* and *Abronia pumila*. A brighter touch was provided by the scarlet *Sphaeralcea parvifolia*, and the purple end of the spectrum was represented by *Stephanomeria exigua* and *Coldenia hispidissima.* Three grasses (*Aristida glauca*, *Hilaria jamesii*, and *Oryzopsis hymenoides*) were abundant in the sand, as were several species of *Astragalus* (including *A. amphioxys*, *A. desperatus*, and *A.kentrophyta*). Some of the most abundant herbs were difficult to identify because of their lack of flowers; these included a *Petalostemon* which we supposed to be *P. flavescens* S. Wats., a little furry-looking milkweed which was apparently *Asclepias involucrata* Engelm., and a very abundant weedy-looking, fruiting *Amsonia* which we called *A. eastwoodiana* Rydb. All in all the desert flora was most impressive and most rewarding.

My main objective, however, was to explore some parts of the Henry Mountains, so I was pleased when the paleo-botanists, on June 6, set off on what proved to be an 80-mile trip southward along the western side of the mountains, into the desert foothills and canyons of Hansen Creek, where they hoped to find some exciting fossil remains. Our party had been enlarged in Fruita by the addition of Fred W. Cochran of Oakland, California, so there were 5 fossil-hunters who went off down Hansen Creek on the morning of the 7th, while I took the carryall and drove across the valley 13 miles to Star Spring, at the southern base of Mt. Hillers.

The Henry Mountains comprise a ridge, principally of volcanic origin, which extends for about 30 miles along an axis which is roughly NNW - SSE. The plain which surrounds the base of the mountains has an average elevation of perhaps 1500 meters above sea-level at the north end, and slopes off somewhat toward the south. In the mountains themselves there are five principal peaks, which from north to south are Mt. Ellen, Mt. Pennell, Mt. Hillers, Mt. Holmes and Mt. Ellsworth. The northernmost peak, Mt. Ellen, is also the highest; it reaches an elevation of 3445 meters, and its rock-strewn talus-slopes rise well above the tree-line. The two southermost peaks, Holmes and Ellsworth, appear from a distance to be little more than piles of rock; they are of lesser stature (2379 m. and 2445 m. respectively), and their southeastern sides fall off precipitously to the Colorado River canyons a few miles away. As far as I know these two have yet to be visited by a botanist. Mt. Hillers, on the other hand, appeared more accessible. It is a little higher (3195 m.), and from a distance of ten miles it was apparent that parts of the upper slopes were covered with conifers. When I found that a good road passed within a mile of the base of the precipitous southern escarpment, it was impossible to resist the temptation to try to climb it, although we had been warned that it was impossible from this side.

Actually the climb proved to be nothing like impossible, although it was hot and steep. From the Star Spring a winding valley ascends easily to the point where a steep canyon cuts the face of the mountain. The elevation here is probably about 2600 m. The intrusive nature of the mountain is easily demonstrable by the surface strata on this south side; the characteristic reddish Wingate sandstone and the lighter-colored rocks of the Navajo formation have been pushed up into an almost vertical position at the base of the peak, and surround the volcanic rocks which push on higher in similar near-vertical cliffs. One narrow canyon winds steeply up into these jumbled strata from the south side, and by following it I am sure one can reach the top with no more than a little water and a stout heart, and plenty of time. My own time proved to be too short; after botanizing around Star Spring I began the ascent about noon, and was forced by the approach of sunset to come down with the fir-covered summits still stretching far above me. Perhaps, however, I should tell the story in order.

The foothills near the spring are covered, like so many others in southern Utah, with pinyons and junipers. The big thorny mahonia, *Berberis fremontii*, is common. As one ascends gradually to the base of the mountain, small groves of treelike oaks (*Quercus gambelii*) begin to be more frequent. *Artemisia tridentata* is the dominant low shrub here as well as elsewhere in the pinyon-juniper association. As one passes into the mouth of the dry canyon, the first impression is not of additional moisture, but simply of more woody plants — the pinyons and junipers grow more closely together, and are associated with characteristic dry-climate shrubs and small trees like *Cercocarpus ledifolius*, *C. intricatus*, *Holodiscus discolor* (a small-leaved variety), *Shepherdia rotundifolia*, *Amelanchier utahensis*, and, of course, more and more oaks of the same kind seen below.

A little farther up the canyon (the only ascent, by the way, is over boulders which lie at the angle of repose in the dry wash; the ascent over loose boulders is not much more difficult than a similar climb up 1500 feet of stairway, but the descent is an irritating, ankle-twisting and foot-bruising process) I got my first glimpse of the shrubs that were to set the tone, so to speak, of the flora of the upper slopes. Here were *Prunus virginiana*, in flower, and groves of aspen (*Populus tremuloides*); under the oak thickets I found *Berberis repens*, and in the canyon-bottom were *Acer glabrum*, *A. negundo*, *Rubus strigosus*, and *Juniperus scopulorum*. In my frequent stops for breath I could look out from this assemblage which suggested strong affinities with the Rocky Mountain flora, and see far below me, but not more than 10 miles away, the desert flats where the largest (and only) shrubs were *Coleogyne*, *Ephedra*, and *Atriplex*. These isolated desert mountain ranges demonstrate, as nothing else can, the effectiveness with which vegetation may be limited in range by barriers associated with climate and elevation.

From the base of the canyon one can see large green patches among the spire-like conifers on the talus-slopes far above, and it transpires that these patches are formed by colonies of two shrubby species of *Arctostaphylos*, *A. patula*, and *A. pungens*. The most abundant tall conifer, and the one which descends the farthest, is the douglas fir, *Pseudotsuga taxifolia*. *Pinus ponderosa* is occasional at the higher elevations, and two other pines, *P. flexilis* and *P. aristata*, are perhaps slightly more abundant than *P. ponderosa*, but I did not see any spruce or any species of fir.

Where the mountainsides begin to level off toward the summits, at an elevation estimated to be about 2850 m., the canyon opens out a little, and there is a thin forest, principally of douglas fir but with a small percentage of the three pines. The largest trees are up to a meter in diameter and perhaps 20 meters in height. Because of the lack of dense cover, many of the trees are round-headed in age. As far as one can see toward the summits, the slopes are covered with similar thin forest except where the steepest talus slides make it impossible for the trees to gain a foothold.

The forest-flora on these slopes was very meager at the time of my visit, and the whole aspect was that of a semi-arid region. Almost no herbaceous species were in evidence. There was little water, although at one point in the canyon a small spring broke out and ran a few yards on the surface before diving into the broken rocks again.

Partly because of the meager flora, and partly because of approaching darkness, I gave up any attempt to reach the top, and returned to camp with my load of specimens. I found that the fossil-hunters had been successful, but much enervated by the extreme heat in the creek bottoms, and ready to leave the next day. We did not get another chance to explore the Henry Mountains for two weeks.

On June 19 Arnold and Becker and I left Hanksville early in the morning, with the avowed intention of climbing Mt. Ellen. We found that a good road existed; it crossed the desert to a ranch in the foothills northeast of the mountain, then wound up across the first row of intermediate summits into what is called the Sawmill Basin, at an elevation of some 8000 feet, and at the very eastern foot of the peak. We camped in an aspen grove at the edge of a clear cold mountain stream (fed from the numerous snowbanks which were clearly visible on all the north-facing slopes above us), and reconnoitered, with a view to making the ascent the next morning.

Here was a very different scene from the thin conifer forest on Mt. Hillers. In the basin itself was a mixed association of large aspens (up to at least 50 cm. in diameter), douglas fir, pine (*P. ponderosa*), and a spruce which we took to be *Picea pungens*. There was plenty of water, and herbs were abundant, including such genera as *Woodsia*, *Arabis*, *Cymopterus*, *Corydalis*, *Antennaria*, *Heuchera*, *Caulanthus*, *Osmorhiza*, *Smilacina*, and *Cardamine*.

Fig. 1. Mt. Ellen in the distance, far right. The picture overlooks the Sawmill Basin, which extends to the base of the ridge in the middle distance.

By 8 o'clock the morning of the 20th we were well on our way up out of the Basin. The first two hours' walk was through the rather open groves of *Pinus ponderosa*; oak thickets alternated with these. Occasional ravines supported aspen groves. Our objective was a rocky knife-like edge which angled back toward the south as it ascended to the summit ridge south of the high peak. At noon we had left most of the aspens behind and had passed into the zone of slender firs and spruces near timberline, at the base of the knife-edge. Here we began to notice a marked change in the flora.

The mixed aspen-conifer forests of the middle slopes had supported a typical forest flora: we found plenty of such things as *Arnica cordifolia, Aquilegia caerulea, Thalictrum fendleri, Fritillaria atropurpurea, Berberis repens, Carex occidentalis, Arabis drummondii,* and *Corallorhiza maculata.* The common shrubs were two currants, *Ribes inebrians* and *R. montigenum,* and a rather surprising acquaintance which we had known in northern Michigan in the limestone barrens, *Shepherdia canadensis.* As we left these relatively mesophytic wooded areas, and passed onto the rocky summit ridges, we realized that here even some distance below timberline we had reached the edge of the real subalpine vegetation.

To our regret we found that spring had not yet really come to these high elevations. Of course there were huge snowbanks on all sides, especially on the shaded sides of the patches of conifers and in the small ravines. One of the largest snowbanks had been visible to us for 50 miles or more as we approached the mountains from the north. Even where the snow had actually melted, the sun had hardly had time enough to stir life into the vegetation.

Enough species were flowering, however, to indicate that in a very short time these summit ridges would be a riot of color. Here, as in the desert below, the yellow colors seemed to show up the most. A *Potentilla* (of the affinity of *P. plattensis* Nutt.), two little umbelliferous plants (*Oreoxis alpina* and *Pteryxia hendersoni*), an unidentified *Draba,* and *Lesquerella wardii,* all very low-growing, combined to form a nearly continuous carpet of yellow on the rocks. Probably the most abundant of all the species here was a clover with rose-colored flowers, *Trifolium dasyphyllum,* which grew in tufts or mats almost everywhere, in association with *Selaginella watsoni* (of the *rupestris* group), *Arenaria rubella, Cerastium beeringianum,* and *Arenaria fendleri.* The most conspicuous species was probably *Oxytropis sericea,* which is as much as a foot high (by far the tallest plant here), and carries erect its many-flowered white spikes.

As we neared the summit of the great ridge just south of the peak itself, and perhaps 150 m. below the peak, we found ourselves on bare open slopes covered with small loose rock-fragments. In many places *Trifolium dasyphyllum* and the *Selaginella* formed a carpet which almost covered the stones. In spots the turf consisted of a nearly pure stand of *Carex elynoides*, or this species mixed with the *Trifolium*, with *Oxytropis oreophila*, with *Potentilla* or with *Silene acaulis* (which latter species was not yet in flower). We found occasional spots where the lavender-blue flowers of *Polemonium delicatum* formed a touch of color. Scattered among the turf-forming plants were some less aggressive species, like *Androsace septentrionalis* and *Poa pattersoni*. The only woody plant to reach this elevation (and indeed to reach the summit itself) was *Ribes montigenum*, which occurred here and there on the talus slopes.

Fig. 2. Upper slopes of Mt. Ellen, near timberline, looking north toward the summit.

The summit of Mt. Ellen, which we reached about 3 o'clock, is a symmetrical cone of loose broken rocks, which supports very little vegetation. We viewed with some alarm a thunderstorm which seemed to be coming our way from the Aquarius Plateau to the west, but we stayed on top long enough to take a few pictures. Shivering in the wind, we actually got a few flakes of snow from the clouds which looked so threatening, but did not catch the brunt of the storm.

Sliding incautiously down the steepest slopes took us into our camp in the Sawmill Basin, in little more than a third of the time it had taken for the ascent. All voted the climb a real success, and in view of the general drought which had afflicted Utah this year, we were much pleased to find the high-mountain vegetation so nearly unaffected.

REMARKS ON THE OCCURRENCE OF SELAGINELLA SELAGINOIDES IN THE GREAT LAKES REGION

Rogers McVaugh

In the 1908 edition of Gray's Manual, *Selaginella selaginoides* was listed as "rare," and the range was given as "Wet places, Nfd. to N.H. (*Pursh*), Mich., L.Superior, Col., and northw." My first acquaintance with the plant can be dated precisely; I saw it first on the Bruce Peninsula, in Ontario, when I was a guest of Dr. Edgar T. Wherry on the summer excursion of the Botanical Society of America, in 1934. At the time this species meant relatively little to me, although I was impressed by its rarity, and by the fact that Dr. Wherry had been willing to make the long journey from Philadelphia with one of his primary objectives to photograph this little plant. Since 1934 I have come to know *Selaginella selaginoides* much better, and to realize that in one area of the United States, at least, it is not a rare plant at all. Rare or not, it remains one of the most interesting plants in the Michigan flora.

Fourteen years after my introduction on the Bruce Peninsula, I found *Selaginella selaginoides* again. This time it was on June 28, 1948 (as recorded in my field-book), when Dr. Leo F. Koch and I found it growing abundantly in the marl flats on the north shore of Lake Huron, east of Cedarville, Michigan. Anything but rare here, it proved to be a consistent member of an association which included *Drosera linearis, Parnassia parviflora* and *P.glauca, Primula intercedens, Satureja arkansana, Gerardia paupercula, Castilleja coccinea, Utricularia cornuta, Lobelia kalmii,* and *Solidago ohioensis.* After finding the *Selaginella* at the Cedarville locality, we discovered within a few weeks that it grew in many similar places in Mackinac, Emmet and Cheboygan counties.

The habitat which these species share is an interesting one which deserves a detailed ecological study. Numerous species of plants are common about the general area of the Straits of Mackinac, but are chiefly or entirely confined to this marl flat or beach-pool habitat.

Along the shores of the two Great Lakes, Michigan and Huron, there are numerous level stretches, either just back of low coastal bars or dunes, or sometimes extending to the very edges of the lake, which are kept continually moist by lime-laden seepage waters from the landward side. The soils of these moist areas are for the most part nearly neutral. The only common trees are the white cedar (*Thuja occidentalis*) and the larch (*Larix laricina*). Most of the plants on the open wet flats, as might be expected, are calciphiles. In the coniferous forest which grows down to the edge of the areas that are periodically inundated, however, the soils are prevailingly acid. The marginal swamps often support a heavy layer of Sphagnum, in which grow such species as *Ledum groenlandicum*, *Vaccinium oxycoccos*, *Gaultheria hispidula*, and *Drosera rotundifolia*. As a natural result of the proximity of the two zones, the areas between the open beach pools and the swamp forest show an interesting series of intermediate habitats. It is primarily in this intermediate zone that the *Selaginella* may be found; it occurs on little hummocks above the general level of the marly flats, often among mosses (usually not Sphagnum), and often slightly shaded by Thuja.

So much for the ecology of the species; even more interesting than this are the phytogeographical questions which are suggested by a study of its geographical range. In the Great Lakes region, for example, the southern boundary of its range is a very sharp one. In Michigan the southern limits are in Alpena and Charlevoix counties, near the line between the calcareous strata which underlie the soil to the north, and the black shales to the south. From its southern limits in Ontario, Michigan and Wisconsin the species ranges far northward to Greenland, Labrador, and Alaska. The first questions I should raise are these: Where did this plant live during the last glacial period, when all of Michigan (and for practical purposes all of northern North America) was covered with ice? And if it survived during the glacial period in some area that was not ice-covered, how did it later attain its present range, particularly in Michigan?

It would seem to have required an extraordinary succession of accidents in post-glacial time to have brought this (and numerous other species, e.g. *Parnassia parviflora*, *Primula intercedens*, *Pinguicula vulgaris*) into the region of the Straits of Mackinac from the South. None of the species in question now grows very far south of the Straits, and it seems unlikely that all should have migrated rapidly northward in the wake of the glaciers, only to die off *en masse* everywhere south of Saginaw Bay. It seems much more probable that these species, and doubtless others which have similar ranges, like *Juniperus horizontalis* and *Gentiana rubricaulis*, entered the Lower Peninsula of Michigan from the north, perhaps in late Algonquin time when, as we think, the Straits had shrunk to little more than a river, and the present islands were peninsulas. But how did these species get to the north side of the Straits in the first place, following the retreat of the ice? Did they perhaps survive the glacial periods on the Keweenaw Peninsula, as suggested by Fernald some years ago, or did they come from western America where some of them and their close relatives still occur? Or what if the *Selaginella* survived somewhere in the northern Appalachians, say in western Maryland, West Virginia or Virginia? Although this particular species now ranges no farther south than the upper Great Lakes region, some of its associates are known as far south as western and southern New York (*Primula intercedens, Pinguicula vulgaris, Juniperus horizontalis*), and other associated species (e. g. *Triglochin palustris* and *Lobelia kalmii*) are widely distributed in calcareous regions as far south as the southern boundary of the Wisconsin glaciation and even a little beyond this. A hypothetical refugium, or series of refugia, in the northern Appalachians, may be considered as definite possibilities, and have in fact been suggested by various people.

Assuming a place where various "northern" species may have lived during the period of glaciation, then these species must have spread rapidly northward as the glaciers receded. From what is known of the order in which different areas became ice-free, and from the ranges of many present-day plant-species, one can reconstruct a probable migration-route that must have been followed, in early post-glacial time, by many plants that spread northward into the areas that had been denuded by the ice. Such a route must have been a generally northwesterly one, passing through central and western New York, southern Ontario, northward and northwestward to the Straits of Mackinac, thence westward through the Upper Peninsula of Michigan, and southward again into the Lower Peninsula.

In this way one can, it seems, provide a reasonable explanation for the range occupied by *Selaginella selaginoides* in the Lower Peninsula. It is tempting to speculate further, and apply the same reasoning to such species as the white pine and the hemlock. These occupy much more extensive ranges in the Great Lakes region than does the *Selaginella*, but it seems equally unlikely that they should have come into the region from the south. Of course it is unsafe and unscientific to make generalizations based upon the distribution of a single species, or upon the similar distribution-patterns of a few associated species. The question of the origin of any particular flora is a fascinating one, however, and seems worth asking even if one cannot answer it with certainty. Some day perhaps we can give an answer which will be based upon study of the entire floras of the areas in question. In the meantime the editors of this Bulletin will welcome suggestions or comments upon this or related subjects.

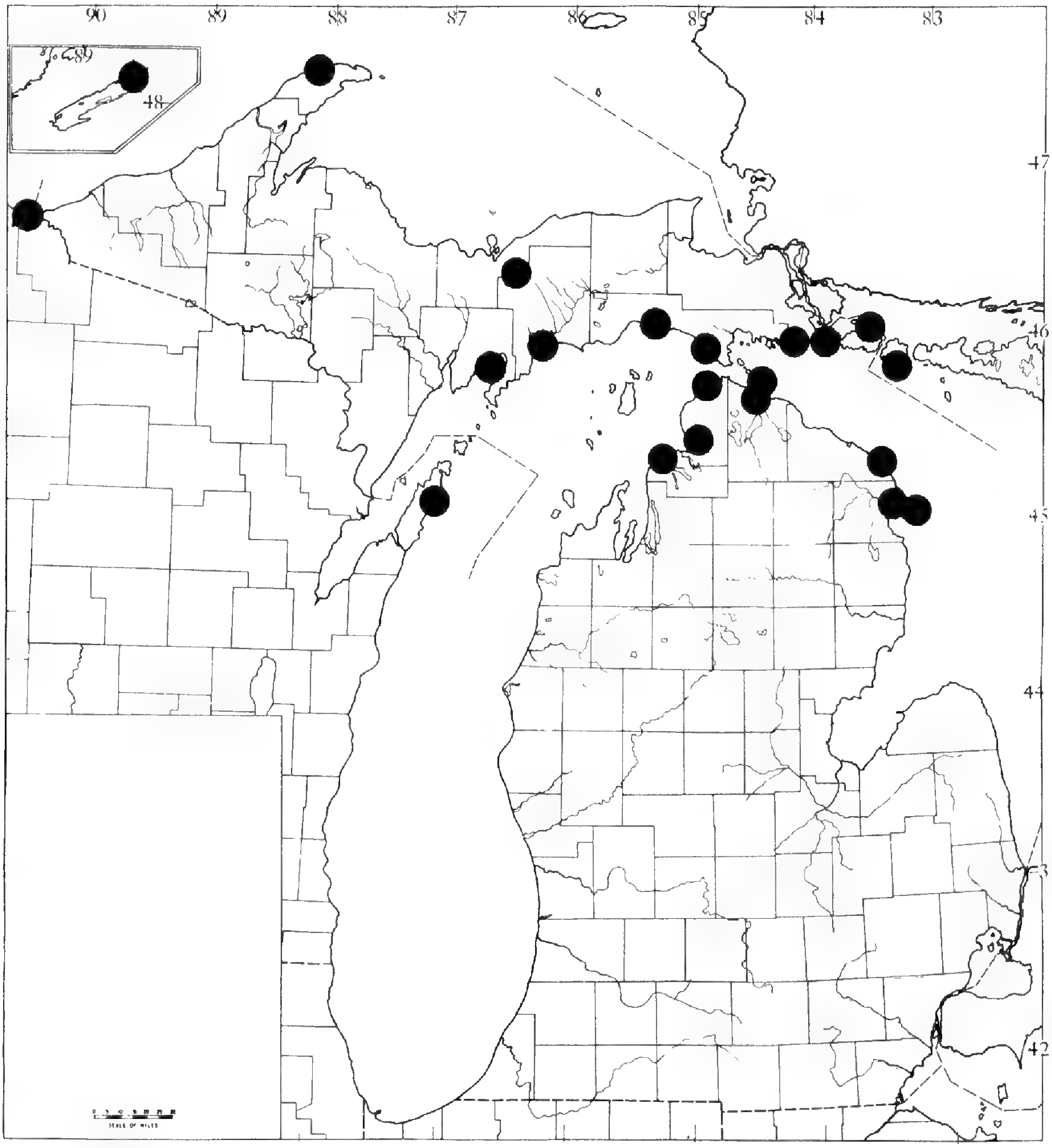


Fig. 1. Map of the distribution of *Selaginella selaginoides* (L.) Link, in Michigan, Wisconsin, and adjacent Ontario. Wisconsin records are taken from "The Ferns and Fern Allies of Wisconsin," by R. M. Tryon, Jr., *et al.* Other records are based on specimens in the Herbarium of the University of Michigan.

BOTANICAL IMPRESSIONS OF TRAVELS IN MEXICO

Ida K. Langman

My first trip to Mexico was in the summer of 1939 and collecting, I must confess, was a side line, subordinated to getting a quick, tourist's-eye view, gathering impressions of the country and the people, and learning a little of the language. Collecting was done almost entirely along the comparatively few automobile highways open at that time. The trip, though superficial, served several useful purposes. It infected me with a love of the country and its people from which I expect never fully to recover. It introduced me to a new kind of fun — learning to speak a language other than my own — and it plunked me down in the middle of a strange (to me) and colorful flora which made the Pennsylvania Poconos where I had done my previous collecting seem dull, indeed, by comparison.

During that summer over 300 numbers were collected and deposited in the herbarium of the Academy of Natural Sciences of Philadelphia. A large part of the collection came from along the Pan American Highway between Laredo and Mexico City, a region of great diversity both scenically and floristically. Certain plants still stand out vividly in my recollections of that highway. First there was *Leucophyllum texanum*, so appropriately called "cenizo" by the Mexicans; then *Cordia boissieri*, the "anacahuite," whose fruit is eaten by the herds of goats that roam the dry plains of the north; mezquite, with its feathery foliage; *Argemone*, the Mexican poppy; and *Nicotiana glauca*, the tree tobacco. Here, too, I saw the first representatives of genera that were to become familiar elements of the Mexican flora — Cupheas, Ruellias, Lantanas and Commelinas.

From Mexico I made a number of excursions, each of which introduced me to new aspects of the flora. At the Pyramids of Teotihuacán I first saw the four-o-clock, *Mirabilis jalapa*, growing wild. Here also I became familiar with some of Mexico's most common weed-genera: *Stevia*, *Sanvitalia*, *Sphaeralcea*, *Mentzelia*, *Bouvardia* and *Gaura*. On the way to Guadalajara, a side-trip to the crater of the Nevado de Toluca acquainted me with the brilliantly colored herbs of the forested mountain slopes: Salvias, Lupines, Penstemons, Castillejas, and Phacelias; in the fields were Dahlias, Cosmos and marigolds; at an elevation near 15,000 feet, in the crater, flourished a diminutive alpine flora: *Draba jorullensis*, *Castilleja tolucensis*, *Cerastium purpusii*, *Senecio procumbens* and *Commelina orchidoides*.

On the way to Acapulco, by way of Cuernavaca and Taxco, the last part of the road was still under construction. I remember *Thevetia* *yecotli* in Taxco, an interesting assemblage of ferns and Selaginellas along the highway south of Taxco, and my first wild guava tree near Acapulco.

A final trip was to Puebla and Tehuacán, and from there by train to Oaxaca, with a side trip from Tehuacán to Orizaba.

Mention should be made here of the gracious assistance I was given by several members of the staff of the Instituto de Biología, who helped me with the identification of many of the plants as I brought them back from each of the trips. Thanks go particularly to the Señoritas Débora Ramírez Cantú and María Agustina Batalla.

The next summer I was back in Mexico, this time for a year's stay. I had been eligible for a sabbatical leave from my teaching job, according to a law passed by the previous state legislature, but until I discovered the favorable exchange for the "Yanqui," I had not been able to take advantage of the leave. The rapid survey of the previous summer had indicated where we would like to spend more time, and so the year divided itself up into a month or so spent at each of a number of different headquarters. Again, I am forced to confess, collecting shared time with other activities: sightseeing, shopping for native handicrafts, trying to keep up with unusual fiestas, etc. That, added to the fact that collecting is really good only in the months of June to December or January, kept my numbers down to about 1000. These were, however, collected in quadruplicate; one set for the Academy of Natural Sciences in Philadelphia, one for the Division of Plant Exploration and Introduction in Washington, one for the Instituto de Biología in Mexico and one, as required by law at that time, for the Mexican Department of Agriculture.

July and August passed rapidly, as we spent the height of the rainy season in Mexico City and surrounding areas. The high spot of the period was a one-day trip to the Lagunas de Zempoala when by some miracle, it did not rain once, and we collected nearly 75 different species. Still remembered from this trip are the lovely shell pink *Pedicularis mexicana*, *Pinguicula macrophylla* with deep purple flowers, and the showy yellow *Calceolaria mexicana*. On other days we saw purple Daleas in dry, sunny habitats; *Distichlis* and *Maurandya* on the shores of Lake Texcoco; *Milla biflora*, lovely relic of a lush meadow where now is a dry field; and the striking, white-flowered tree Ipomoeas.

September and October found us in the North. The rains had ended as we came to the deserts above Monterrey, and to Saltillo and Torreón. The rocky hillsides and dry roadsides were a mass of color with the yellow cushions of *Dyssodia greggii*, the tiny white *Zinnia pumila*, *Scutellaria potosina* with blossoms of velvety purple blue, and a host of others. We enjoyed our trips to Tampico, San Luis Potosí and Durango, but the fall was coming on and we wanted to go West.

From the area around Guadalajara, where November and December are beautiful sunny months with warm days and cool nights, come a host of varied memories: *Banisteria beecheyana* climbing on the trees; attractive blue Bonplandias; feathery-flowered Iresines, the tall purple *Wigandia*, and the fern-like *Coriaria thymifolia*. Near Colima, on our Christmas excursion, we came across a plantation of *Hibiscus sabdariffa*, grown for the scarlet calyces from which, by drying and steeping in hot water, a delicious beverage called "Jamaica" is prepared.

Following January in Uruapan, I returned to Acapulco for the month of February. Here swimming and sunbathing took up more than their proportionate share of time, and here, too, the new plants really began to overwhelm me: *Swartzia*, *Gliricidia*, *Ocotea*, *Couepia*, *Podopterus*, *Cochlospermum*, *Conocarpus*. Bignoniaceous trees and vines seemed to be everywhere. Here was one violet-striped legume that may have been a new genus, but the fruits were missing and I have never been back to collect them. Now with all the building that has gone on at Acapulco since then, the plant may well be extinct.

In March and April, in Oaxaca, the dry season was in full force and only a few plants were in flower, notably Plumerias, *Tournefortia densiflora*, *Cordia curassavica*, and *Maurandya scandens*. But on Cerro San Felipe, where we could look down on the city of Oaxaca as we climbed to the 10,000 foot summit, we found verdant forest and water, even a waterfall. The day's collecting turned up, among other things, *Anisacanthus conzattii*, whose name brings to mind a memorable visit with the venerable Professor Conzattii himself.

April passed with a number of visits to eastern cities: Orizaba, Córdoba, Jalapa and Veracruz, and my last month in Mexico, May, was spent in Cuernavaca. Most of the time seemed to be taken up in preparations for returning home, but it was impossible not to notice the early-flowering plants with conspicuous flowers, coming just before the rains: *Stemmadenia mollis*, *Albizzia occidentalis*, *Bouvardia chrysantha*, *Zephyranthes verecunda* and *Erythrina leptorhiza*.

Seven years later, in the fall of 1948, I was back for another year — this time on a grant to continue gathering material for the bibliography on Mexican botany, which I had started in the interim. Most of my time was spent, naturally, in libraries. On a number of holiday periods, however, through the kindness of Dr. Faustino Miranda and other members of the Instituto de Biología, I was privileged to go on a number of collecting trips. Collections totalled over 400 numbers. This time specimens were sent to The National Museum in Washington, to the Academy of Natural Sciences in Philadelphia and to the Escuela Agrícola Panamericana in Tegucigalpa, Honduras.

The first collecting trip was in November to Córdoba and covered a number of varied habitats: along the Río Atoyac, the Río Metlac, a climb almost to the summit of Cerro de San Cristóbal overlooking Orizaba, and a visit to El Mirador the once famous home of Carlos (Christian) Sartorius and C. A. Purpus. On the trip to Huatusco and El Mirador, several stops were made and such widely different species were collected as *Liquidambar styraciflua, Epidendrum cochleatum, Scutellaria mociniana* and *Carpinus caroliniana*. At one spot there was an interesting combination of a magnificent tree-size *Clethra*, a *Platanus* and a tree-fern, *Cyathea*. The ascent of Cerro de San Cristóbal was through dripping fog forest with orchids, Fuchsias, and Begonias. At the higher altitudes, although I had been prepared for it, it was still a surprise to find, among other things, the Mexican representative of *Cornus florida*.

The Christmas holidays and the Easter vacation were spent in the state of Chiapas. Although we didn't get into the really exciting jungle region of the state, the Selva Lacandona, we were far enough south to get many plants closely related to Central American and South American flora. On the higher elevations, however, particularly near San Cristóbal Las Casas, we found more familiar temperate zone genera: *Rhus, Rubus, Crataegus, Alnus, Senecio, Ceanothus, Vaccinium, Arctostaphylos, Fraxinus, Polygala* and *Liquidambar.* Here in December, the seasons overlapped so that at one spot the hills were scarlet with the autumn color of oaks, while a short distance away, fruit orchards in bloom heralded the coming of spring.

Collections were made near Tuxtla Gutiérrez, the capital of the state, near Comitán further south, and most interesting of all, on a trip by horse and foot to Cerro Brujo off the road between Ocozocuautla and Villaflores. This is dense forest where the legendary quetzal is still said to live — an area where one would have liked to spend several weeks rather than just a few days. Interesting plants collected at these various localities include the parasitic *Arceuthobium, Monimia, Ternstroemia, Robinsonella* (a beautiful white flowered malvaceous tree), several Ruellias, *Cattleya, Alvaradoa, Heliocarpus, Jacquinia* (the fragrant ciqueté with tiny orange flowers), *Chrysophyllum*, the elm-like *Chaetoptelea*, Heliconias, the black flowered *Lisianthus nigrescens* and an aromatic *Exostemma*, a quinine relative.

A few minor trips included a hike up to the cliffs overlooking Tepoztlán north of Cuernavaca and a quick flying trip to Yucatán, mainly for library research, with stops at Campeche and Ciudad del Carmen. Nothing startling turned up on these trips, except that the only place in Mexico where I ever saw poison ivy was at the temple of Tepozteco, overlooking Tepoztlán!

Summary of Itineraries and Collections

Date	Nos.	Localities
		1939
July 8-10	1963-2010	Pan American Highway — Laredo to Mexico City
July 11	2011-2048	San Juan Teotihuacán, Estado de México
July 13	2049-2072	Mexico City to Toluca, Estado de México
July 17	2073-2079	Cuernavaca, Morelos
July 18-21	2080-2118	Cuernavaca to Taxco, Estado de Guerrero, and around Taxco
July 23-25	2119-2178	Taxco to Acapulco, Guerrero, and around Acapulco
July 28-29	2179-2199	Mexico City to Puebla and Tehuacán, Estado de Puebla
July 30	2200-2213	Monte Albán, Estado de Oaxaca
Aug. 1	2214-2228	Tehuacán to Orizaba, Estado de Veracruz
Aug. 4	2229-2251	Mexico City to Morelia, Michoacán, including trip into crater of Nevado de Toluca, Estado de Mexico
Aug. 5	2252-2259	Morelia to Patzcuaro, Michoacán
Aug. 6	2260-2277	Patzcuaro to Zamora, Michoacán
Aug. 10	2278-2289	Mexico City to Laredo
		1940
July 7	2435-2447	Laredo to Monterrey, Nuevo León
July 17 — Sept. 14	(2448-2824	Mexico City and the surrounding area, for the most part. Includes the following special trips):
	2495-2516	Trip to Toluca
	2533-2592	Trip to Tlaxcala and Cascadas de Atlihuetzia, Estado de Tlaxcala, via Puebla highway
	2593-2634	Trip to base of Cerro de Ajusco, D.F.
	2635-2711	Trip to the Lagunas de Zempoala, Estado de Morelos
	2712-2722	Trip to Acapulco
	2756-2786	Trip to El Parque on Mexico-Cuernavaca R.R.
Sept. 18-21	2825-2862	Mexico City to Monterrey, with side trip to Tampico, Tamaulipas
Sept. 22 — Oct. 20	(2863-2999	In northern Mexico, mainly in and around Monterrey including the following):
	2975-2992	Trip to Saltillo, Coahuila

	2950-2963	Trip to Torreón, Coahuila, and by train to Durango
Oct. 22-26	(3000-3046	Monterrey to Mexico City):
	3007-3033	Side trip to San Luis Potosí
Nov. 5 — Dec. 27	(3047-3212	Mexico City to Guadalajara, Jalisco. Includes the following trips):
	3097-3106, 3116-3124	Guadalajara to Chapala, Jalisco
	3167-3212	Around Colima (trip made from Guadalajara to Colima via R.R.)

1941

Jan. 6-25	3213-3299	Uruapan, Michoacán, and the surrounding area
Jan. 28 — Mar. 1	3300-3371	Acapulco and environs
Mar. 5-16	3372-3407	Mexico City to Veracruz via Jalapa, Estado de Veracruz
Mar. 20-24	3408-3456	Fortín, Estado de Veracruz, and surroundings
April 2-14	3457-3504	Oaxaca and nearby areas
April 31 — May 31	3505-3518	Cuernavaca and environs

1948

Oct. 12	3530-3550	Pedregal, south of Mexico City
Oct. 22	3551-3563	Trip to Toluca
Oct. 31 — Nov. 5	3564-3671	Around Córdoba, Veracruz, including ascent of Cerro de San Cristóbal, near Orizaba, and trip to El Mirador, Huatusco
Nov. 21	3672-3700	Trip to Tepoztlán, Estado de Morelos
Dec. 20	3701-3730	On road from San Cristóbal Las Casas to Tenejapa, Estado de Chiapas
Dec. 22-26	3731-3803	Around Comitán, Estado de Chiapas

1949

Jan. 1-2	3804-3849	Around Tuxtla Gutiérrez, Estado de Chiapas
Jan. 4-5	3850-3882	Trip to Cerro Brujo, on road between Tuxtla and Villaflores, Estado de Chiapas
April 15-16	3883-3921	Around Tuxtla Gutiérrez
July 26	3922-3929	Trip from Mexico City to Tecolutla, Veracruz
July 31-Aug. 2	3931-3933	Yucatán
Aug. 12-13	3934-3955	Around Tuxtla Gutiérrez

A TRIP TO TENNESSEE FOR BUCKLEYA

Bernard Harkness

In 1890 (Garden and Forest, Vol. 3, p. 236) Professor Charles Sprague Sargent gave in detail the history of the discovery of *Buckleya distichophylla*. In 1842, soon after the charge of the Cambridge Botanic Garden was entrusted to him, Asa Gray made a long journey through the mountain region of the south for the purpose of collecting roots and seeds for the garden. He brought back then the famed plant of *Buckleya* which has outlived the Harvard Botanic Garden itself. For Massachusetts, though thought to be a cherisher of tradition, forsook the Botanic Garden and apartment houses now trespass on that hallowed ground. The transplanting to the Arnold Arboretum of this pistillate plant, which had never yielded progeny assexually, was a feat of no mean order. Dug with a ball of earth, it was settled down in a new position over live hemlock roots and rewarded this attention to its needs by continuing to thrive.

The first botanist to find *Buckleya* was Thomas Nuttall in 1816 on a trip up the French Broad River. Sometime later S. B. Buckley sent specimens to John Torrey who gave the plant the name which commemorates Buckley. Sargent in the fall of 1888 came to Paint Rock just as the fruits were ripening. From his rich harvest of fruits and small seedlings sent to the Arnold Arboretum he had high hopes that *Buckleya* might become well established in plant collections. However, most, if not all, of this material apparently suffered the fate of the Kew Gardens introduction of 1897; this, W. J. Bean states, lived for only ten years. The difficulty at Kew was attributed to the plant's inability to become attached to a host.

On September 26, 1953, I was at the Paint Rock locale where Paint Creek flows into the French Broad River. If, as Sargent stated, the creek is the boundary between North Carolina and Tennessee, then the bank on which *Buckleya* grows is on the Tennessee side. Two roads start up-stream and it is on the banks of the upper left-hand road where *Buckleya* makes its stand. Its existence is seemingly as precarious as sixty-five years ago when Sargent was moved to wonder when fire might exterminate *Buckleya* and send it to join *Franklinia*.

In Garden and Forest (Vol. 9, pp. 163, 210) T. H. Kearney, Jr., then an agrostologist with the United States Department of Agriculture, reported additional stations for *Buckleya* along the French Broad River. These were the Wolf Creek and Newport stations, all in Tennessee. He had enlisted the aid of a local young man, Harry Allen, who gathered seed for him. I was very pleased to find at Wolf Creek that relatives of Mr. Allen occupy the same home. Mr. James W. Walker knew *Buckleya* by its name and understood the significance of my search for it. With his help, I came upon it in short order. In the garden of the Allen-Walker home, interesting for a century-old bald cypress and fine boxwood, there was also a robust plant of *Buckleya* brought in by Mr. Walker, Sr. According to his recollection the seed was planted under a hemlock tree with which the mature plant has now achieved a completely successful association.

Most references are to hemlock as the host plant but in the limited area of its occurrence at Paint Rock the *Buckleya* grew as well near holly, pitch pine and mountain laurel. Other plant associates on the dry rocky bank were *Rhododendron maximum, Oxydendron arboreum, Liquidambar styraciflua, Epigaea repens, Mitchella repens* and *Galax aphylla.* In addition to the limitations of its semi-parasitism and the rapid deterioration of the ability of its seed to germinate, *Buckleya* seemed to me to be subject to a definite light requirement. In the thin woodland of the edge of the road *Buckleya* was thriving; 100 feet back in denser shade it did not exist. It is very likely that along the French Broad River before white settement there were Indian trails which provided much the same environment with respect to light as the dirt roads do today. At the Wolf Creek site Mr. Walker picked up an arrowhead as we were collecting seed. Heaven forfend that some day a tremendous scenic drive should be pushed through on the east bank of the French Broad, as that could completely do away with *Buckleya.*

Distribution of *Buckleya* fruits has been made to 25 botanic gardens and arboreta, selection having been made on the basis of a previously expressed interest in the American Santalaceae. A collection of *Pyrularia pubera* was made two years ago in Kentucky. To my knowledge only one seed germinated of this lot; Mr. W. A. Smith of Lyndonville, New York is growing the plant in a pot. In two seasons it has grown about five inches. Field observation does not show as convincing evidence of parasitism for *Pyrularia* as it does for *Buckleya,* and it is hoped that the oilnut may become established in Mr. Smith's garden, which is notable for double *Trillium grandiflorum* and other American plants both herbaceous and woody. I should mention that my most persistent advocate of the *Buckleya* expedition was Mr. Kan Yashiroda, The Plant Acclimatization Garden, Kagawa-Ken, Japan. In August he wrote me, "Will you not mind my asking you to spare for me a few fresh seeds of *Buckleya distichophylla,* if you go on the seed collecting trip to Tennessee and Kentucky this September? Last August I had prepared some potted trees (Hemlock) to be ready for the seeds and still have kept these. I am very anxious to try *Buckleya,* a plant which I am so much interested in from C. S. Sargent's writings."

FIELD WORK IN 1953
THE PROBLEM OF POLLEN REPRESENTATION

Stanley A. Cain

Some of the major problems relating to transportation and sedimentation of pollen have received scant attention despite the fact that they are basic in pollen analysis. Early this year I proposed to study these as part of a larger project, the preparation of a *POLLEN ATLAS*, and am glad to express my appreciation at this point to the Horace H. Rackham School of Graduate Studies, University of Michigan, for a grant in aid which, among other things, permitted rather extensive field work in 1953.

The studies this summer were spread from Baie Comeau, on the north shore of the St. Lawrence as far east as one can get by car, to as far west as Iron and Gogebic counties in the western Upper Peninsula of Michigan. Areas of concentrated work in Quebec were around the biological station in the Mont Tremblant provincial park and the biological station in the Laurentide provincial park. The northernmost stations were in Abitibi-Est at about 49° N. Lat., and in Chibougamau at about 50° N. Lat. The summer's work, then, has yielded a spread of studies in the boreal spruce-fir forests and in the transition with the northern hardwoods forests. Some other time other geographic-climatic-vegetational regions will have to be tackled.

About 40 stations were studied this summer. They were mostly representative of phases of the Canadian spruce forest, as found in central Quebec, and of the Great Lakes — St. Lawrence forest which lies south of the spruce. This is the region of northern hardwoods that is sometimes more or less rich in pine.

There was more to the summer's field work than sample plot studies. One thing I learned is that flies are for fishermen, not for fish. This is true at least for speckled trout in the Laurentide region. The creel limit is 40 fish (7 in. minimum) or 15 lbs. per day. It can be done. It was done. This was a special project connected with the fish studies being carried on by the Provincial Department de la Chasse et de la Pêche. We were not fish hogs. Much of the fishing was for population studies where the fish were immediately returned after being caught; fishing time, catch, and tagged fish numbers being recorded. The north country, or "bush," can't be talked about without some mention of insects: mosquitoes, deerflies, "brûlots," and blackflies — especially blackflies which creep into eyes, ears and nose, and even fly down one's throat when it is necessary to talk or pant. But of course, if there weren't so many flies there wouldn't be so many fish.

From the middle of July, in a seven weeks period, we travelled over six thousand miles, much of it on gravel roads. Some of the gravel roads are new, well engineered, and maintained. Others were not, or were logging roads. At any rate we got used to having a stucco finish, on the car and ourselves. The rocky roads were hard on tires — we bought three new ones during the trip; and on the "soft under belly," the oil pan had to be welded twice and the muffler and exhaust pipe replaced. Other things happened. An old car can't take it; a new car (ours wasn't) ages fast. Logging road bridges, too, deserve a word — but not in print.

Much of my field work was in Provincial parks and fish reserves (Verendrye, Mont Tremblant, Laurentide, and Chibougamau). The roads are few and a "circulation permit" must be obtained to use them. Control is by the Department de la Chasse et de la Pêche or by the lumber company that has the concession to lumber the areas. When the fire hazard is high the roads are closed and no one circulates on the roads or in the bush unless on official business of some sort. At all times my work was facilitated by the persons in charge of circulation, and I wish to express my appreciation for the cooperation of the Department's agents. At the same time I want to register a protest. All the Crown lands including the parks (except for the park at Mt. Albert in Gaspé) are subject to complete lumbering. The provincial officials would do well to establish within the parks and fishing reserves some wilderness areas where virgin vegetation still remains and where it will be protected for its natural history interest, its value to forestry, and its attraction for tourists. It also seems strange to me that public parks sometimes have all fishing waters under lease to private concessionaires. Of course anyone can fish in these parks, that is if he can afford $15 to $20 or more a day which it costs through the concessions.

But to return to the serious project of the summer: Palynology, a recently created term, covers a field in which there are several active branches: pollen analysis, concerned mostly with non-mineralized late-glacial and post-glacial sediments; spore analysis, concerned mostly with older sediments and applied to oil shales and coal stratigraphy; and the study of air-borne allergens. Pollen analysts have mostly been busy working out stratigraphic columns from bogs and lake-bottom sediments. From the pollen and spores of each sample there is prepared a "spectrum" or table of percentage composition by types of the recovered microfossils in the total flora. The successive spectra in the column form a pollen "profile." The pollen spectra at a given period of time in history are taken to represent the prevailing vegetation of the period. As the composition of the fossils in the spectra changes with time it is a reflection of the changing vegetational patterns. This may be due to succession and the maturing of the soil under a prevailing climate; but in the longer frame of time reference it is an indication of climatic amelioration or deterioration — of warming or cooling, of becoming more humid or more dry, of warming and drying, etc. — for climate is a basic control of vegetation. As one comes up the profile a certain pollen type may make its appearance, have a rise, maximum and decline, and then disappear from the record.

By and large, the relationship between pollen rain — the general pollen falling on any spot at any time — and vegetational cover is taken to be direct; yet everyone knows, or at least suspects, that certain trees are heavy pollen producers and have a disproportionate representation in the pollen rain. Acre for acre, certain species must produce from a few to several times the pollen of other species. If it were possible to obtain factors for correction of pollen statistics, the reconstruction or interpretation of vegetation of the past would be more accurate.

There are two problems here and they are closely tied up. These are the problem of over- and under-representation of species in the pollen rain (that is, not as to pollen production, but as to area of terrain occupied by the type producing the pollen), and the problem of distance of transport. As to the latter, it is well known that pollen and spores can be transported long distances. The question, rather, is how close do plants of a given species have to be to the spot of sedimentation for the species to be represented consistently in the pollen rain, even though the percentage may be small? One can hypothesize that the probability of pollen grains occurring in the pollen rain at any given point diminishes with the square of the distance. Said simply, this means that most of the pollen is probably of local origin. But the basic question still remains. How close must plants be to produce a consistent representation at a certain percentage level?

It is not possible at this time to report any results, for they depend upon laboratory analyses yet to be made of the collected materials, but the technique of approach to the problems, and some of the difficulties involved are of interest.

Basically the idea is simple. It is known from some European studies that moss and liverwort polsters and mats are usually good pollen traps. A study in the Great Smoky Mountains by a former student of mine, Gladys Carroll, showed that the moss species in the spruce forest are also effective traps. They usually yield an abundance of pollen which is taken to represent the average "pollen rain" of the past few years. The exact age of the polster is unimportant as long as it is old enough to contain the pollen rain of a few years and average out any annual differences. Extraction of pollen from the polsters is simple. A piece of the mat is pulled apart, boiled in 95% alcohol, and strained through cheesecloth. The pollen is concentrated by centrifuging, the alcohol decanted, and the residue boiled in 10% KOH for about 10 minutes. After two or three washings and centrifugings, slides are prepared by removal of the top of the residue and mounting it in glycerine jelly. No stain is needed if KOH is used. From this material a pollen spectrum is prepared that represents the average pollen rain.

Spectra obtained in this way are to be compared with the percentage composition of the vegetation in the immediate area from which the moss polsters were collected. For this purpose the polster collections this summer came mostly from within plots laid out for study of forest composition. On plots ranging from 0.1 to 2.0 acres, according to the complexity of the forest, all trees were measured by inch diameter classes. From these data the percentage composition by species is determined according to density or basal area, the latter representing "coverage" of the species and giving weight to the trees according to their sizes. Since in most forests young, over-topped trees don't produce pollen, additional percentage composition figures can be computed for canopy trees alone.

The composition of the forest is then compared with the composition of the pollen rain and the strong discrepancies are immediately apparent.

In addition to the timber plots, at each station a study of ground cover was made by a set of milacre quadrats (this is about 2 x 2 m.) distributed through the timber plot. These sets were either 10 or 20 quadrats in number. The moss polster collections averaged about four from each station, each usually a different species. The study stations were selected to be representative of a forest type or site of an area.

In the north central states, and in the northeast, pollen profiles often have this simplified form: in the earliest sediments the dominance is by trees of the spruce-fir forest climax formation; this is commonly followed by a pronounced pine-dominated period; next is the Atlantic period in which species of the Great Lakes-St. Lawrence forest (beech, birch, hemlock, maple, etc.) usually have their maximum; this is followed by predominance of oaks and associated species.

If the present attempt to establish factors, even rough ones, of over- and under-representation of species in the pollen rain can be established, it will be possible to revise (correct) pollen statistics so that they will be more representative of the actual vegetative cover that prevailed at various times in the past. As in all paleo-ecological work, the key to the past lies in present relationships, so we have some hopes for the present approach to the question of pollen representation. The past summer's work is geographically extensive. It will not answer our questions in a precise manner. Intensive studies of local areas will also have to be made.

Beside the question of representation, the present materials will provide some data on distance of transport of significant amounts of pollen. In the materials from the northern stations it is known in a rough way at least, because of personal observations and the work of others such as Halliday, how far it is to the nearest white pine, yellow birch, sugar maple, etc. In other cases it has been possible, as at the Biological Station on Lake Monroe, to have a rough estimate of the percentage occurrence of hemlock, for example, in the total forest cover of the area.

In addition to the field work described above, moss collections were often obtained from an open bog mat (locally called "savane"), sometimes of extensive area, where the pollen rain should be more representative of the local area as a whole than is the case of collections actually made under forest cover. These collections extend the possibilities of working assumptions about representation and transport. Dr. John E. Potzger, Butler University, provided me with *Sphagnum* collections from as far north as Lat. 52°, about 50 miles northeast of Rupert House on James Bay. Dr. Potzger, with Dr. Albert Courtemanche, Director of the Mont Tremblant Biological Station, and two others, had drilled a series of bogs for pollen analysis. Travelling in a Beaver hydroplane, chartered by the Station, they had been able to locate from the air suitable bogs not too inacessible from landing places for the plane. It is expected that the moss samples brought back for me by Dr. Potzger will yield some evidence about truly long distance transport.

RED SPRUCE IN THE PARC DE LA MONTAGNE TREMBLANTE

Stanley A. Cain

On our first trip together after my arrival at the Provincial Biological Station on Little Lake Monroe, Dr. Albert Courtemanche and I became interested in the spruces seen along the Rivière du Diable. *Picea mariana* was everywhere prevalent on wet sites and sometimes on the upland. *Picea glauca* was infrequent and had to be looked for. A few miles above *le grand Pontage*, a dry-land bridge up a steep, narrow, rocky valley — and falling to pieces from dry rot to such an extent that my inexperienced eye thought it imprudent to put a car on — we stopped to examine some young open-grown trees that didn't look "right." I said "red spruce," and was surprised at Dr. Courtemanche's excitement, for I did not remember that Marie-Victorin's "Flore Laurentienne," was doubtful about its occurrence in Quebec. *Picea rubens* had later become known in the valley of the Ottawa River, and for all I knew the central Quebec situation could have been much like parts of New England where a good many knowledgeable and practical woods people settle the perplexing problem of spruces quite simply by calling the wet site trees "black spruce" and the upland ones "red spruce," often with some comment about a "hybrid mess."

In several respects *Picea rubens* is intermediate between *P. mariana* and *P. glauca.* The twigs of typical white spruce are completely hairless; those of black spruce are densely hairy with abundant glandular hairs; and red spruce is more or less hairy with some glandular hairs. If the red spruce is toward the less hairy range of variation, the hairs are often confined to the grooves of the twig. In both of the spruces with hairs, however, there is often pronounced variation from twig to twig. The dominant twigs (not just the leader of the main axis) tend to be the hairiest of all and the weaker laterals the least hairy. Some of the confusion about the spruces probably results from looking for the twig hairs on randomly selected twigs, for even the black spruce can be hairless on shaded, suppressed twigs. In typical forms the cones are very distinct as described in the manuals, but trees occur in which red spruce cones are pretty close to the black in size and shape.

One character I have been using to help distinguish puzzling specimens of spruce seems to work well in the Mont Tremblant region. The black spruce terminal buds, on the leader and on strong laterals, have numerous outer bud scales — at least two cycles — that have long attenuate tips. The red spruce has only the outermost scales — about one cycle — with the attenuate tips. White spruce normally has no such scales, although an occasional scale may have a pronounced "midrib" that is slightly excurrent. These features are illustrated in the accompanying figures (scale, 10 times natural size).

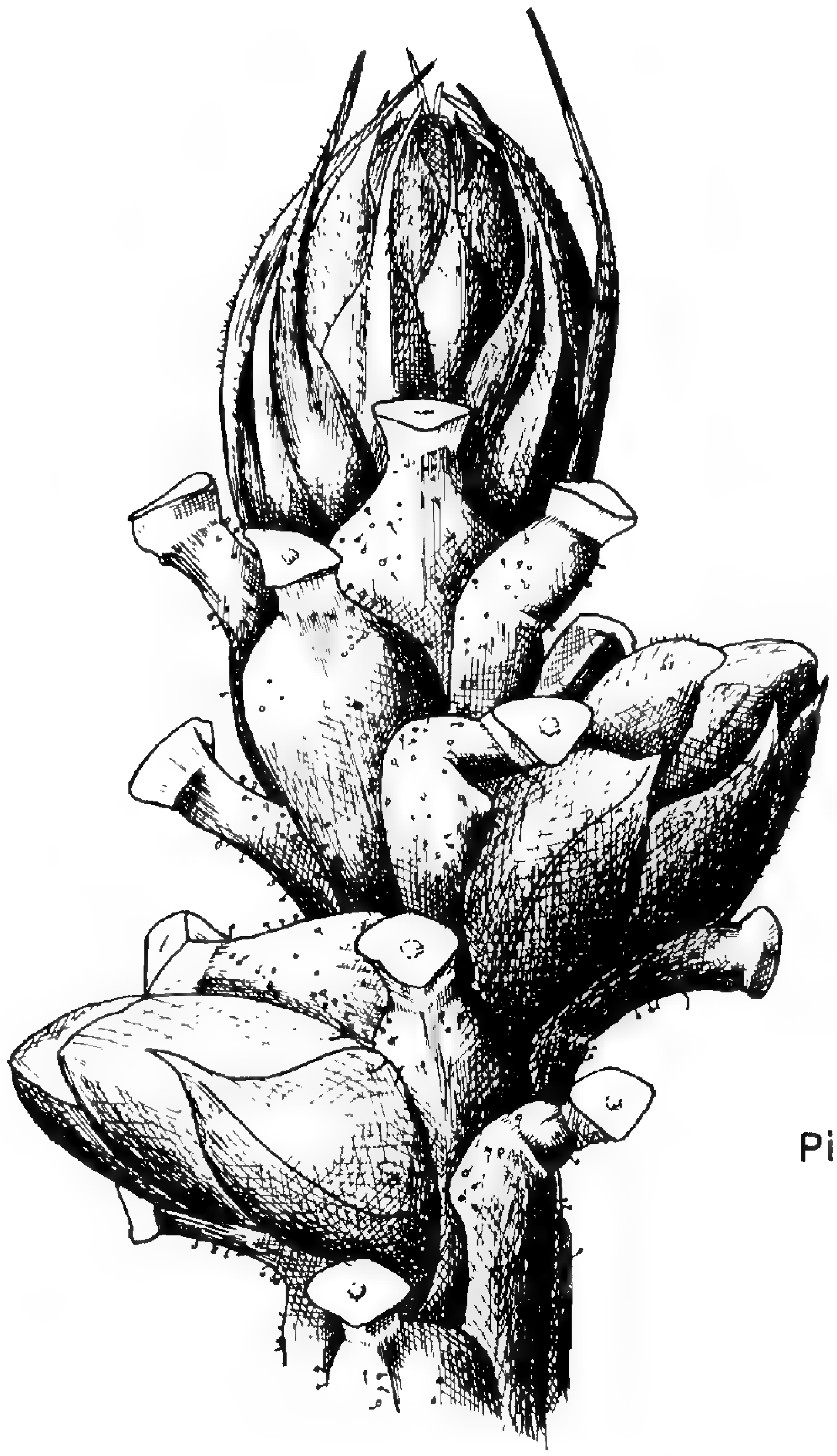
The spruces deserve close study. I believe that they hybridize, and that there is introgression, but I can't accept the conclusion that red spruce is just a hybrid swarm of crosses and backcrosses of black and white spruce, for *Picea rubens* in the southern Appalachians is a good species in a region of ancient flora with no other species around.

During the next two weeks we looked at spruces everywhere we went and finally concluded that in the Mont Tremblant area of the Laurentians red spruce was the prevailing species. Having convinced ourselves, we sent a representative collection of the three entities down to the Botanical Garden at Montreal. We have since heard from Marcel Raymond and Jim Kucyniak that our red spruce satisfies their critical judgment. Later travels with Courtemanche through Verendrye and as far as Rapide du Cèdre, in Abitibi-Est about 45 miles north of Senneterre, turned up no more red spruce. After leaving the Mont Tremblant Biological Station, I spent several days in the

Picea glauca

Laurentide Provincial Park north of Quebec City working with Dr. Yves Desmarais of Laval University. We turned up no red spruce there. He advised me to look for it in the Lac St. Jean region as a number of elements from the south and southeast have penetrated up the Rivière Saguenay. But it was not seen. Nor did I find it, or expect to, as we travelled the new road through the Chibougamau Park to its end at the frontier gold-rush town of Chibougamau at about 50° N. Lat.

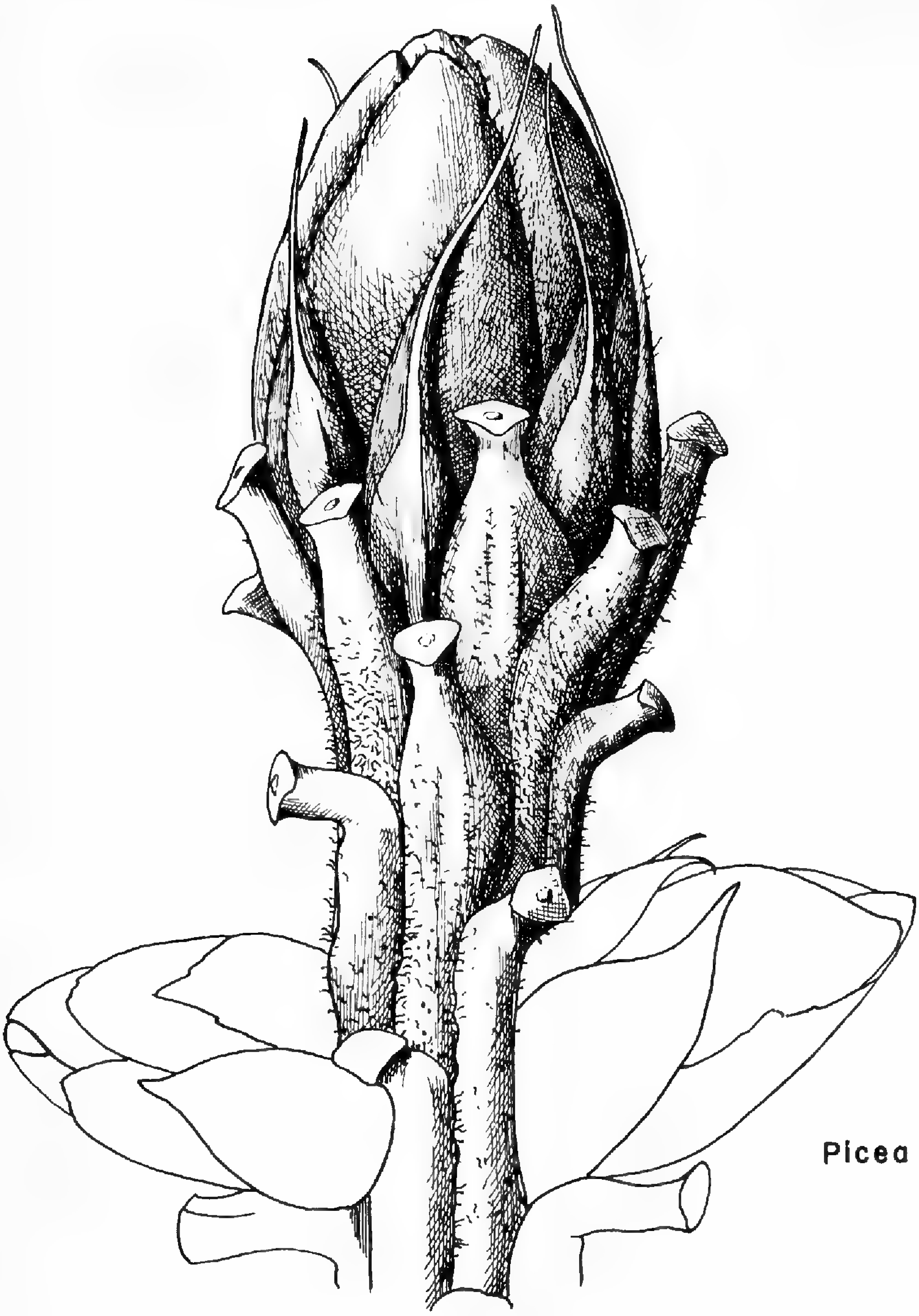
On La Vache Noire ("Black Cow" in the States is a drink, but the one near Lac Superieur in the Mont Tremblant region is a small, rough and frustrating mountain) Courtemanche and I laid out two timber plots and 20 milacre ground-cover quadrats. The results are to be found in tables 1 and 2. These red spruce — balsam stands are on the mountain top at an elevation we estimated at about 2300 feet.



Picea mariana

The first stand is on the ridge of the sharp north end. It is pretty ragged looking because of blow-down, birch die-back, and some spruce and balsam killing apparently due to bud worm. A 0.3 acre plot nevertheless revealed a basal area of 138 sq. ft. per acre with balsam fir composing 53.7%, red spruce 38.3%, white birch *(Betula papyrifera,* var. *cordifolia)* 7.3%, and the remaining small fraction contributed by mountain ash and pin cherry. In our sample balsam had four times as many trees as red spruce (164 to 41), reaching a maximum d.b.h. of 11 in., whereas the spruce reached 16 in. The maximum height of trees did not exceed 50-55 ft.

The stand from which the second set of data come was almost missed, for it was getting late and I was tired, bruised, scratched, and sustained only by the large onion which Courtemanche considers a necessary part of a field lunch. On the south end of the mountain we had come to a small flat which needed looking into. Although it wasn't in the direction we were headed, it was enticing because it wasn't rocky and tangled with blow-down. Once in it we forgot our



Picea rubens

troubles. The red spruces reached a maximum diameter of 25 in. and occurred in all size classes from 1 in. up. Balsam exceeded spruce in number of stems, but with a maximum d.b.h. of only 8 in. The basal area proved to be exceedingly high for the region, about 250 sq. ft. Of this the spruce composed 80%, balsam 13.3%, and white birch the remainder.

The ground cover plots are self explanatory as the flora is pretty much as expected. Reproduction of the trees of the area is adequate or abundant. Collections of the unidentified forms are at the Montreal Botanical Garden and names will become available.

Table 1. Red spruce-balsam fir timber plots on La Vache Noire, near Lac Superieur, County Terrebonne, Quebec. # Plot I: 1x3 chains. Plot II: 1x2 chains.

D.B.H. inches	Red Spruce I	Red Spruce II	Balsam Fir I	Balsam Fir II	White Birch I	White Birch II	Mt. Ash I	Mt. Ash II	Pin Cherry I	Pin Cherry II
1	5	7	16	6	-	1	1	-	1	-
2	3	3	22	8	2	2	-	-	-	-
3	2	-	22	13	-	4	-	-	-	-
4	2	1	24	13	-	-	-	-	-	-
5	1	2	18	11	-	2	-	-	-	-
6	4	3	28	8	-	-	1	-	-	-
7	3	1	12	3	5	2	-	-	-	-
8	3	2	13	2	1	-	-	-	-	-
9	4	2	5	-	2	1	-	-	-	-
10	-	1	3	-	-	2	-	-	-	-
11	4	-	1	-	1	1	-	-	-	-
12	5	5	-	-	-	-	-	-	-	-
13	1	1	-	-	-	-	-	-	-	-
14	2	3	-	-	-	-	-	-	-	-
15	1	4	-	-	-	-	-	-	-	-
16	1	2	-	-	-	-	-	-	-	-
17	-	2	-	-	-	-	-	-	-	-
18	-	3	-	-	-	-	-	-	-	-
21	-	1	-	-	-	-	-	-	-	-
23	-	2	-	-	-	-	-	-	-	-
25	-	1	-	-	-	-	-	-	-	-
No. on plot:	41	46	164	64	11	15	2	0	1	0
No. per acre:	133	230	347	320	37	75	7	0	3	0
Basal area:	17.1	39.2	23.9	6.5	3.3	3.2	0.2	-	-	-
Per acre:	56.3	196.2	79.8	32.5	10.9	16.2	0.7	-	-	-
Basal area %:	38.3	80.1	53.7	13.3	7.3	6.6	0.4	-	0.1	-

Table 2. Ground cover in red spruce-balsam fir timber plot I, La Vache Noire. Data based on 20 milacre plots spaced 1 x 2 rods within the timber plot. Coverage classes have the following values; (.) less than 1 %; (x) about 1%; (1) 1-5%; (2) 6-25%; (3) 26-50%; (4) 51-75%; (5) 76-100%.

Species	F %	Cover classes .	x	1	2	3	4	5
Frequency class E								
Dryopteris spinulosa var. americana	100	1	3	7	5	3	1	-
Betula papyrifera, var. cordifolia, seedling	100	2	3	9	5	1	-	-
Abies balsamea, seedlings	100	11	7	1	-	1	-	-
Oxalis montana	90	6	1	2	5	1	2	1
Frequency class D								
Clintonia borealis	80	1	2	3	6	2	1	1
Frequency class C								
Cornus canadensis	60	3	3	4	2	-	-	-
Rubus idaeus	60	-	2	7	3	-	-	-
Maianthemum canadense	55	4	-	5	2	-	-	-
Frequency class B								
Trientalis borealis	40	3	5	-	-	-	-	-
Prunus pensylvanica	30	2	4	-	-	-	-	-
Frequency class A								
Aralia nudicaulis	20	-	2	1	1	-	-	-
Aster acuminatus	20	1	2	1	-	-	-	-
Solidago macrophylla	20	-	2	2	-	-	-	-
Ribes glandulosum	15	-	2	-	1	-	-	-
Picea rubens, seedlings	15	2	1	-	-	-	-	-
Vaccinium myrtilloides	15	-	1	1	1	-	-	-
Aster cordifolius	15	2	1	-	-	-	-	-
Cinna latifolia	10	1	1	-	-	-	-	-
Coptis groenlandica	10	1	1	-	-	-	-	-
Acer spicatum, seedlings	10	-	-	1	1	-	-	-
Pyrus americana, seedlings	10	-	1	1	-	-	-	-
Acer rubrum, seedlings	5	1	-	-	-	-	-	-
Carex sp?	5	-	-	1	-	-	-	-
Carex sp?	5	-	1	-	-	-	-	-

Total ground cover (shrub and herb layers) ranged from 5 to 95%, averaging 66%. The number of species ranged from 5 to 13, averaging 9 per quadrat. The heavy ground cover is due to the open crown caused by tree death from various factors. Time did not permit taking ground cover plots in timber plot II, but the crown was much more dense and the ground cover correspondingly lighter.

SOLIDAGO

George R. Cooley

If you call a flower a Composite (Com-po-zite the British say), the chances are about one in ten you will be right, for the Composite Family (known also as Daisy or Sunflower or Thistle Family) contains about 10 or 12% of the known species of flowering plants in the world. This ratio holds true in the area covered by Gray's Manual; 1,071 species, varieties, forms and named hybrids of the 8,000 total reported in the Manual are Composites.

If the plant is a Composite, the chances are about one in eight that it is a Goldenrod in this area. Of the 1,071 species, varieties, forms and named hybrids listed under Compositae, 128 are Goldenrods. There are 75 species listed in Gray's Manual; 30 reported from New York State; 15 commonly reported from the region covered by our group[1], and 5 reported rarely. (Gray's names 53 varieties and forms, and reports 36 hybrids).

M. L. Fernald says, "Solidago, like Aster, is one of our most difficult genera. Natural hybridization frequently occurs and the species are also highly plastic. For proper study full specimens, showing subterranean parts and basal leaves as well as the whole flowering stem, are essential. Identification of fragmentary specimens is safe only after long familiarity with the group."

Do not be overwhelmed by this large number of species, varieties, forms and hybrids. Facetiously it might be said, "Goldenrods are easy to identify." Goldenrods are wand-shaped perennials; they have sessile leaves, except some have winged petioles; the leaves are lanceolate, except some are ovate and some linear; the leaves are narrowed at both ends, except some are cordate and some are spatulate; the leaves are lanceolate, except some are ovate and some linear; the leaves are smooth, except some are rough above, and some are rough below, and some are rough above and below; the leaves are triple ribbed, except some are loosely and pinnately veined and some have a midrib only; the inflorescence is yellow, except that two species are creamy; the inflorescence is in panicles or racemes, except when in the axils of the leaves or in flat-topped corymbs; the flower heads

[1]Mr. Cooley, who is making his first appearance in the AGB, and who says he is more used to having his copy appear at advertising rates than in botanical magazines, is active in the Eastern New York Botanical Club, which has its headquarters at Albany. The present paper is adapted from a talk given before the group. We heartily commend his efforts to interest our readers, as well as others, in becoming better acquainted with the goldenrods. — Eds.

have more disk flowers than ray flowers, except that those in the section Euthamia have more ray flowers than disk; the flower bracts are appressed, except when they are squarrose.

But if you cannot quickly identify a plant as a Goldenrod by its characteristics, try by its location. Fernald reports that Goldenrods grow

along roadsides,
on low ground,
on banks,
in borders of woods and streams,
in openings,
on rocky riverbanks,
on slately ledges,
in alluvial soils,
on barrens,
on sandy shores,
in calcareous bogs,
on prairies,
on wet prairies,
on coastal plains,
in swales,
in savannas,
in damp moss and marl-bogs,
in saline, brackish or fresh water,
in habitats near the coast,
on limestone knobs, barrens or glades,
in meadows,
in rich, deciduous woods,
in rocky, open woods,
on argillaceous soils and magnesian soils,
in cool damp woods,
in thin woods,
in mountain woods,
in montane woods,
in open sandy woods,
in thickets,
in dry thickets,
in wet thickets,
in gravelly thickets,
in moist to dryish thickets,
in clearings,
in dry clearings,
in the uplands,
in dry woods,
in dry plains,
in dry soils,
on dry bluffs,
on dry gravels,
on dry openings,
on dry shales,
in swamps or bogs,
in acid swamps,
on tundras,
on acid rock,
in pinelands,
on calcareous alpine cliffs, and gravelly alpine areas,
among siliceous rocks and gravels.

Despite this confusion (to continue in a more serious vein) you can easily learn a dozen or more local goldenrods by their striking individual characteristics. Goldenrods *are* wand-shaped perennials. The mostly golden-yellow flower heads are few- to many-flowered, the central part bearing tubular flowers described as disk flowers and generally surrounded at the outer edge by ray (pistillate or seed-bearing) flowers. The disk flowers crowded together give the mass coloration; the ray flowers extended above and beyond this background give beauty and brilliance. In the goldenrods the bracts (also called phyllaries) are appressed about the flower-heads except in *S. squarrosa* which gets it specific name from the fact that the phyllaries are squarrose, i.e. recurving, at the tips.

The inflorescence grows either:

1. In axillary clusters or as panicles with spirally arranged heads, as in *bicolor, caesia, flexicaulis,* and *squarrosa.*

2. In panicles with heads borne on the upper side of the branches, but the panicles themselves elongate or unequal-sided, and not noticeably flat-topped, as in *nemoralis, juncea, rugosa, altissima, canadensis, arguta* (*gigantea*), and *patula,* or

3. In flat-topped (corymbose) panicles, as in *graminifolia, rigida,* and others.

A few goldenrods have the cauline leaves uniform or only gradually decreasing in size upward; these species have no basal rosettes. They include *caesia, flexicaulis, altissima, canadensis, gigantea, rugosa.* Another group of species has very unequal leaves varying from large on the lower stem to smaller toward the middle and still smaller on the upper stem, and with basal offshoots that produce rosettes of large leaves; the basal leaves may be absent at flowering time in some species.

Careful consideration of these inflorescence- and leaf-types makes the problem of identification much easier than is usually believed, because there are fewer than 15 common species in the area studied by our group. A well-grown and normal plant of any of these species can usually be identified quickly in the field.

Our flat-topped goldenrod is *S. graminifolia.* It has very numerous narrow leaves which are pleasantly fragrant when crushed. Notice the occasional round black disks on the leaves; these are blister galls which produce [are produced by?] non-biting mites of the Itonidae group. This is our only common species which has more ray flowers than disk flowers (a feature of the section *Euthamia,* as the genus *Solidago* is divided in Gray's Manual; all the rest of our species belong to another section, *Virgaurea.*)

In the woods we find two pretty species, the wreath or blue-stem goldenrod (*S. caesia*) and the broad-leaved or zigzag goldenrod (*S. flexicaulis*), which usually have the flowers in axillary clusters along the upper part of the leafy stem. Both plants are conspicuously leafy, so that the flower-clusters seem to arise from among the leaves and not from a separate terminal inflorescence, but the leaves of the two are strikingly different; in *S. caesia* the leaves are long and narrow, and in *S. flexicaulis* they are broadly ovate and acuminate.

Notice the flower-head of the stout goldenrod in Thatcher Park, and examine the phyllaries; they curve strongly away from the flower head. This is *S. squarrosa* — there is no other goldenrod with strongly recurving bracts. [It is also abundant along the shale bluffs east of the Hudson, south of Albany. — RMcV]

In dry, sterile fields and in open woods, the white goldenrod or silver-rod is to be found. Its cream-colored ray flowers are pale enough to merit the term white; the disk flowers pale yellow enough to be called cream. There is often enough contrast between the ray and disk flowers to justify the scientific name *S. bicolor.* The straight, simple stems end in a spikelike panicle or a cylindrical cluster of straight branches.

All the rest of our common species have the flower-heads secund, that is, borne on one side (the upper) of the panicle-branches. When you find this character, look next for the large basal leaves and a gradual (or abrupt) decrease in size of the cauline leaves as one goes from bottom to top. Here belongs the smooth early goldenrod, *S. juncea*, which grows in dry open fields, and is our earliest species to open fully here; it begins to flower late in June, far earlier than any of its relatives. Its stems usually grow singly, with a beautiful pyramidal yellow panicle. The stem leaves are not near each other, are lanceolate and entire, and rapidly decrease in size upward. The stem (and leaves) are noticeably smooth.

The cut-leaved goldenrod, *S. arguta*, can be mistaken for the early goldenrod, *S. juncea;* they look much alike. The upper stem-leaves of *S. arguta* are closely serrate, of *S. juncea* entire. The branches of the panicles of the cut-leaved goldenrod are generously covered with soft hairs, of the early goldenrod, only sparsely and minutely hairy. Look for *S. arguta* in woods and clearings; *S. juncea* in dry fields. While the early goldenrod blooms earlier than the cut-leaved goldenrod, it also blooms later in the season, having a much longer blooming period.

At the north side of Route 20 just east of the road to Voorheesville is a gully where *S. patula* can be found. This swamp goldenrod has lower leaves as large as one's hand and as rough as sandpaper. The stem leaves are few, thick, rough above, smooth below and the upper ones are much smaller. No other goldenrod can be confused with it.

In fields and along roadsides, often growing with *S. bicolor* and *S. juncea*, one often finds near here a similar but somewhat smaller goldenrod, generally a foot high or a little more (Gray's Manual says up to 13 dm. high, or about 4 feet). Upon closer inspection the whole plant will be seen to be covered with a minute gray pubescence; hence its name, gray goldenrod. This is *S. nemoralis*, perhaps our "weediest" species in old fields.

Now consider the few species which have the leaves all about the same size. These also have very numerous leaves (up to 100 on one stem). Look for one of these very leafy plants with wrinkled leaves; in our area it will be *S. rugosa*, the wrinkle-leaved goldenrod. (But look out for *S. ulmifolia*, which looks like *S. rugosa*, but has the stem smooth instead of rough-hairy). *S. rugosa* has a generally rough appearance, but the wrinkled leaves with pinnate venation are good distinguishing marks, in spite of the fact that Fernald calls it a hopelessly variable species. In fields it will be found two feet tall, whereas in damp open ditches or in thickets it often exceeds six feet in height.

Three goldenrods, namely *S. altissima*, *S. canadensis*, and *S. gigantea*, look much alike. All have numerous linear-lanceolate to oblong-lanceolate leaves with 3 fairly strong, nearly parallel veins. One of these, the late goldenrod, is glabrous or essentially so. It is called *S. serotina* in the new Britton and Brown Manual, *S. gigantea* in Gray. It is a fairly stout plant, sometimes growing in a cluster of stems; these are smooth, often with a white bloom. Fernald reports that flowering occurs from late July through September; Britton and Brown, August to October. My experience has led me to expect *S. gigantea* when field specimens of early goldenrod are beginning to fade. Also I look for dark red stems on *S. gigantea.*

In *S. altissima* and *S. canadensis* the summit of the stem below the inflorescence is densely pilose. Both species grow commonly along roadsides and in thickets, and they are often confused. *S. altissima* has somewhat larger flowers (disk corollas 3-4mm. long, as against 3mm. or less in *S. canadensis*), and the phyllaries are linear, blunt and keeled (as against attenuate, long-pointed and thin in *canadensis*).

Some other goldenrods are found in eastern New York, but the above are the most common species. After a brief acquaintance with these one can easily learn the others as he meets them, and learn at the same time how to avoid the mistakes in identification which are one of the things that make Solidago reputedly a "difficult" genus.

If some of you are hesitant about taking up the study of goldenrod because of its supposed ability to cause hayfever, don't worry. Goldenrod pollen grains, if inserted under the skin of a person susceptible to late summer hayfever, will cause the formation of welts showing the definite symptoms of an allergy, but happily other things keep the pollen from being a general causative agent of hayfever. Goldenrods are insect-pollinated, not wind-pollinated. The pollen is shed from most species in very small quantities, and the grains are heavy and waxy and covered with long, sharp spines, so that when shed they nearly all stay clumped together and can get into the atmosphere in limited amounts only.

NEW BOOKS BRIEFLY NOTED. —*The Vegetation of Chiapas*. We noted in the first volume of the Asa Gray Bulletin the publication of the first part of Dr. Miranda's important contribution to our knowledge of Mexican vegetation. Now comes the second, and concluding, part. The major portion of this volume (pp. 8-326) is taken up by the remainder of the list commenced in volume 1, namely a catalogue of species, arranged by their common names with comments on uses. The rest of the second volume includes an alphabetical list, by scientific names, with appropriate cross-references to common names, of all the species treated in the whole work; this is followed by notes on previous botanical exploration in Chiapas, a brief bibliography, and index, and a list of important errata.

La Vegetación de Chiapas. Segunda Parte, by Faustino Miranda. 426 pp. Sección Autográfica, Departamento de Prensa y Turismo, Tuxtla Gutiérrez, Chiapas, Mexico, 1952 [1953].

The Index Kewensis. A new supplement to the Index Kewensis is always worth mentioning. The present supplement, No.11, includes all new names of species and genera of phanerogams published from 1941 to 1950, inclusive. The previous supplement, No.10, which covered the 5-year period from 1936 to 1940, was delayed in publication because of World War II, and did not appear in print until 1947. The present volume, then, covering as it does a 10-year period, will bring systematists pretty well up-to-date on nomenclature. It is interesting to notice that because of the war, or for other reasons, new names for plants were not multiplied as rapidly in the decade covered by Supplement 11 as they were in the 5-year period preceding this. Supplement 10 comprises 251 pages, while Supplement 11, covering twice as long a period, has but 273 pages.

Index Kewensis Plantarum Phanerogamarum supplementum undecimum nomina et synonyma omnium generum et specierum ab initio anni MDCCCXLI usque ad finem anni MDCCCCL nonnulla etiam antea edita complectens. Compiled under the direction of E. J. Salisbury. [iv], 273 pp. Clarendon Press, Oxford, 1953.

EDITORIAL NOTES. — In order to get the Asa Gray Bulletin on a regular publication schedule we have had three numbers in preparation at once. It now appears that Vol. III, no. 1 will appear before Vol. II, no. 4, because the index for Vol. II must be compiled.

There is to be a loan exhibition of old Japanese books at the Clements Library in Ann Arbor during March, in commemoration of the hundredth anniversary of the signing of the first treaty between the United States and Japan. Since the collection is mostly botanical we shall run the liberally illustrated exhibition catalogue in Vol. III, no. 1. In order to give Far-Eastern emphasis to the entire number, appropriate articles on the Orient will be included. Our contributors may expect other publication arrears to be taken care of largely in Vol. II, no. 4, which will follow shortly after Vol. III, no. 1.

"FARWELLIANA"*: A REVIEW, with Notes on the Herbarium and Botanical Library of Parke, Davis and Company and on Ma-Huang.

H. H. Bartlett

Three authors, Rogers McVaugh, Stanley A. Cain, and Dale J. Hagenah, have collaborated in a full account of the botanical career of Oliver Atkins Farwell, who, until his retirement in 1933, was Botanist for Parke, Davis and Company of Detroit. In that capacity he had had responsibility for the pharmacognosy of raw botanical products used by this great pharmaceutical firm but the necessity for such work as his had diminished rapidly with the increase in use of synthetic drugs. So after Mr. Farwell retired, the decision was made to transfer the herbarium of Parke, Davis and Co., together with a large part of the associated botanical library, to the University of Michigan. The gift was one of the greatest and most important of the kind that the University had ever received, for even if the significance for Pharmacy of both specimens and books had waned as synthetic organic chemistry developed, it had grown disproportionately for historical and systematic botany.

It should be more generally known that the herbarium and botanical library of Parke, Davis and Co. came to the University of Michigan through Mr. Farwell's initiative. On October 13, 1933, the late Mr. Cecil Billington gave a dinner at his Detroit home in honor of Mr. Farwell, who had completed forty years of service with the company and was about to retire. In addition to the host and the guest of honor, those present were B. A. Walpole, A. W. Andrews, F. W. Robinson, John M. Sutton, Bruno Gladewitz, Frederick E. McCain, and myself. The place cards were miniature herbarium sheets with pressed specimens of small size, each having an individual printed label appropriate to the chief botanical interest of the guest. There was a printed menu on which each dish had a "scientific" name. The conversation naturally ran to what would become of the important Parke-Davis herbarium. At the time I was not aware of the great extent and value of the library. In the course of the conversation Mr. Farwell told me that he had already recommended that the herbarium be given to the University, that he would repeat the request, and that a demonstration of genuine interest on the part of the appropriate University officials

*McVaugh, Rogers, Stanley A. Cain, and Dale J. Hagenah. "Farwelliana": an account of the life and botanical work of Oliver Atkins Farwell, 1867-1944. Cranbrook Institute of Science, Bulletin 34. [Bloomfield Hills, Michigan, September 1953.] Price, $1.00.

might result in a gift of major importance. So the next morning I wrote a letter addressed to J. H. Ehlers, Curator of Phanerogams, E. B. Mains, Director of the Herbarium, Dean E. H. Kraus, and President Ruthven, requesting that Mr. Farwell's suggestion be followed up. It was, and in due time the Herbarium was offered. Dr. Mains and myself were appointed as a committee to inspect the herbarium in Detroit and to draw up a report and formal recommendations. On 17 November, we had a very pleasant conference with Mr. Taylor, representing the company, who gave us every help and attention. I wrote at the time: "The herbarium rather more than came up to my expectations, and will be especially important to us because of its richness in tropical American material. It is built up about Rusby's various South American collections and even contains a set of the specimens of the last (Mulford) expedition. There are very numerous cotypes. It contains most unexpected treasures from other regions also, as, for instance, East Indian plants of Teysmann, *et al*. We had not known about the fine collection of botanical books owned by Parke, Davis & Co. They have a wealth of most valuable floras, monographs, and periodicals — maybe to a [cost] value of $20,000, including such things as Flora Brasiliensis, etc. I swallowed all sense of shame and decency, and asked for the gift of the books to accompany the specimens, and think the request will be acceded to." The next day Mains and I submitted our report. "We have never done a *better* or *bigger* day's work," I wrote, "and I consider it one of the best strokes of business I'll ever help do for the University." Of course the gift of books was still unconfirmed, but only a few days later "Mains got word from the President's office that our request for the books as well as the herbarium had been favorably acted upon by Parke, Davis & Co. They are only reserving a few important reference books. This gift is exceedingly important to botany at Michigan. It will exceed in magnitude and value the gift of the 'Krieger' library by Dr. Kelly. I'm delighted through and through . . . " About the end of the year I had a nice letter from old Dr. Rusby expressing his satisfaction that the magnificent Parke-Davis gift had insured the availability of so much of his South American material at the University of Michigan. We at Ann Arbor must always be grateful to Mr. Oliver A. Farwell for the original suggestion that resulted in the gift, and to Mr. Taylor of Parke, Davis and Co. who followed the matter through, to our great and lasting satisfaction.

Farwell had added many of the more important and rare botanical volumes to the Company's library during his forty years as Botanist, for he was actually as much or more interested in the literature of general systematic botany as that specifically on drug plants. Since the firm's book-buying policy was very liberal, Farwell was able to add almost anything to the collection that was at all pertinent, if he could find it offered in the catalogues of antiquarian book dealers. He realized to the full that the pursuit of systematic botany was largely historical delving, and it is astonishing how many books he was responsible for acquiring during a period when botanists in general were not alive to the rapidly growing difficulty of assembling the scarce background books and periodicals which in his years of greatest activity were to be acquired at only a small fraction of what they cost now, when they turn up at all. The cost of many of the Parke-Davis books was noted in them, and the amounts would now be grotesquely out of line with present values. Likewise one must realize the vast amount of time and catalogue reading that it took to collect them.

So the gift of the books of Parke, Davis & Co., together with the herbarium, was one of the great events in the development of systematic botany at the University of Michigan. No other single gift of the sort among other notable ones has added so much to our resources for research.

If the books were a treasure, the plant specimens were equally so. They had been acquired by field work, purchase and exchange over a period of many years. The early botanical explorations of Rusby and Bang, in the Cinchona regions of South America, were financed by Parke, Davis & Company, and the specimens of those collectors are now among the historically important materials in the University of Michigan herbarium. Many that were added later, however, were equally important, and among them, important for the regional record, the Michigan collections of Farwell himself, for they were the subject of numerous publications over many years.

Opinion may well be divided as to whether many of his proposals of new varieties and new names for old ones were well considered or not, for he was highly independent in drawing conclusions and constitutionally recalcitrant when it came to abiding by rules of nomenclature. He did not have any deep feeling for what variations of plants might or might not be worth naming, and undoubtedly many of his proposals had no systematic value, but others may sometime be found to be worthy of recognition even though as yet they remain neglected. His changes of plant names (largely of ferns) were largely based upon book work, for he was one of those who would make no exceptions to following the principle of priority in plant nomenclature, regardless of established usage or convenience.

Farwell's publications were not so convincing as they might have been, because of a characteristic carelessness in preparation. His manuscripts were the despair of editors, because they were always so badly written that they could never be printed as submitted, but nevertheless he deeply resented any suggestions for revision. The best way to deal with them was to correct them editorially as well as possible and say nothing to him about it, in the expectation or hope that in reading proof he would be oblivious to any changes. Sometimes this was impossible, because the changes could not be considered merely editorial. One time, for instance, he sent an editor a long article which he had run off on teletype tape, pasted on sheets, all in capitals, practically without punctuation, and full of errors of spelling and citation. He was extremely indignant when it was returned to him. On another occasion he wished to make one of his short papers on Michigan botany a vehicle for the hidden or reprehensibly obscure publication of hundreds of proposed changes of names of exotic plants, largely South American. There were many pages of them, mostly proposed in contravention of the rules of nomenclature, or at any rate such as should have been submitted to an international botanical congress for validation, since, if accepted, they would have upset current usage drastically. The title of the article had no reference whatever to the great bulk of its content, and it would have been highly discreditable for any responsible editor to have accepted it as submitted. Of course it had to be refused, and Mr. Farwell's feelings were hurt almost beyond remedy, and I had unhappily been the editorial referee in the matter. Actually, his proposals were based upon a tremendous amount of research that represented the labor of spare time during months if not years, and it all came to nothing. With much of his iconoclasm the reviewer found himself completely in sympathy. (Nothing, for instance, could be more foolish than some provisions of the very latest code of botanical nomenclature. The rules do not improve with successive revisions and imitation of the still worse zoological rules.) Farwell had much in common with E. L. Greene, who was a thorn in the flesh of the stupidly rule-abiding, who willingly follow any established rule, regardless of how idiotic it may be. All established traditions profit from the reexamination engendered by opposition, and Farwell was useful in our botanical community as a valient non-conformist.

The work on Farwell which is under review consists of an excellent biographical sketch, by Stanley A. Cain, an exhaustively annotated list of the 330 taxa (mostly varieties) that Farwell described as new, by Rogers McVaugh, a list of hitherto unindexed new names in the nature of mechanical combinations, other than descriptions of new entities, also by McVaugh, and a bibliography of Farwell's articles, approximately 80, by Dale J. Hagenah. In all, Farwell appears to have published about 1300 new names in botany, and the Cranbrook Bulletin accounts for all that pertain to new systematic entities (taxa), but to other new names only in so far as standard bibliographic indexes have failed to include them.

The volume is nicely printed on excellent paper and has several photographs of Farwell. "Farwelliana" will be welcomed by all who are interested in botanical biography and bibliography, and will have the very practical value of bringing together in one place everything that the local botanists of the future will need for tracing the scattered record of Mr. Farwell's botanizing in Michigan and studying his propositions at their type localities.

Farwell's extensive private herbarium was left to the Cranbrook Institute of Science. Many of his more important collections had also gone into the Parke-Davis Herbarium, and are therefore now at the University of Michigan. No type specimens have yet been found in either herbarium for a few of the plants that he described. The herbaria of both institutions have been enhanced in value by this careful searching out and designating of the types, and acknowledgement has appropriately been made of the generosity of Parke, Davis and Company for a grant in aid of publication of the volume by the Cranbrook Institute of Science.

The Typification of *Ephedra sinica* Stapf.

Most of Farwell's new taxa were not drug plants. He did publish, however, the generally accepted name for the Chinese source of ephedrine, *Ephedra sinica* Stapf, in advance of Stapf's own description. The Kew botanist proposed in his correspondence with Farwell in the U. S. and with B. E. Read in China that the then very important drug plant *Ma Huang*, source of ephedrine before that compound came to be produced synthetically and marketed in quantity by Parke, Davis & Co., was botanically unnamed. Farwell quoted in the Journal of the American Pharmaceutical Association, for February 1924, Stapf's preliminary description of a sterile commercial drug sample sent to Kew from Parke, Davis and Co. A "name-type" was clearly designated by Stapf, namely, the sterile commercial sample sent by Farwell, (possibly to intimate that a botanical type might be something different) which was apparently the only specimen at hand when he wrote Farwell, for he said: "I have seen neither flowers nor fruits and I have therefore hesitated to describe the plant." Since any type specimen whatsoever is a "name type," the use of this peculiar designation by Stapf for typification of a pharmaceutical raw material hardly alters the situation botanically, especially because the designated type remains the same in the later publication. By the time Stapf himself republished the name *Ephedra sinica* a few weeks later, in the Kew Bulletin, he had secured a fertile female specimen from China, sent by B. E. Read, but had nothing to represent the male plant. He had, however, also concluded that a female specimen collected at Tanhwa, Chihli Province, by F. N. Meyer (no. 1095) was specifically the same. The latter was the only specimen somewhat precisely localized, although Read's specimen was said by him to be from Chihli also, because Liu localized and cited it as from Inner Mongolia. In choosing a type specimen some weight would ordinarily be given to Stapf's statement that the name *Ephedra sinica* was for "Mahuang of Chihli," and he did not know certainly that the commercial specimen originated in that province. Moreover, according to Liu, the specimen Read sent Stapf was not from Chihli but from Inner Mongolia. Liu seems to have concluded that *Ephedra sinica* was *not* "Chihli *mahuang*."

J. C. Liu* (according to Read**) was the first to recognize that the Chihli *mahuang* had no proper botanical name, and to propose a name for it, *Ephedra Ma-Huang* Liu, in a report to the 18th Biennial Conference of the China Medical Association, held at Peking, August 31, 1926, although he did not actually propose the new name in his first publication, but only in the supplementary note some months later. Even his first article would not have antedated Stapf's publication. Read stated that Liu definitely showed that Chihli *Mahuang* of classical Chinese herbals was neither *E. equisetina* nor *E. vulgaris* var. *helvetica*, names previously used for it in botanical literature, and that Liu had even described the male plant from material collected at Kalgan and Peitaiho. Liu's name, from his supplementary note, may antedate Stapf's for Chihli *ma-huang* if it is indeed true that Stapf confused two species, as Liu believed he did. Thus the typification comes to be of considerable interest, although Read in his own publication of 1930 (which is, he states, abstrated from the work of Liu) granted priority to Stapf. Read's work was not too critical however, from the standpoint of botany or nomenclature. His monograph has a map showing geographical distribution of Ephedra species in China, as well as two nice lithographic color plates showing female and male plants of Chihli *mahuang*, with details.

What Liu actually concluded in his supplementary note of November 1927 was that: "At least three species of Ephedra exist in China.

1. -- *Ephedra equisetina* Bge. (Liu 13, T'ai Yuan Fu, Shansi).
2. -- *E. sinica* Stapf spec. nov. (Erickson 1, Inner Mongolia).
3. -- *E. Ma-Huang* Liu spec. nov. (Provisional name: Erickson 2, Gokhagen, Inner Mongolia; Cowdry 489, Peitaiho, Chihli)."

It will be noted that Liu justified the proposal of the name *Ephedra Ma-Huang* by considering (a) that the name *S. sinica* covered a mixture, (b) by disregarding Stapf's typification of *E. sinica* by a sterile commercial sample, sent by Farwell from Detroit, from crude drug stock of Parke, Davis and Co., (c) by considering as the type the fertile specimen, *Erickson 1*, from Inner Mongolia, sent to Stapf by Read

*Liu, J. C. [Liu Ju-ch'iang], A preliminary botanical study of Peking ma huang (Ephedra sp.). China Journ. 7:81-86, 2 plates, map. August, 1927. Further notes on Peking ma-huang, *ibid.* 7:257. November 1927.

**Read, Bernard E.,Ephedra: Part II. The Botany of Mahuang, abstracted from the work of J. C. Liu, with additional notes from Stapf, Meyers, Groff and others. Department of Pharmacology, Peiping Union Medical College, in collaboration with the Peking Laboratory of Natural History. Peiping, China, 1930.

(This publication and one other appear to be all that resulted from a project for an elaborate Chinese Flora. The cover title, much at variance with the actual title page, indicates that this was to have been "Flora Sinensis, Series B. Vol. XXIV. 1." The only other published part which the reviewer has seen, of great interest to anyone who refers to the great old Chinese herbal to which it is an index, is as follows: Read, Bernard E., and Liu Ju-ch'iang, Flora Sinensis: Series A. Volume I. Plantae Sinensis [i.e., Sinenses]. Second Edition. Bibliography of Chinese Medicinal Plants from the Pen Ts'ao Kang Mu, 1596 A.D. Peking, China, 1927.)

after Stapf had already reported that the sterile sample represented an undescribed species, (d) by disregarding Stapf's statement that the name *E. sinica* was intended for the traditionally important *ma-huang* of Chihli, and (e) by distinguishing two different species of Ephedra (*E. sinica* and *E. Ma-Huang*) in Erickson's collections from Inner Mongolia.

So it would appear that there may still be ground for another elucidation and another name, if Liu's botanical conclusion about the distinctness of three kinds of *mahuang* in North China and Stapf's typification are both to be accepted.

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PHILIPPINE JOURNAL. I[1]

Pierre Dansereau

531110[2]. Washington, D. C. to Travis, California.

Sunny morning on the white buildings of the capital. Anything but a cosmopolitan city, this orderly, leisurely self-centered town. Beautiful trees, poorly kept lawns.

The National Herbarium quite an antiquated place (How envious they must be of Cornell!). Guards at every door. I finally reach Egbert Walker, am escorted upstairs by a policeman. Small offices. Shrivelled, busy, people. Mrs. Agnes Chase a delightful little old lady. Through corridors, elevators, subterranean passages, we visit a catacomb where the bamboos are temporarily stored, and admire the *Chusquea pinifolia* that she collected on top of Itatiaia many a year ago. We reminisce enthusiastically about Brazil.

Walker drives me to the airfield. We go by the (to me mythical) Pentagon. It *does* have 5 sides. We leave at 15:00, in a large, but very crowded plane, that seats 3 + 2.

The rolling Appalachian hills are beautiful in this autumnal light. The slanting sun casts perfect shadows of the trees upon the ploughed fields: the full black outlines of the junipers contrast with the filigree of the elms, sycomores, and the stocky, somewhat leafy form of the oaks. Drainage patterns show as green veins on the pale brown epidermis of the pastures and the fields. Sharp pink scars of erosion on mountain tops and gullies. And then the strip-mining country with its even uglier wounds on the face of the landscape. And then the "Valley and Ridge" province (Fenneman), so regular, with its gentle rises and broad flat expanses; much of it wooded, mostly oak.

Down from the Appalachians to the Middle-West. The monotonous geometry of Indiana, a prosperous and well-kept checkerboard. Crossroads at every mile. A diagonal at towns. We circle south of Chicago, and on into the night henceforth. Hours of darkness, of small towns, red and green jewels on the velvet earth.

[1]The editors are privileged to present this log of Dr. Dansereau's journey to the readers of the ASA GRAY BULLETIN, feeling that it should be read as a literary piece as well as for its botanical and documentary interest. Dr. Dansereau left Ann Arbor early in November, as a delegate to the Pacific Science Congress in Manila.

[2]For the sake of our readers who may not be familiar with this efficient but somewhat unusual system of dating events, we suggest that the number be broken into its component parts for ease of interpretation, thus: 53 11 10, or November 10, 1953. — Eds.

A box lunch is all we get. Nothing is seen of the Sierra. It is 20:30 when we fly above Sacramento. And then Travis Airfield.

A young airforce officer greets our party and we are the first to disembark. Are taken to headquarters for "processing." All this with extraordinary courtesy ("Sir," par-ci and "Sir" par-là!). Many curious abbreviations are used which I have never heard before. We are lodged, for instance, at the BOQ. Upon questioning I am advised that these are the Bachelor Officers' Quarters. And very nice too. Clarke, Swingle, McMullen and I share a large, comfortable room.

531111. Travis (California) to Honolulu.

This time we have a much smaller plane, but we have it all to ourselves. Having been joined by several new people, we are now 18 (It is very much like the plane that took us to Baffin in 1950). The advantage: a large empty space in the centre and "litters" on both sides. Some lay down to sleep. Walker writes indefatigably all day. I read several manuscripts. Fourteen hours. A box lunch. Clear weather. When we near Oahu, bumpy air, and we circle around, as it seems endlessly. We are quite harassed, eager to get the vibration out of our bones.

As soon as the plane stops, a very young officer (?) jumps in, recites a lesson to us and we walk into the station one by one. O surprise! Miss Ernestine Aker greets each one of us with a lei and a kiss. And then we all sit down and face the officer, fill blanks, weigh baggage and are sent on by army car to BOQ's. We have no eyes for the city, the boulevards, the lights on the mountain, are only vaguely conscious of the sweetness of the tropic night. The insistence of the breeze. We are too tired to be hungry but think we must be. The BOQ is on Waikiki Beach. Clarke and I share a very pleasant room, shower, shave and go out to dinner in a not too effusively "Hawaiian" restaurant.

A martini has hardly ever seemed so good. Marr, Swingle, Clarke and I have an excellent dinner of mahimahi ("dolphin," a fish). We are joined by O. E. Settee, chief of the Pacific Oceanic Fisheries Laboratory, who takes us on a short tour of the boulevards. We are now in a mellower mood. But very sleepy.

531112. Honolulu to Johnston Island.

The vibration seemed to be gone this morning, and everything was bright. The coconut palms, the flowering oleanders, the blue Bermuda-grass all looked very good. Leisurely breakfast and drive to airport. Coolidge was there, assigned me to write up the Biology programme of the Congress for "Science." Some interesting conversation with Gosline about Brazil and Michigan. A general air of optimism among the large party at the airport. Goodwill, and no-harm-done-so-far.

We are travelling "plush"! A large "pressurized" plane with all the trimmings, reclining seats, air-conditioning, etc. More blue sky, white-flecked green sea and mattresses of cloud. Four hours of it, and then, a mottled pattern in the ocean: purple stripes of high shoals and the thin foamy line of breakers. In the centre of the ring, two islands, very regular, like large air-craft carriers, the partly artificial Johnston Island. A long black airstrip on the white coral sand. Scattered and cluttered buildings. Many falling to pieces, not yet removed. We have a cafeteria lunch, quite good.

An unbelievably blue and green sea, with the submerged purple coral. White strand of big rubble blocks, some sand. Ridges and mounds, a few low platforms. In 1923 only three plants here (according to E. H. Bryan). Many were deliberately planted (but why *Araucaria excelsa*?). The usual atoll shrubs: *Messerschmidia, Scaevola,* the coarse grass *Lepturus,* the sand-bur (*Cenchrus*). Lots of *Pluchea odorata* and *indica.* It is interesting to see and enthusiastically collect these plants I have thought about so much and so often since 4902. Many families on the island, a school, two churches (Catholic and Protestant). Sports well organized. Many young men off duty swimming or playing basketball. Three months of this narrow island must breed ennui of the surest kind. Very much like an Artic outpost (Which would I prefer? What form of nostalgia for the fertile vacuum of boredom?).

531113. Johnston Island to Kwajalein Island.

1423 miles to Kwajalein, a long flight. We cross the date line. We reach Kwajalein just before midnight and go on a guided tour. This is the largest atoll in the world, saw some fierce fighting during the war. A hecatomb of Japanese bodies. Now, towering cisterns, cranes, jeeps, power houses, new housing units, mostly unfinished. Much raw ground, rubbly, disused and useless material. But even at night, a general humming. In spite of the coconut palms and hibiscus, very much like some North Canadian outpost or the U. S. Far West. Ugly pioneer settlement, hopeful, changing, ephemeral.

Another cafeteria meal. Breakfast? Is this today or tomorrow? We are all a little haggard. Food has no taste.

531114. Kwajalein to Guam to Manila.

A night of unrest. Lights out, reclining seat that does not recline enough, pillow moved from left to right and right to left. By porthole a cluster of stars, blurred and blurred again by drifting clouds. The hum, the purr, the whistling, the trumpeting, the vibration, the whirring of the plane alternating and confusing. And many pockets in which we sink and rise, bump and tilt. Some moments of peace, brief interludes of sleep with short menacing dreams. A pervading discomfort and insecurity.

From time to time, in the unreality of night, a cup of coffee or fruit juice and some pseudo-philosophical conversation with nameless people.

The fresh light of morning on Guam. A wet island with cliffs and much scattered but very green vegetation. We are taken to quite primitive BOQ's. But water on our skins, lather on our faces are exquisite. The stubble and the stickiness gone, to be at one with the green grass, the waving palms. Enormous snails in the *Stenotaphrum*, beautifully patterned shells.

An excellent breakfast at the officers' mess.

But a great disappointment follows: we are not allowed off the base, into the less spoiled country. A patient but somewhat harassed colonel (major? sergeant?) tries to explain why, but his reasons make no kind of sense. We argue, but get nowhere.

As we fly off, some of this forbidden vegetation becomes visible: a few wooded hillsides, much agricultural (pastoral?) country, savanas (some of them with clumps of palms).

This is soon lost sight of and we again spend long hours above the cloud mattress. But here is a reef, a small jutting rock, fringed with foam. And now Luzon! We traverse hilly country, some of it very densely forested in strips or blocks, but always alternating with open country, especially in the lush green valleys. We get down lower and lower and the terracing of the slopes becomes apparent. As the whole relief is attenuated, finely contoured fields appear in a beautifully geometric design: green and dark green where the rice or cane are growing, a bright brick red where the crop has been reaped.

Villages of light-coloured houses. One with an emerald swimming-pool. Trees outcropping from the avenues. The large dome of a church in the centre.

And now we swing low over the plain. Outskirts of Manila, and then north towards Clark Field. The checkerboard of fields is brilliant. Along the streams, very few trees (in contrast to the preceding, and higher zones). Many deep-green plots, some gray and flooded: rice in different stages? Vast expanses of soft pink sugarcane. Few apparent wastelands.

We get off at Clark Field and ride by bus to Manila, preceded by a honking, bragging armored car, manned by four very young soliders who signal frantically to everyone in sight to get the hell off the pavement and let us by. We proceed in this outrageous fashion to the U. S.

Embassy where we are received by a bewildered young receptionist. After much haggling, the army bus took us directly to our hotels. We had seen no immigration and no customs officers.

The ride in was most exciting. The peasants were all returning from work, and lined the roads. Many of them looked very young (I am at first surprised by the apparent racial homogeneity, at least as far as skin colour goes; there is but little variation, also rather little in stature and hair colour and texture). They come in groups, leading their patient-looking black buffaloes (a few albinos, rather reddish-pink) with a hemp cord. Many young boys and old men reclining on the buffalo's back in incredibly relaxed attitudes. The women with shawls over their heads, and many with lovely wide-brimmed revolute straw hats. All smiling, many shouting a greeting or making the V-for-victory sign. They all appear surprisingly clean.

The houses are of many kinds. Very many on stilts. All are more or less open and almost all windows are without glass panes. The lovely texture of the matted straws and the grass roofs. A good deal, among the more prosperous, of ugly stucco and false wrought-iron grilles. Market-places in the towns and town streets strewn with American advertisements. No lettering on shops and elsewhere (except an occasional Farmacia) in Spanish — all in English.

The background of this landscape. Vast expanses of sugarcane and rice. The rice is green and in almost all stages of growth except maturity. The sugarcane 7 to 8 feet tall, is all in flower: the lovely soft pink inflorescences wave in the wind as far as one can see. On the edge of the fields and in the ditches, the white plumes of the smaller and coarser wild cane (*Saccharum spontaneum*), or else some *Panicum maximum*, a yellower green. In the wetter spots, *Phragmites karka.* In the water itself many long bands of *Eichhornia crassipes.* Here and there some *Jussiaea.* On the dry land, a common sight is *Tricholaena rosea* here a very bright pink at anthesis, becoming almost white later (This contrasts with the lighter and more uniform pink of this plant in Brazil).

Many trees are planted along the road: *Mangifera indica, Bixa orellana, Ixora* sp., *Terminalia catappa, Pithecolobium saman, Hibiscus tiliaceus, Carica papaya, Areca catechu, Corypha elata.* Hedges of *Hibiscus fimbriatus* are very common and a lovely white-flowered shrub (*Tabernaemontana*).

Along some of the streams, grow belts of nipa palm accompanied by *Acrostichum aureum,* and in one place we see *Rhizophora* and *Avicennia.* Some laborers ride buffaloes which are up to their backs in the soft mud. Fishermen are also busy in the streams, submerged to their necks and leading their dugout canoes, dragging a net.

531115. Manila.

Last night, George Clarke, John Marr, Allan Smith and I settled down in a double-room suite at the Manila Hotel, a somewhat new but predominantly 1900 hotel. Spacious, high-ceilinged, a cucaracha in the bathroom. Shower, shave, cocktail, food very welcome, relaxing. Ray Fosberg was here awaiting us, fresh from Japan, and with extraordinary descriptions of a new kind of bog.

This morning, the vast green park opposite the hotel resounded with the sharp cries of ROTC students exercising. Everything was bright, the *Erythrina*, the *Albizzia*, the *Samanea* trees luscious, the dark *Terminalia* and *Barringtonia*, the very green grass.

At seven a taxi drove me to Malate Church, a long cathedral, Jesuitic baroque, but not at all ornate. Standing room only, among the black lace-veiled women, the starched men. The singing rings loud and clear, and somewhat operatic. The birds fly all around through the open grilles, and chirp and perch on the ledges and chandeliers. Common sparrows. St. Francis of Assisi must smile at them. Being late for one mass I remain for the next, the children's mass. All around me the shining black hair, the sharp intelligent eyes of well-washed little boys. Across the aisle the white- or black-veiled, shy little girls.

After breakfast Allan Smith and I go for a walk. We penetrate into the enclosure of the old walled city. The crumbling brick of the walls themselves, the bombed churches, the exploded domes and fallen arches, all hirsute with weedy grasses and protruding shrubs. Inside this devastated sanctuary, squatters have built their straw houses on stilts. Open, fetid. But with flowers in the windows. A smile in the window, too. In the apse a patch of beans. Banana trees among the fallen columns. One almost expects one of Chirico's interrogative horses.

In the afternoon, a visit to the Museum. More evidence of bombing. Painting collection mostly unimpressive. Rank imitations. A few show more freedom. Upon inquiry I learn that these artists are now studying in Madrid (not Paris).

Pleasure of meeting Hosokawa, a very affable gentleman, whose English is a little difficult, but whose work I very much admire. It seems to me that German influence must have been very strong in Japanese scientific circles. I also encounter old acquaintances: Archey and Falla from New Zealand, and — as large as life! my compatriot Shrum. Quisumbing, the botanist and director of the Museum, turns out to be a very genial person.

George, Jack and I take a taxi to a cockfight arena. Through the business centre to a slum district. A vast dirty yard cluttered with many of the jeepneys so characteristic of Manila, with horsecarts (for two, carrying 5-6), and some expensive American cars. We enter into a large market-like building. Counters improvised everywhere for the sale of drink and food. No! not hamburgers, not hot-dogs but 25 varieties of food: eggs containing an embryo chick, meats, jellies, pastries, patties, fries, roasts, stews. They smell rather good. I wish I had the courage to sample them (free myself from this silly occidental pasteurian complex!). Inside is another enclosure. 60 more centavos. Here we are on a scaffolding. Down below, in a large cage are the cocks, their owners, the umpire. The crowd on the steps is shouting, rhythmically, spasmodically. All men. They hold up one hand above their heads indicating numbers (of pesos to bet) with their fingers. The other hand over the mouth. And back and forth and again and again. Each man gyrates, challenges his neighbours, obtains a subtle (to us imperceptible) acquiescence. The bell rings. Noise stops. The cocks fight. Jump, ruffled and angry. Claw, scratch, crouch, leap, fall, tremble and are slain by the sharp razor. Many helpful people explain all this to us. Urge us gently but not insistently to bet. Small boys pass with trays of ice water, coffee, beer, soft drinks. No drunks here. No half-drunks either. No hysteria. It all seems quite healthy and goodhumoured.

531116.

First day of the congress. Ride out to the U. P. (University of the Philippines, not the Upper Peninsula!). Registration is a quick affair. We get various leaflets, programmes, etc., and a "gold" medal as insignia. Inaugral speech by president Tan very good: social responsibility of scientist. Not new, but good. Some of other speeches at rotarian level, and some rather old-fashioned.

Lunch at the Water-Distilling Plant, a pastoral place, not in the best of taste but most pleasing. Even more pleasing is a beautiful student, who "takes care" of Allan and me. A simple girl from the Province of Negros who has never seen "professors" like us — she says. We like it. We give her the very best.

Botanical session starts in very low gear. The U. P. Department of Botany, Drs. Velásquez, Santos and Pastrana make us feel very much at home. Me especially as all three have Michigan degrees! With van Steenis and Heim, a great discussion on German vs. Spanish as an international scientific language. Van Steenis and I argue that German should be re-instated at the forthcoming International Botanical Congress next summer.

531117.

The day starts with Oliver's report of the Standing Committee (of which I am a member and for which I have done nothing!). Fosberg also gives a report on what has been done since the 7th Congress to implement the resolutions passed by the assembly.

Lunch is graciously offered by the National Research Council, an excellent lunch in the U. P. dining room. Purple ice-cream made out of *ube* (cassava, the hated tapioca!).

Beginning of symposium on Pacific vegetation. Fosberg makes a reasonable exposé and proposes tentative criteria and divisions.

Ray and I have dinner together and then go to the evening lecture. Von Koenigswald is very interesting on the subject of early man in Malaya. The following speaker talks too long, shows a crudely amateurish film.

531118.

A harrowing day. A fight against sleep and fatigue. The symposium goes on. Van Steenis' exposé is interesting as it brings together a good deal about Indonesian vegetation that has never been summarized before. His system and nomenclature are however not very acceptable to me. His presentation is intense, argumentative. The most interesting point: description of bog forest (real sphagnum bog, not swamp, accumulation of peat, not muck) at sea level in the Tropics! It looks as though I shall have to revise my ideas on this matter. But I am unable to obtain much elucidation from v. Steenis on this subject. I feel that there may be here an over-efficiency of rainfall in this particular region that he describes, as I do not think that bog forest occurs in Amazonia (v. S. replies that he is quite sure it is there but no one has seen it!).

Dinner at José Santos' with Fosberg, St. John, McClure, Walker. A pleasant suburban house, surrounded by lovely flowering shrubs. Panelling of smooth light-coloured Philippine woods. Mrs. Santos serves us a delicious "adobo," a Filipino dish that reveals oriental influence.

531119.

Morning in Conservation. An excellent report on deer in the P. I. by Rabor. Other papers rather weak. List of birds, mammals, plants to be protected made by vote and consent.

After lunch, I wander around the campus. Conversation with art students. They take me to their classroom. Tier upon tier of chromos in the best Ecole-des-Beaux-Arts academic tradition. The professor himself however, is a man of sensibility (as some of his painting shows) but he has to turn out commercial artists.

P. M. partly in Botany. Fosberg's Symposium on Pacific Vegetation areas goes on. Harold St. John is an excellent speaker, brief and to the point, does not emphasize in advance the importance of anything he has to say. Were there more speakers with this style!......

Evening: two lectures again. R. C. Murphy very interesting: good talk, good film. But too long. The second speaker, Pierre Auger, has to abbreviate hopelessly. A poor idea in the first place to schedule two speakers!

TO BE EXPECTED IN FORTHCOMING ISSUES

Botanical Collecting in Grant County, North Dakota, by O. A. Stevens

Plant Collecting in the Bad Lands at Medora, North Dakota, by O. A. Stevens

Myriangiales Selecti, by Anna E. Jenkins and A. A. Bitancourt

Letters from Okinawa, by Robin Drews

Botanizing in the Tahquamenon Area, by Alexander H. Smith

Geography of Tradescantia ohiensis, by Donald S. Dean

Three articles by Elmer D. Merrill

A Letter on Collecting Hawaiian Bryophytes, by H. A. Miller

Letters from India, by Walter N. Koelz

An Autobiography for his Family and Friends, by Cornelius L. Shear

Glimpses of the Natural History of Koror, by Peter J. and Alma Hill

Ekman, Botanical Explorer in the West Indies, by Siri Von Reis

Biographical Sketches of Louis H. Jordal, W. G. Waterman, Ray C. Friesner, Charles C. Deam, and Alice Eastwood

Wyoming Newsletter and Herbarium Report, by C. L. Porter

Observations on the Edwards Plateau, by Winifred O. Moore

Botanist's Visit to Mount Sisipitan, by José Vera Santos

Hoogstraal's "Second Mexican Expedition" by Virginius H. Chase

The Tall Grass Prairie in Oklahoma, by Lloyd Schairer

Round Robin from Alaska, by Gertrude Frohne

Ethnobotany of Popcorn, by Volney H. Jones

Japanese Flower Arrangement, by Mary Cokely Wood

The Allen Walnut of Middleville, Michigan, by H. H. Bartlett

The Everett G. Logue Collection of Hybrid Oaks, by H. H. Bartlett

Nathan A. Cobb as a Botanist, by Frieda Cobb Blanchard

Philippine Journal. II, by Pierre Dansereau

A Study of Mahogany, by F. Bruce Lamb

THE ASA GRAY BULLETIN, NEW SERIES. -- A quarterly publication devoted to more or less informal communication among the members of the three organizations listed below and our subscribers in general. For the present, progress reports of current field, garden, and herbarium work, with readable and relatively non-technical articles in the fields related to systematics, botanical history, biography, and bibliography, will be preferred. There will be special emphasis upon preparatory work for a new "Flora of Michigan". Free use will be made of letters to the Editors (if released for publication by their writers) and of current news notes regarding botanists.

Items for publication should be addressed to either of the Editors at the Department of Botany, University of Michigan, Ann Arbor, Michigan. Contributors of major articles may secure 100 copies of their contributions, at a cost of $1.25 per page or fraction thereof. Covers furnished without additional charge.

Address subscriptions to Dr. Ruth B. McVaugh, Business Manager, 403 Arbana Drive, Ann Arbor, Michigan. Subscription price for Volume I (if available) is $6.00; single copies of Nos. 2, 3, and 4, $1.00 each. Vols. II and III, $3.00 each; single copies (if not breaking volumes) 75¢ each.

THE GRAY MEMORIAL BOTANICAL ASSOCIATION, FOUNDED 1887. — This organization sponsored publication of early volumes of the Asa Gray Bulletin. Later it issued a mimeographed "Bulletin". Its object is to commemorate the life and botanical work of Asa Gray and to assist its members in botanical activity by furthering friendly correspondence and cooperation among them. Interested persons are invited to communicate with the Permanent Secretary, Professor R. Lee Walp, Department of Biology, Marietta College, Marietta, Ohio.

MICHIGAN BOTANICAL GARDENS ASSOCIATION. — Founded in 1925 to include persons interested in promoting the development and current activities of the Botanical Gardens of the University of Michigan. There are no dues, but subscription to the Asa Gray Bulletin is invited. For further information, communicate with Dr. Frieda Cobb Blanchard, Secretary, 2014 Geddes Avenue, Ann Arbor, Michigan.

MICHIGAN BOTANICAL CLUB. —— The membership is about 350, made up of persons interested in the Michigan flora, nature-study, wild-flower protection, preservation of natural areas, and conservation. It has members at large and the following chapters: Southeastern, Bay County, Marquette, Wild-Life (Houghton). For information address the President, Mr. Paul W. Thompson, 17503 Kirkshire, Birmingham, Mich.

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and
THE MICHIGAN BOTANICAL CLUB
by
Harley H. Bartlett and Rogers McVaugh

CONTENTS

(Continued over)

ANN ARBOR, MICHIGAN

CONTENTS
(Continued)

Editorial Note to our Subscribers -- With the appearance of this number of Asa Gray Bulletin many subscriptions will expire. If renewals at $3.00 for Vol. III can be remitted at once without bills being sent, it will save us time and expense. Please make checks or money orders payable to Asa Gray Bulletin, and send to 403 Arbana Drive, Ann Arbor, Michigan.

The editors feel that some apology will be owed our readers for devoting the whole of Vol. III, No. 1, to a single article. This will not set a precedent, and the following number will be as diversified as usual.

Vol. III No. 2 is mostly processed and ready for printing. So, in spite of being considerably in arrears, Asa Gray Bulletin bids fair to catch up during the current year.

That we are venturing to start Vol. III indicates that our support seems to be getting somewhat stabilized. We have gained very little from the expenditure that we have been able to make for advertizing, and it is evident that our growth in circulation results chiefly from the personal recommendations of our readers. We hope that each subscriber will try to find us at least one other!

THE ASA GRAY BULLETIN

NEW SERIES

VOLUME II

Edited by
Harley H. Bartlett and Rogers McVaugh

A Botanical Quarterly published in the interests of the Gray Memorial Botanical Association, The Botanical Gardens Association of the University of Michigan, and the Michigan Botanical Club

ANN ARBOR, MICHIGAN 1953-1954

Dedicated to the

memory of

CHARLES C. DEAM

August 30, 1865 — May 29, 1953

Indiana's Preëminent Botanist
for over half a century
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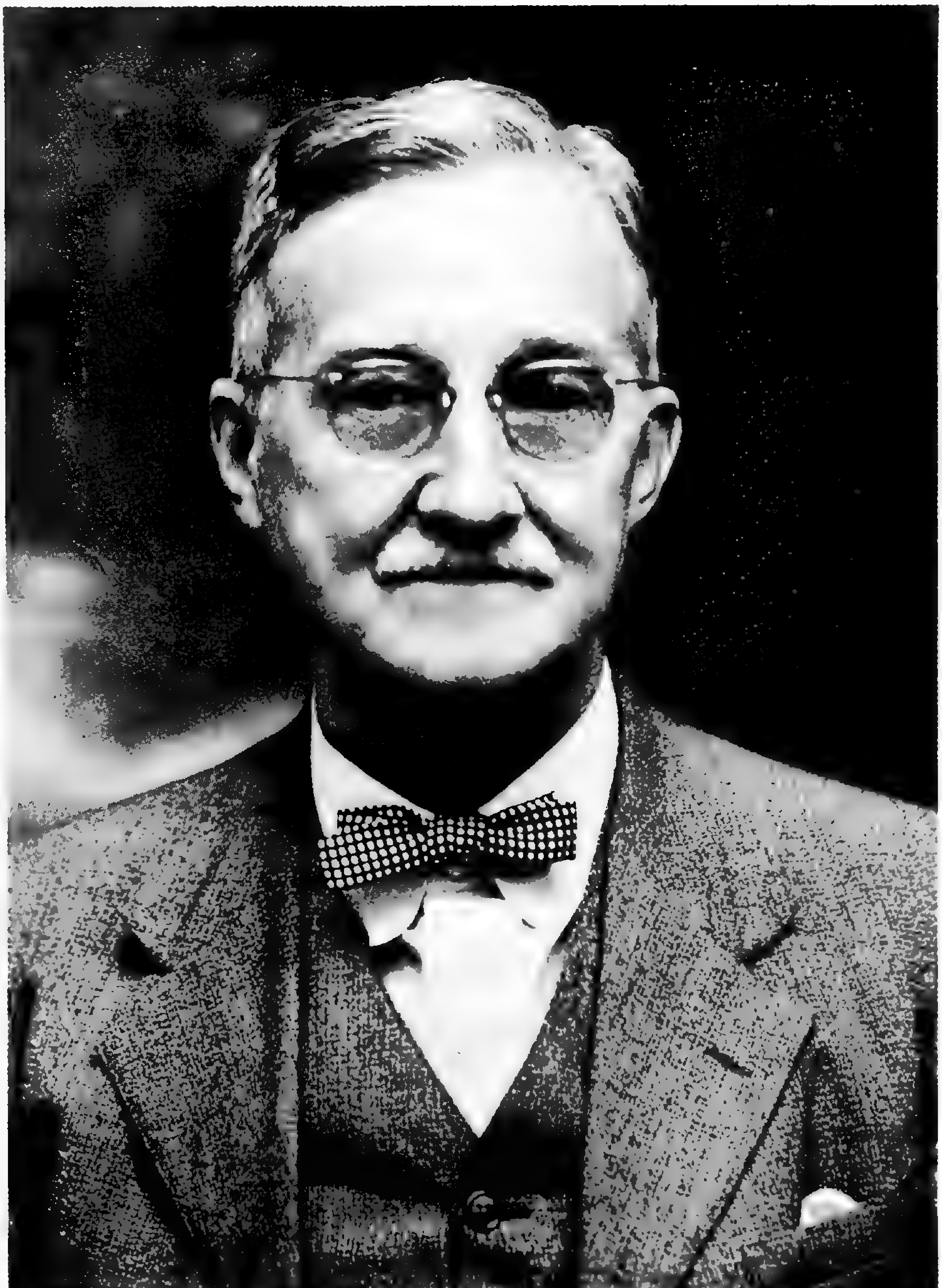
all American Workers on Local Floras



Chas. C. Deam on 73rd
birthday. Aug. 30. 1938

TABLE OF CONTENTS

ARTICLES

CONTENTS
(Continued)

CORRESPONDENCE

REVIEWS

EDITORIAL NOTES

AUTOBIOGRAPHICAL: EARLY YEARS, THE PHILIPPINES, CALIFORNIA

E. D. Merrill

I was born at East Auburn, a suburb of Auburn, Maine, October 15, 1876. My parents and immediate ancestors were people of limited means, and for several generations back were apparently "hewers of wood and carriers of water." They were upright, industrious people, characteristic of rural New England, with limited outlook, and limited culture, for apparently none of them had more than a common school education. They were for the most part small farmers of pioneer stock. There is no evidence in my ancestry of any special traits that would explain my own predilections.

My father was a native of Freeport, Maine, a direct descendant of Nathaniel Merrill, the first immigrant of that name, who first settled at Ipswich (later at Newbury) Mass. in 1635. The Merrill family itself is of French Huguenot descent, originally de Merle, supposedly of the Auvergne nobility. I never knew personally any of my uncles and aunts on my father's side of the family. As my paternal grandfather and grandmother died before I was born, they are merely names to me. Two cousins, Herbert Merrill of Freeport and William Merrill of Portland, Maine, are the only close relatives on this side of the family that I ever knew personally.

My maternal grandparents I well remember, as they were both natives of Auburn. My grandfather, Nathaniel Noyes, who lived across the street from our home, owned and operated a small farm of perhaps forty acres about a mile from his home in the village, and we as children had to help him in his farming operations. He was tall, robust, with emphatic political ideas, outspoken in his opinions and of rather a domineering disposition; my grandmother, a White, and a descendant of Peregrene White, of the original Mayflower contingent, was quiet and efficient. My immediate ancestry thus represents English, Scottish and French origins: White, English; Cummings, Scottish; Merrill, French Huguenot; and Noyes, French or Norman French.

Like many New Englanders, the Noyes family scattered, though not to the extent of the Merrills. Both a maternal aunt, Mrs. Charles Record, who lived a few miles from my home, and an uncle, Eliphalet Noyes, who lived at Lewiston, across the Androscoggin River from East Auburn, had two children, cousins with whom I was naturally well acquainted as I saw them frequently. Another uncle, John Noyes, who lived at Somerville, Mass., we saw occasionally on his trips home to visit his parents. One great-aunt, Clara Vickery, and a great-uncle, William Noyes and his family also resided in or near

East Auburn. On the whole I felt fairly well acquainted with my immediate relatives on my mother's side of the family. In Auburn and Lewiston, there were also various second cousins, among whom were the White children, grandsons of Senator William P. Frye, whom I saw occasionally.

East Auburn was a small village located about three miles from the city. It boasted one general store, a school, a grange hall, less than fifty houses and a single church (Baptist), which was more frequently closed than open for want of a permanent pastor. It was originally established for the water power it gained by its location at the outlet of Lake Auburn; there, in my childhood, a sawmill, a furniture factory and a gristmill were in operation. Earlier there were woodworking factories of other types; but as the forests were cut, the mills were gradually abandoned, closed, and ultimately removed. This small community was made up of farmers and workmen in the extensive shoe factories of Auburn and of those who combined farming on a small scale with factory work.

For a New England village East Auburn was not particularly religious; most residents took their religious duties lightly. I do not remember that my grandparents ever attended church; my own parents certainly never did; nor did they require or expect their children to do so. My mother tended toward spiritualism, while I never heard my father express any opinion one way or the other regarding religion. As a boy of 14, he ran away from home because, as he expressed it, his stepmother was too religious. I remember his stating at various times that he got too much religion as a boy and that therefore he would never require any of his children to attend church — and he never did. I was therefore brought up more or less as a "heathen"; I never elected to attend either Sunday school or church and I doubt if I was ever inside of the East Auburn church more than half a dozen times. There was no objection to playing on Sunday, nor to boating, fishing and hunting; in common with most other boys of my generation in the village these sports appealed to me much more than church attendance. Perhaps because of my early training formal religion has never appealed to me, although as a boy I read the Bible considerably and was reasonably familiar with it.

Pioneer spirit apparently existed on both sides of the family. My grandfather Noyes was a "forty-niner" who left his young children in charge of his wife and made the long journey to California via Panama. He was not successful in his quest for gold and returned to Maine after a short stay in California. My father, as noted above, ran away from home and took to the sea at the age of fourteen, shipping as a cabin boy on a trading ship to the Orient via Cape Horn. From this time to about 1866 he apparently followed the sea, but served chiefly as a common sailor. The call of the sea remained with him however for many years after he settled at Auburn and he occasionally took fishing trips to the Grand Banks. When I was a youngster, I still remember, he left home for an occasional trip or season on a fishing schooner out of Portland or Gloucester. This apparently continued up to about 1885. During the longer intervals of shore life he worked chiefly in the shoe factories of Auburn; but after my grandfather's death he gradually discontinued his work as a skilled laborer and gave more and more attention to farming. At any rate, his various experiences at sea and in foreign ports apparently did him little physical harm, as he lived until 1925, being nearly eighty-nine years of age at the time of his death.

East Auburn was a normal small New England village and few people in it had ever travelled farther than Auburn or Lewiston, or perhaps Portland or Boston. Generally speaking, we boys thought that if anyone had been as far as Boston, he had seen the most important part of the world. Our outlook was singularly restricted. Postage stamp collecting was not for us, as nothing but ordinary U. S. stamps ever went through the local postoffice, so our substitute was tin tobacco tags and our happy hunting grounds were the old wooden mill buildings and ancient structures used for the storage of lumber, that a generation or so back had served as factory buildings of one type or another. Workmen of earlier days apparently frequently removed the tin tags from their cut plug and stuck these into the beams and walls, little realizing how highly a later generation would prize these "obsolete" tobacco tags.

Our family consisted of five children, my oldest brother Edward Leonard Merrill born in 1867; the next a sister Linda, born in 1869; then Arthur Cummings born in 1871; and finally the twins, Dana T. and myself, born October 15, 1876. As the boys of the family reached the age of productive work they were required to assist our grandfather in his farming operations, and in due time this servitude, although not really very heavy, was the part of myself and my twin brother. My father was impatient at times and occasionally emphatic in his use of language. When he couldn't find a tool that he himself might have misplaced, he would invariably charge its disappearance to us and remark: "Those damned twins, they scatter things from hell to breakfast." My grandfather Noyes, on the other hand, never used violent language, although doubtless he had much more occasion for doing so than did our own father, as during our farming days he saw much more of us than did the latter. His strongest expressions were: "I vum," "I swan," "I swan to man" and "Godfrey mighty." The first three never bothered us much; but on the rare occasions when he used the last one, he spoke with such authority we realized that it was time to give due attention to whatever was being done. I can see him yet — a tall straight man, with abundant black hair, heavy eyebrows, long, patriarchal, gray beard, shaven upper lip.

Our farming operations were to bring home the cows and as we got older to milk them; to help at the haying season, which was a strenuous one; to go over the land with drags in the spring and pick up the crop of rocks; plough, harrow, and pick up the next crop of rocks; plant the potatoes, beans and other crops; weed and hoe them at intervals; gather the crops and, late in the season, go over the land again and pick up the next crop of rocks — we firmly believed that the rocks grew like potatoes. The two families thus produced a very large part of their essential foods: potatoes, corn, beans, turnips and other vegetables; apples, eggs, dairy products, and pork. Dependence on stores was limited to staple groceries. Actual knowledge of farming operations gained was small compared to the appreciation we gained of the value of work. Swimming, boating, fishing, hunting, tramping in the woods — many things were more appealing to us than work, but when there was work to be done it always came first!

My two older brothers and my older sister finished their formal education in the East Auburn school when they completed the grammar school course. I have often felt that my brother Arthur was the one member of the family who should have had the advantages of a higher education, as his early acquirements were rather remarkable, but fate did not will it so. My twin brother and I decided that we would continue through high school, being influenced in this decision by Margaret Wilson, our teacher in the village school, and by our mother; our father did not oppose the decision, nor do I remember that he ever expressed himself in favor of it. The first year's work was taken by special dispensation in the East Auburn School at the initiative of Miss Wilson who had a class of five or six pupils. On finishing the first year there, my brother and I entered the second year at the Edward Little High School in Auburn, a distance of three miles from our home; and for the next three school years we had to walk down and back each day, regardless of the weather. I do not know that we were brilliant scholars; but I am impressed by the fact that during our three years in the city high school we did practically no home studying. I am also impressed with the fact that, except at the time of my mother's death in 1893, we never missed a day at school and were never late. Many times in the winter we walked the entire distance to the city in a howling blizzard only to find "no sessions" because of the inclement weather. We came to have a rather scornful opinion of city people, not blaming the children, but rather the authorities. At times we made the trip on snowshoes because the roads were otherwise impassable. This school experience doubtless had its effect in establishing one quality — that of persistence, a quality to which I believe I owe most of such success as I attained in after life.

With me, as with many other boys of New England and elsewhere, bird-nesting was a favorite pastime; at an early age I became adept at locating birds' nests, gained a fairly comprehensive knowledge of the names and habits of the birds characteristic of the region, and built up a respectable collection of birds' eggs. Rocks and minerals also appealed to my collecting instincts, for in the glacial gravels of the region many different types of rocks were to be found; and an occasional trip to the tourmaline mines in Auburn, where a number of special kinds of rocks and minerals occurred *in situ*, added to the collection. Hunting for Indian relics along the shores of Lake Auburn, at times when the water was unusually low, had its attractions. I remember also building up a collection of local woods. In the woods I was attracted at an early date by the shelf fungi, and assembled a considerable number of the more showy types some years before I even realized that they represented plant forms. Before reaching high school age, I had become interested in collecting and naming plants and in the preparation of rather crude botanical specimens; my earlier method of naming these was to look up the current common name in the few publications available; at this time I did not even have access to a manual of the local flora. The collection of birds, mammals, reptiles, insects, and shells never appealed to me, although regularly after circus season we made cages, constructed traps and energetically established "menageries" with squirrels, mice, lizards, and snakes as our exhibits.

At the time I entered high school at Auburn, I had no idea of any further education — in fact, both my brother and I felt that probably anything beyond high school was impossible with our limited means. Therefore, we both elected to take the so-called English course, with no Latin or Greek, a decision that I have ever since had occasion to regret, as my later work involved not only extensive reading of Latin, but also the mastery of writing simple Latin descriptions of plants. Gradually, however, the idea of college appealed to us, as a number of our classmates were planning on college careers at various of the classical colleges in New England, such as Bowdoin, Bates, Colby, Brown, and Wellesley. With no training in Latin or Greek, we realized that these institutions were closed to us and that there remained open, as far as we were concerned, only professional schools. Consequently, as our thoughts turned to work beyond high school, we both decided to go in for engineering and in the fall of 1894 entered the freshman class of the Maine State College at Orono, an institution that, in our senior year, became the University of Maine.

Before the end of the first year in college, however, after coming in contact with college mathematics, I decided that, although I had taken trigonometry and plane surveying in the high school, there was too much mathematics in engineering to appeal to my non-mathematical mind and that engineering was not my forte. Accordingly, at the beginning of the second year we both elected to take the general science course without having, at that time or even on graduation, any very definite ideas as to what we would do afterward.

The Maine State College in 1894 was a small institution scarcely beyond the formative stage, a typical small fresh-water college, most of its students taking engineering courses. Our entering class in 1894 was the first of the large classes, approximately 90 presenting themselves in Orono in September; this was as many students as there were in all of the upper classes combined. This large entering class was largely due to the changes in policy initiated by Dr. A. W. Harris who had been made president of the institution in the preceding year. The real growth of the institution commenced with the class of 1898 and during our last year in college the name of the institution was changed to the University of Maine, although it was then a long way from a real university.

Of the ninety that entered in 1894, about fifty were graduated four years later, the year of the Spanish-American war; and in the spring of this year about a dozen classmates, including my twin brother, enlisted in the first Maine regiment, although they got no farther than the camp at Chickamauga and at commencement time received their diplomas *in absentia*. This move, however, determined my twin brother's future career, as shortly after the close of hostilities he received a commission as a second lieutenant of infantry in the regular army. Shortly thereafter, due to the Philippine insurrection, he proceeded with his regiment to the Philippines. He remained in the army permanently, attaining the rank of Brigadier General in 1935.

I was valedictorian of my class at graduation but never quite realized how it came about for, perhaps underrating my own ability, I thought there were many more able men in the class than I. I made no striking record in college. I was not an athlete, being a natural dub at athletic games; I was no leader, being naturally too diffident and having little confidence in my own abilities; I was not a grind, giving no more than normal attention to my studies and taking considerable part in social activities of one kind or another in Orono, Oldtown and Bangor. My college activities were limited by limited funds. I went through college on a small legacy from my mother — that expended at her request, by borrowed funds for which my older brother took the responsibility, and on such money as I could earn during vacation periods; once or twice during my college career I remained out of school for a month at a time to earn money. My vacation employment during my entire college career and during the latter years of high school was in fish culture, my older brother being at that time superintendent of the State fish hatchery at Auburn and later at Monmouth. My work was largely that of a common laborer or helper, doing everything from digging fish ponds and clearing land, to chopping meat and feeding the young fish. I did gain a rather comprehensive knowledge of the principles and practices of pisciculture as applied to trout and salmon and at one time seriously contemplated following this as a profession.

In college I did not distinguish myself in any particular way except by making a fairly high scholastic record – certainly at the time of graduation, and for that matter for many years afterwards, I gave no promise of leadership. In college I had become a charter member of the local chapter of Phi Kappa Sigma and as the highest ranking member of my class automatically became one of the charter members of the Phi Kappa Phi honor fraternity, the parent chapter of which was organized at Maine during my senior year. Years later, when the chapter of Phi Beta Kappa was installed at Maine, I was elected an alumnus member of this honor fraternity, being actually initiated in 1924 at the University of California, where I was also elected to membership in Sigma Xi and Alpha Zeta.

While in college I was much interested in biological work, especially in botany and particularly in the classification of flowering plants. Here I came in close contact with a rather remarkable teacher, Professor F. L. Harvey who, like similar men in other small institutions, was charged with teaching botany, zoology, entomology and geology. Handicapped as he was by a small salary, a very heavy teaching schedule and a growing family, his enthusiasm for field work and for research was contagious. It was Harvey who called my attention to the lower groups of plants and in my four years of college I not only made collections of fungi, lichens, mosses, hepatics, algae and even myxomycetes, but named many of them as well. My formal work in botany consisted of a single semester in general botany and another in so-called cryptogamic botany. Never having taken formal graduate work, I may be considered to be self-trained in botany; a hard school, and one that supplied a most sketchy, inadequate training for future work as I was to discover in later life. During my entire college career I collected extensively and at the time I left Maine, had a private herbarium in excess of 2000 named specimens in all groups that a few years later I presented to the New England Botanical Club. During my junior and senior years I acted as student assistant in botany in charge of laboratory sections. In the summer of 1897 I climbed Mount Washington in New Hampshire on a tramping and collecting expedition and the next year made the more difficult trip to the summit of Mount Katahdin in northern Maine – more difficult, because of the long overland trip that we had to make on foot from Brownville.

I received the B.S. degree from the University of Maine in June 1898 and in September of that year returned as assistant in natural science at a salary of $250 for nine months' work. No formal postgraduate work was offered, but I took certain courses to round out my college work, gained considerable experience of one kind or another and rather industriously followed my own inclinations in the pursuit of systematic botany, although having little or no supervision. On the basis of the year's residence and the work accomplished during the period and after leaving college, I was granted the M.S. degree by the University of Maine in 1904, although looking back I can hardly claim

Elmer Drew Merrill, at the time of his graduation from the University of Maine, in June, 1898.

that it was an earned degree. Even during this supplementary year I had no definite idea as to what my future field would be, but do not remember worrying at all as to the outlook — there was too much of interest in life.

In the spring of 1899, as a sort of forlorn hope but with little anticipation that I would secure an appointment, I took the U. S. Civil Service examination in Bangor for a position as Assistant Agrostologist in the Department of Agriculture. The announcements read that one position at $1800 was to be filled and two at $1200. I had no misconception as to my own ability and took the examination for the $1200 job. Among the subjects taken was the translation of French and German at sight; also Latin, but the Latin examination was the translation of some botanical descriptions and my grade, as I remember it, was 85; fortunately for me no questions in Latin grammar were propounded! However, to be certain of some employment, I had accepted a fellowship (board, room and laundry) for a year at the Geneva (N. Y.) Experiment Station, to work in plant pathology, and reported for duty there early in July. In Geneva I found some forwarded mail and among the letters was an appointment to a $1200 position, as Assistant Agrostologist in Washington. On consultation with Dr. W. H. Jordan, Director of the Geneva Station, he very strongly urged me to decline the Washington appointment on the basis that a year's additional work at Geneva would be ultimately of greater value to me; and further that the Government service could not be looked upon as a career and that I would make a serious mistake in accepting the appointment offered; it is probable that it would have been a serious mistake had I remained in Washington permanently, but this was not to be. Partly on the basis of the salary offered, in contrast to living expenses for the year at Geneva, and partly because the Washington appointment gave promise that I could continue to work in the field that I most desired — that of systematic botany — I decided to accept the Washington offer and reported for duty on July 7, 1899.

My work in Washington was on the taxonomy of the North American Gramineae, where I was an assistant to F. Lamson-Scribner, then the leading authority on the classification of grasses in America. Here I gained a knowledge of herbarium methods and flatter myself that I improved on some methods followed in the office; I also gained a wide knowledge of the literature appertaining to the classification of the Gramineae, and general experience in handling material and literature. I also acquired a wide knowledge of the grasses of North America as they were then represented in the extant collections covering the region from southern Mexico to the Arctic Circle. I have always looked on my two and one-half years work in Washington as my post-graduate course in taxonomy, even though to a very large degree I was placed on my own resources and was my own teacher; it was excellent training for the infinitely more complex and difficult task that was to come later in the Philippines. When I commenced my work in Washington, my outlook was singularly restricted. I had no knowledge of the sources of literature in botany, having previously had access only to a few published manuals, such as those of Gray and Wood, and Britton and Brown's illustrated flora of the North-Eastern United States, that had been available to me as a student. In this connection I may mention that one of the high lights in my college career was the securing of a copy of Britton and Brown's Illustrated Flora from Dr. Britton by trading duplicate botanical specimens for it.

While in the Department of Agriculture I prepared for publication my first papers, other than a few short lists consisting of extensions of range for known species, published while I was at the University of Maine. Part prepared in collaboration with Lamson-Scribner, and part independently, these dealt with the revisions of small genera and groups, miscellaneous descriptions of new species, and discussions of nomenclature; none of them was of any great importance. The last paper prepared in Washington was a consideration of the grasses of Alaska in manual form which, although completed in 1901, was not actually published until 1910. While my early work as a botanical author was relatively unimportant, it served its purpose in that, in the preparation of the manuscripts I mastered methodology in dealing with material and descriptions; familiarized myself with problems of nomenclature and mastered the principles of taxonomy as applied to the grass family. It was perhaps fortunate for me that my first real botanical work happened to be in this particularly difficult family. Because of the relatively obscure characters that are basic to classification, it was a most excellent training school for the work that was to come in the near future.

I remained in Washington all of the first year, and for the first time realized what really hot weather was like. In the summer of 1900 I was authorized to visit certain parts of Wyoming, Idaho and Montana on an investigation of range conditions, as expressed by the Chief of the Division: "so that I would realize that New England is not all of the United States."

The areas covered were the Laramie Hills near Laramie, the sand hill region in the vicinity of Saint Anthony, Idaho, the Jackson Hole country in Wyoming, Yellowstone Park and limited parts of Montana. The field experience was highly interesting and fairly profitable, with considerable general collecting accomplished. The next summer I again visited the same general region with a supplementary trip from Point of Rocks northward through the red desert of Wyoming to the Wind River Mountains, thence to the Jackson Hole country again, and the Teton Forest Reserve; while I was in the Jackson Hole a partial ascent of the Teton range was made (Mount Moran).

Although I occupied a botanical position in the Government service in Washington, I was by no means settled as to what my career should be. Having little to engage my attention in the evenings, I entered the George Washington University Medical School at the opening of the semester in 1900-01, completed the first year's work and the first semester of the second year, when an event occurred that was definitely to place my career in the botanical field.

In 1901 the Philippine Commission authorized the establishment of a Bureau of Agriculture in Manila, and naturally the officials of the Bureau of Insular Affairs in Washington turned to the Department of Agriculture for advice in selecting the personnel. F. Lamson-Scribner, Chief of the Division of Agrostology, was offered the position as Chief of the Philippine Bureau of Agriculture and on acceptance was authorized to select the nucleus of a staff. A position as botanist at $1600 had been created, this being $200 more than I was then receiving after one promotion in Washington. Early in the fall Mr. Scribner offered me the position as botanist. This I very promptly declined, on the basis that I was poorly trained and wholly inexperienced in Philippine botany and in Philippine botanical literature and that I felt incompetent to handle the situation in any satisfactory manner. In declining the Philippine appointment, I dismissed the matter from my mind and continued my routine work in Washington. I was busy in attempting to master the intricacies of the classification of North American grasses and this in itself being a lifetime job, I was beginning to feel that I had really found my own niche in life.

About the middle of February 1902 Governor Taft reached Washington on his first trip from Manila. In an interview with him shortly after his arrival, Mr. Scribner secured certain modifications in reference to the authorized personnel of the Insular Bureau of Agriculture; among these was the authorization to offer a salary of $2000 for a botanist. Immediately on his return to the office, he again offered me the appointment and my rejoinder was the same as before, whereupon he stated that nobody in the United States knew anything about the Philippine flora and that I had just as good a chance as any one. Perhaps flattered by the salary, which was large for a man of my training and experience, perhaps by the confidence implied by the offer, on the spur of the moment I accepted. This was on Monday afternoon, February 20, 1902, and in accepting I had to agree to be ready to sail from New York at 1 P.M. February 22 — a short time in which to arrange my affairs, pack and get the boat. As the night train from Washington was very badly delayed by a heavy sleet storm, it was nearly noon on the 22nd when it reached Jersey City, instead of 7 A.M. when it was due. I made the U. S. Army Transport "McClellan," however, at dock 10 on the East River before she proceeded out into the stream that afternoon. The next day we sailed for Manila via Suez and I was off on my long adventure; I, least of all, anticipated that for twenty-two years I would remain in the Philippines. Slightly over two months later, after stops at Gibraltar, Malta, Port Said, Colombo and Singapore, we reached Manila and landed in the midst of a very severe epidemic of Asiatic cholera. Here I had anticipated meeting my twin brother who had come out with his regiment in 1899; but I discovered shortly after landing, that he had sailed for San Francisco two weeks before I arrived and I was not to meet him again until 1915.

In Washington I had made only a fair start, but I was on my way. That my services were appreciated there by others perhaps more highly than I ranked them, may be evidenced by the fact that W. J. Spillman, who succeeded F. Lamson-Scribner when the latter resigned to accept the Philippine appointment, urged me to reconsider and remain in the Washington office with a very substantial increase in salary at the beginning of the next fiscal year — practically the equivalent financially of the position I had accepted in Manila. My response was to the effect that I had accepted the Manila position in good faith, and that while I appreciated his interest in my remaining in Washington, I did not feel justified in trading on the proposition. The die was cast and I was destined to remain for many years in the botanical field, my work in later years to be interrupted by unsought administrative duties.

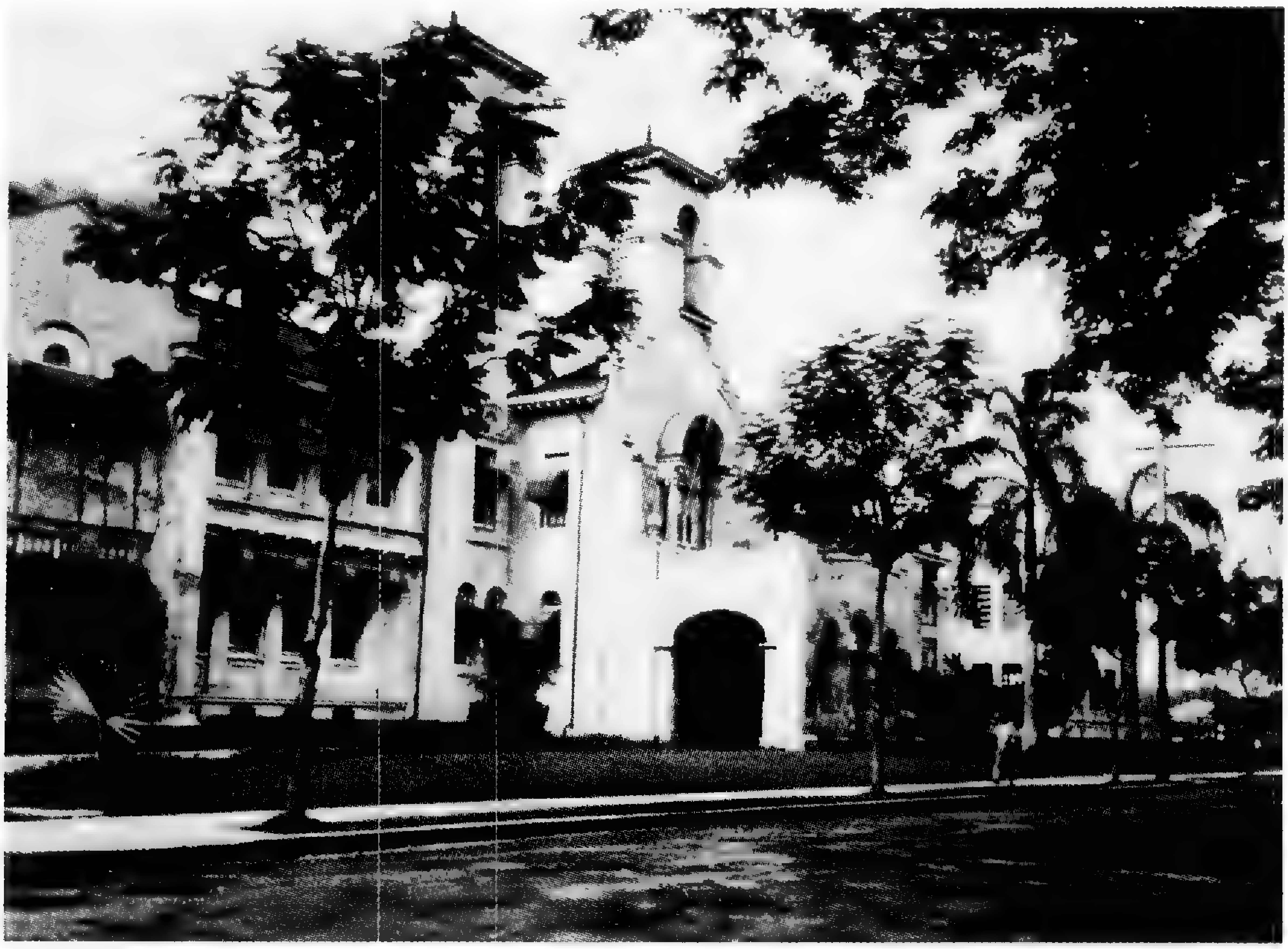
On landing in Manila it was found that a private dwelling at 155 Calle Nozaleda had been rented as headquarters for the newly arrived personnel of the Bureau of Agriculture. Here I reported for duty and commenced my work in a vacant building, without a chair or table, much less a botanical publication or a botanical specimen. This was indeed a discouraging outlook in the extreme! I soon learned that I was expected to devote my time to "practical" work but in my own mind decided that the thing to do was to build up the reference collections of botanical material and to acquire the necessary botanical literature. In surveying the field I found that the botanical collections assembled by Vidal from 1876 to 1888, together with the entire botanical library, had been destroyed by fire in the burning of the offices of the Inspección des Montes in 1897; that the small but important collection of botanical literature at the Jardín Botánico, then operated as a small city park, had disappeared in the unsettled period contingent on the American occupation of Manila. Some year later I examined these books which had come into the possession of a private citizen of Manila and it was interesting to note that in every single volume the fly-leaf had been removed. The duplicate set of Vidal's herbarium in the Museo Biblioteca had also disappeared, and not until some twenty years later did I have the privilege of examining this material, then in the possession of another family in Manila. The botanical material assembled by Fernández-Villar for the third edition of Blanco's *Flora de Filipinas*, stored at the Guadalupe Convent on the Pasig River above Manila, had been destroyed when this building was burned by the American troops in 1899. Truly a most discouraging outlook for the most enthusiastic botanist.

Some botanical material had been assembled in the reorganized Bureau of Forestry under the leadership of Captain George P. Ahern, but it was for the most part unnamed or only partly named. Some, but all too little, of the essential botanical literature had also been acquired by that Bureau. Undaunted by these unlooked for conditions I commenced my botanical field work by collecting representatives of all the weeds in the back yard of our "office building;" this was the beginning of the large and important collections that were to be assembled during the next two decades.

It was soon made evident that the position of botanist in the Bureau of Agriculture was not favored by Dean C. Worcester, Secretary of the Department, who correctly took the attitude that if scientific work was to prosper in the Philippines it must be centralized in one institution. The beginning of this centralization had been the establishment in 1901, of the Bureau of Government Laboratories that in 1906 was to become the Bureau of Science. As the Bureau of Forestry was actually in greater need of botanical work than the Bureau of Agriculture, I was therefore, a few months after my arrival, made botanist in that Bureau, dividing my time between the Bureau of Agriculture and the Bureau of Forestry, being still officed with the former Bureau. In January 1903 I was transferred with all botanical work and the meager equipment then available to the Bureau of Government Laboratories with offices in a ramshackle building on Calle Iris.

I started on my first trip about one month after my arrival in Manila. It was a long overland trip northward from Manila over the Caraballo Sur mountain to Nueva Vizcaya, with a side trip into the Ifugao country at Quiangan under military guard, thence to the Cagayan River at Echague, down the river to Aparri and thence back to Manila by steamer; this six weeks' trip through a most fascinating country was the first of very numerous journeys that were to take me to all parts of the extensive Archipelago in the next twenty-two years and to many of the remote and relatively inaccessible parts of it — not only once, but many times — to the Mountain Province of Luzon, to Palawan, to central Mindoro, to the Agusan River in Mindanao, to the northern, the southeastern and southwestern extremities of the Archipelago. During my first years in the Philippines I was to spend approximately one-half of my time in the field. It never lost its fascination, for I soon discovered that as far as the Philippine flora was concerned, exploration had been desultory; its little known wealth was only to be uncovered after years of arduous work in the field and in the office. During the twenty-two years that I remained in the Philippines I was privileged to see personally practically all parts of the Archipelago and few individuals in the Government service visited more parts of the islands that did I.

In September 1902 I was authorized to proceed to Buitenzorg, Java, taking with me a set of all the available botanical material for identification, for no trustworthy work could be done in Manila in the complete absence of authentically named material for purposes of comparison and with very little of the essential literature. At this time my only botanical library consisted of the few books that had been acquired by the Bureau of Forestry; in the Bureau of Agriculture my first allotment for the purchase of botanical literature was limited to $250. As the orders had to be placed in Europe one could not count on their being filled under a period of about six months. Two exceedingly profitable months were spent at the Botanical Garden, Buitenzorg, where ample collections of botanical material and ample library facilities were available. Here I named most of the specimens I had taken with me and acquired an excellent working knowledge of the essential literature appertaining to the botany of Malaysia, the latter being of infinite value to me in my later work in building up the botanical library in Manila.



The Bureau of Science in Manila, as it appeared in October, 1913. From a photograph by J. F. Rock.

Little progress was made in acquiring essential botanical literature in Manila until after my transfer to the Bureau of Government Laboratories in January 1903. An initial appropriation of $40,000 had been made to that Bureau to acquire books for its library and this was not entirely obligated at the time of my transfer. The result was that within two years I had access to a reasonably good reference library, which was expanded from year to year until, at the time of my departure from Manila many years later, it stood as one of the most complete collections of botanical literature in all of Asia and Malaysia. At times I regretted the large amount of time and effort that I had to devote to the building up of the reference library by selecting titles, securing quotations, etc. (for most of the publications required were out-of-print books that could be secured only through dealers in second-hand literature), but in retrospect it was time and effort well spent.

In 1903 the botanical staff was augmented by the appointment of Dr. E. B. Copeland, Dr. H. N. Whitford and Mr. A. D. E. Elmer; as a result the collections commenced to increase very rapidly, in fact, more rapidly than they could be properly handled. The efforts of the staff were augmented by the large collections secured by the various American foresters and Filipino rangers in the Bureau of Forestry and later through the employment of Filipino collectors, several of whom, when once trained in methods, developed into remarkably efficient field men. A number of Europeans and Americans during the next two decades became interested in field work in botany and from this source still other very valuable collections were received.

Realizing that no thorough work on the Philippine flora could be done on the basis of Philippine material alone, exchange relations were soon arranged with botanical institutions in Japan, Formosa, China, India, Singapore, Java and Australia, with the more important botanical institutions in Europe and, to a lesser degree, with American institutions; the objective was the building up of the reference collections from those regions surrounding the Philippines. Later through the personnel of the Bureau of Science, its own staff members prosecuted extensive and important field work in southeastern China, Indo-China, Borneo, and the Mariannas Islands.

The result of these efforts was that at the close of my Philippine career in 1922, a reference collection of approximately 275,000 mounted specimens was available in Manila, of which about two-thirds were Philippine and one-third were from botanically related regions; during this time probably in excess of 500,000 duplicates were sent in exchange to over sixty different individuals and institutions in America, Asia, Malaysia, Australia and Europe. Thus at the close of my Philippine career the Bureau of Science herbarium contained representatives of practically all species that were known from the Archipelago in the form of types (of which there were several thousand), isotypes, fragments of types, material critically compared with originals, photographs of types, and sketches. Its general library was admittedly one of the most important single collections of scientific literature in all of Asia and Malaysia, its botanical resources ranking with those of the few older botanical institutions in the area mentioned:

Calcutta, Buitenzorg and Tokyo. Its herbarium ranked next to those of Calcutta and Buitenzorg in size and importance.

My ambition on reaching Manila was the preparation and publication of a general flora of the Philippines in which should be described all the plants in the higher groups known to occur in the Archipelago. The magnitude of this task may be comprehended when one compares the flora of a tropical region with that of similar areas in the temperate zone; Great Britain and Ireland have probably less than 2500 species; New Zealand less than 2000 species; the north-eastern United States about 8000 species, whereas the Philippines contain certainly in excess of 10,000 species. This early ambition was not consummated for several reasons: The vast amount of effort necessary to assemble and digest the reference material, and the absolutely essential literature, even to make merely a preliminary survey of the field; mastering the problems of classification and nomenclature in the major groups; the preparation of descriptions and critical notes on several thousand new species; the determination of the geographic distribution of the very numerous species, both Philippine and extra-Philippine, and determining their relationships and inter-relationships; the burden of teaching that was imposed on me for a period of six years from 1912-1918, which otherwise should have been the most productive ones of my Philippine career in reference to output in systematic botany; and, when once relieved of this duty, my unlooked-for and personally undesired appointment to a very exacting executive position as Director of the Bureau of Science, 1919-1923.

In connection with the very numerous problems appertaining to the elucidation of the Philippine flora, the services of specialists were enlisted whenever possible, duplicate material being supplied freely to any botanist who was in a position to make determinations in any group. My dealings here were almost entirely with European botanists; few Americans had any interest in the Philippine flora, being too busily engaged on their own local problems. Some assistance was received from such Americans as W. A. Murrill of New York, and C. G. Lloyd of Cincinnati, on fungi; and all of the work on Philippine orchids, the largest and most difficult single family of flowering plants, was done by Professor Oakes Ames of Boston. Thus all the work on the fungi, algae, mosses, lichens and hepatics, some of the work on ferns and fern allies, and many of the determinations of the Pandanaceae, Palmae, Cyperaceae, Gramineae, Sapindaceae, Acanthaceae, and in various genera in other families, were done by European specialists.

In 1900 there were definitely known from the Philippines less than 2500 different species of plants in all groups; but many botanists, not familiar with the situation, considered that the flora was fairly well known. In addition there were several hundred species that had been described by Blanco and his successors in the Phillipines but were still inadequately known; no specimens representing them were extant, and they appeared in the literature as imperfectly known forms. In 1923 there were known from the Philippines approximately 8500 species of flowering plants, about 1000 species of ferns and fern allies, and about 5000 species of cellular cryptogams; approximately 14,000 different species in all. In addition the exact status of most of the inadequately known species of Blanco and his contemporaries had been determined. A very high percentage of the additions to the known flora in all groups was in the form of previously unknown and undescribed species.

My first work for publication was based on the work that I did in Java in 1902, this being a systematic enumeration of the plants in the collections assembled in the Bureau of Forestry previous to my arrival in Manila. This was followed by a general survey of the botanical work that had been accomplished on the Philippine flora covering the period 1601 to 1900; and by special publications in the nature of compilations on the status of Blanco's species and a compiled dictionary of native plant names of the Philippines with their Latin equivalents. In 1904 the extensive series of papers on "New and Noteworthy Philippine Plants" was commenced, in which several thousand new species were to be described before the series was brought to a close nearly twenty years later.

In 1912 I was appointed Associate Professor of Botany in the University of the Philippines and head of the department on a half-time basis and without additional compensation. This position was held until the close of 1918 and very seriously interfered with my productive work in systematic botany. During the academic year my teaching duties never occupied less than eighteen hours per week and during certain semesters it was thirty-six hours per week; certainly a heavy schedule for a half-time appointment! In 1919, several months after the beginning of the fiscal and calendar year, I received a letter from the auditor directing me to refund to the University of the Philippines several hundred dollars; this was because of a rider in the appropriation bill, which provided that no half-time employee of the University of the Philippines could receive in excess of a certain specified salary, and mine was in excess of the sum indicated. This "legislation" was directed against certain part-time employees of the Medical School, who were non-grata as far as the Filipinos were concerned, although there seemed to be no objections to me or to the work I was doing. I immediately wrote out a check covering the refund and transmitted it, together with my resignation from the Philippine service, asking for commutation of leave and transportation to the United States on the first available boat. In the meantime legislative provision had been made for certain types of employees on what was known as a special contract basis, providing for salaries of technical men in excess of those authorized in the budget. Within a week from the time that my resignation was presented I had been granted a special contract in the Bureau of Science, free from all duties in the University and at a substantial increase in salary, my full time being for the first time in many years available for what I most desired to do. This was just what I had long hoped for but the consummation of my desires was destined to be short-lived.

A few weeks after this took place, I received a call from the Governor-General's office, asking that I present myself there at a stated time. At this time Governor-General Harrison abruptly informed me that the Director of the Bureau of Science was to be retired at the end of June and that I was to be made Director of the Bureau in his stead. This was a possibility that had never occurred to me, as I was not interested in administrative work. I thanked the Governor-General for the implied expression of confidence in me and stated that I was not interested in the position; that I had at last attained a position that was entirely satisfactory to me from all standpoints and that I desired no change and did not even consider myself a candidate for the position of Director of the Bureau of Science. His response was that there was nobody else available for the position and that I would have to accept the appointment. I had occupied the position as Acting Director for a period of about six months the year before, when the Director was on leave, and therefore knew something regarding the responsibilities of the position. On July 1, I was made Acting Director of the Bureau of Science and a few months later was appointed Director. Thus when I had at last acquired a position entirely to my own liking, with my full time to do what I most desired to do, I was placed in a peculiarly exacting administrative position against my own desires, and so commenced my administrative career. And I followed a director whose policies had to a considerable degree failed, and at a time when the *esprit de corps* of the staff was at rather low ebb.

I was, of course, familiar in a general way with the policies and problems of the Bureau of Science, having served as a Division Chief many years in the organization. The following four years were to be not only deeply interesting, but served also to give me a most liberal education in reference to problems outside of my chosen field. I accepted the position as Director with diffidence and with reluctance but it was a job that had to be done.

The Bureau of Science, from its small beginning as the Bureau of Government Laboratories in 1901, steadily developed in importance and in prestige until about 1914 when, because of Government policies then developed, it commenced to decline. Its general field was medical research; public health laboratory work; the manufacture of all types of serums and vaccines to serve the entire population of the Philippines of approximately 11,000,000 people; organic and inorganic chemistry, including routine analysis, commercial work and research; the standardization of weights and measures; testing of all types of structural materials; the preparation and administration of the Pasteur anti-rabies treatment; geology and mining, fisheries, zoology, ornithology, entomology, botany, plant pathology, plant physiology and anthropology. In it was centered most of the scientific work of the Philippine Government and in it was maintained the great scientific library of the Philippines, probably the greatest collection of literature of this kind in any single institution in all of Asia and Malaysia.

One of my first tasks as Director of the Bureau was the amplification of the facilities of the Serum Laboratory, so that all of the standard vaccines and serums could be manufactured in sufficient quantities to meet any emergency. The basis for this expansion had been laid in 1918 when I was Acting Director of the Bureau, the facilities being then totally inadequate to meet the emergency of a very bad outbreak of smallpox. On the basis of facts presented by me, funds had been granted for the construction of additional buildings, but with the provision that immediate steps should be taken to move the activities of the Serum Laboratory to some point outside of Manila where there was ample room for expansion. This was accomplished by the establishment of an entirely new unit at Alabang, 25 kilometers south of Manila. Another task that immediately faced me was the drafting of regulations governing the leasing of Government land to oil companies interested in "wildcatting" for oil. These items are cited merely as illustrations of the diverse fields to which I, as Director, had to devote attention. The enterprising reporter who interviewed me on my landing in Honolulu in 1920, expressed the activities of the Bureau of Science thus: "The Director of the Bureau of Science does everything from telling the public what to do for a dog bite to where to drill for oil!"

The earlier publications of the Bureau of Government Laboratories had been in the form of free bulletins, an unsatisfactory and wasteful system. As early as 1904 I had discussed this matter with Dr. Freer, Director of the Bureau, urging him to establish a serial form of publication on a strictly subscription and exchange basis. The suggestion took form in 1906 in the establishment of the Philippine Journal of Science, a forerunner of its kind in Government publications. That the periodical was not established earlier was probably due to the feeling that sufficient material would not be forthcoming for publication to maintain a Journal of high standards. However, in 1905 I had attained so firm a grip on the botanical situation, that I assured Dr. Freer that in botany alone sufficient material would be forthcoming for publication to fill a reasonably sized journal in any one year. The year that the journal was established, a supplement of 409 pages was added for taxonomic papers alone. The Botanical Section, which was established in 1907, attained a maximum size of 747 pages in 1908. The Botanical Section of the Philippine Journal of Science was maintained until 1918, when the sections were abandoned and beginning in 1919 all the papers were printed in a single series. During all the

Elmer Drew Merrill, from a photograph taken in Manila in 1914.

years that the Botanical Section was maintained, I did all of the editorial work and personally typed nearly all of the manuscripts, not only my own contributions but the majority of the other papers that appeared in it.

In my early years of work in Manila I soon came to the realization that extra-Philippine material was an absolute essential to good work on the Philippine flora, and while numerous exchanges were arranged, it soon became evident that the material most desired could not be secured from this source alone. Gradually the idea of extra-Philippine exploration developed and between 1910 and 1920 important collections were made by members of the staff in Indo-China, China, Guam, Borneo and Amboina.

The development of this idea came gradually, partly because of the urgent need of comparative material from adjacent regions, partly because some of the early species that were based on pre-Linnean literature could not be accurately interpreted in the entire absence of material from the historical localities in which the plants actually grew. Gradually it developed in my consciousness that Blanco's numerous inadequately described species could, for the most part, be accurately interpreted from general collections made in the regions that were familiar to him and from which he secured his actual specimens on which his descriptions were based; it should be remembered that Blanco made no herbarium and accordingly there existed no specimens representing the numerous species he described. Another of our great problems was the accurate interpretation of the numerous species actually typified by the illustrations and generalized descriptions in Rumphius' *Herbarium Amboinense*. We believed that many of these could be definitely placed, on the basis of an actual exploration of Amboina with special reference to localities cited by Rumphius, native names and economic uses of plants. This idea took form in 1911, when I secured authorization from the Governor-General to send Dr. C. B. Robinson to Amboina with the idea that he would remain in the field for about six months and on his return would prepare a critical publication dealing with the Rumphian species. On the basis of data supplied by him after reaching Amboina, he was later authorized to remain in the field for an entire year but, unfortunately, was murdered by the natives in Amboina in December 1912. His collections and notes were sent to Manila and the task of preparing and publishing a critical consideration of the Herbarium Amboinense devolved on me; this was consummated in 1917 in the actual publication of the volume by the Bureau of Science.[1]

In the meantime I had been working industriously on the problems of Blanco, assembling the material and critically studying his descriptions and other data. My idea was the ultimate publication of a

[1]Merrill, E. D. An interpretation of Rumphius's Herbarium Amboinense. Bur. Sci. Publ. 9:1-595, map. 1917.

critical volume on Blanco's species in the light of my knowledge of them, to be illustrated by sets of named specimens that were to be distributed to the larger botanical institutions of the world. During a period of seven or eight years much time was devoted to this problem and material for sixteen sets of duplicates was finally assembled, the data were organized in form for publication and the volume was issued in 1918.[2]

This work on the species of Rumphius and of Blanco was in the nature of pioneering, for curiously no botanist had hitherto thought of the idea of the actual exploration of classical localities, Amboina and those parts of the Philippines whence Blanco secured his material, to elucidate their inadequately described species; or if any one had thought of this simple expedient, he had been unable to consummate it.

My first attempt at the publication of individual volumes had been in the preparation and publication of the "Flora of Manila," a volume of 490 pages, issued by the Bureau of Science in 1912, and one of the most generally useful publications ever issued by that Bureau.

Outside of the Philippine field I had prepared and published in the Philippine Journal of Science, in 1914, a systematic enumeration of the plants of Guam, and now my attention was directed to another field — Borneo. I had received certain collections of Bornean plants for identification but soon found that the literature was very widely scattered. Accordingly I commenced the preparation of a card catalogue of all references to the Bornean flora by species; this resulted eventually in the preparation and publication first, of a Bibliography of Bornean Botany, containing 479 titles and, secondly, in my Bibliographic Enumeration of Bornean Plants, a volume of 637 pages printed by the Royal Asiatic Society, Straits Branch, Singapore, in 1921.

In the last seven or eight years of my Philippine career, I also became interested in the flora of southeastern China, making two vacation trips of a month each to Canton, Kwangtung Province, to assist in training faculty members of the Canton Christian College in field methods in 1916 and 1917; and one in 1920 to Nanking for similar work in connection with Nanking University. On these rather short expeditions considerable collecting was accomplished and I gained a knowledge of field conditions in eastern and southern China that was to be of future value to me in handling very extensive collections of botanical material from that country.

At the Fifth International Botanical Congress held at Cambridge, England, Professor W. Y. Chun of Sunyatsen University, Canton, credited me, through these visits to Canton and Nanking, with the

[2]Merrill, E. D. Species Blancoanae. A critical revision of the Philippine species of plants described by Blanco and by Llanos. Bur. Sci. Publ. 12:1-423. 1918.

establishment of botanical research in Chinese institutions. Previous to these visits all work on the flora of China had been done by Europeans on the basis of material assembled in various European and American institutions, but between 1920 and 1930 actual botanical exploration and research had been initiated in purely Chinese institutions in Peking, Nanking, Amoy and Canton, in addition to the continuance of the work initiated somewhat earlier in Lingnan University (Canton Christian College) and Nanking University.

My appointment as Director of the Bureau of Science in 1919 clearly indicated to me that I could scarcely hope to consummate my plan of preparing and publishing a general descriptive flora of the Philippines, as I soon realized that most of my botanical work would of necessity have to be done outside of office hours. I accordingly compromised with myself and shortly after assuming the Directorship of the Bureau of Science, commenced the actual preparation of my "Enumeration of Philippine Flowering Plants,"[3] which was issued in four volumes between 1922 and 1926, a total of 2143 pages. In this an attempt was made to account for all binomials accredited to the Philippine flora, adjust the synonymy, cite all important literature references, illustrative collections when desirable, determine the Philippine and extra-Philippine distribution of each species and record native names. The general indices alone contain in excess of 21,000 binomials and about 12,000 native plant names. This was the most extensive and in many respects the most difficult publication ever undertaken by me. The assembled papers and reprints published by me between 1899 and 1930 form a series of twenty-one volumes, averaging about 500 pages to the volume, practically all of these papers being on botanical subjects.

During the entire period from 1902 to 1919 my major interests were strictly in the field of systematic botany and as far as possible everything else was subordinated to this end. In the entire period of my Philippine experience I was home on leave only three times, in 1907-08, 1914-15, and 1920-21. I was in Java for about two months in 1902 and again for a month in 1914, on the occasion of the murder of my colleague, C. B. Robinson, in Amboina, his equipment and collections having been sent to Buitenzorg. In 1905 I took a month's vacation and made a pleasure trip in December up the China coast to Hongkong, Canton and Shanghai, and in 1916, 1917 and 1920 took advantage of my annual month's vacation by making botanical trips in Kwangtung, Anhwei and Chekiang Provinces, China. Other than for these trips I took no vacations for the entire period that I was in the Philippines.

[3]Merrill, E. D. An enumeration of Philippine flowering plants. 1. (1922-25) vii, 1-463; 2. (1923) 1-530; 3. (1923) 1-628; 4. (1926) 1-515.

In May 1907, I was married in Manila to Mary Augusta Sperry of Illinois and the day following our marriage we sailed from Manila for the United States, via China and Japan, spending some months in Washington D. C., with a short trip to New England, leaving New York in October on our return to Manila via Suez. About two months were spent in London where I devoted my entire time to looking up types of Philippine species at Kew and at the British Museum, this being followed by a day or two at Leiden for similar purposes, about two weeks in Berlin, a week in Geneva and a week in Florence. In April 1908, we were back in Manila where I took up my duties in the Bureau of Science.

The children of this marriage were Lynne, born in Manila on February 12, 1909; Dudley Sperry, born in Manila on September 21, 1912; Wilmans Noyes, born in Manila on December 21, 1914 (died February 3, 1915); and Ann, born in Washington, D. C. on August 8, 1916, whom I was not to see until she was nearly five years old. In 1914 we came to the conclusion that Manila was not the proper place in which to bring up a family, so when I returned to Manila in 1915, my wife and children were left behind at Washington, D. C. I was not to be with the family again for the next eight years except for the period of my accrued leave in 1920-21.

In 1920 I was authorized to represent the Bureau of Science at the first Pan-Pacific Science Congress at Honolulu; at the end of its sessions I proceeded to California where my family was then in residence at Long Beach. At the expiration of my leave I again returned to Manila alone and did not expect to see my family again for another five years.

In 1923 I was delegated to represent the Philippine Government at the second Pan-Pacific Science Congress held at Sydney and Melbourne, Australia. On my return to Manila in September 1923, I found awaiting me a letter from California that changed all my plans and which soon resulted in my leaving the Philippines permanently. This letter was from President W. W. Campbell, briefly outlining the situation appertaining to the Deanship of the College of Agriculture, University of California and inquiring if I might be interested in a possible appointment. After considering the situation and consulting with several residents of Manila, who were graduates of the University of California, I cabled that I would be interested but that I would probably not be able to leave Manila before the end of the year because of my recent absence and the approaching end of the fiscal year with its contingent reports, budget hearings, etc. In spite of the attractions that the Philippines held for me as a field of work, I had the uneasy feeling, common to all Americans in the service, that there was no future, even as there was no assured tenure of office, and no retirement pension. I was then on a special contract, good for one year only, which might be cancelled at the end of any year; moreover, there was the family to consider. In my own mind there is no doubt that, if I had had no family dependent upon me, I would have elected to remain in the Philippines in spite of the flattering opportunity in California.

Shortly after my cable was dispatched to the effect that I was interested, I received one from President Campbell, requesting that I proceed to California as soon as possible for an interview, with the expressed hope that if the appointment resulted it would not be necessary for me to return to Manila. A week later, and after a most hectic week, history repeated itself and I sailed from Manila with a feeling of extreme regret — never to return, but this time with a week instead of two days in which to prepare for the trip.

It was not easy to leave the scene of so many years of work, the city in which I made such reputation as I bear as a botanist. The regret was deepened by the feeling that I was deserting the ship at a critical time and that Governor-General Wood needed such support as I was able to give him. During the past three years I had seen much of him, officially and privately, and was frequently consulted on matters that really did not appertain to the field of the Bureau of Science because the Governor-General felt that he could not get unbiased views from some of his subordinates. On a number of trips on the Governor-General's yacht, the "Apo," ranging from a week to six weeks duration, I had become rather intimately acquainted with him; but even when he intimated to me that I might be advanced to the Presidency of the University of the Philippines, I did not feel justified in signifying any interest in it because of the peculiarly complicated political conditions that went with it.

That I left Manila with the goodwill of all my colleagues in the Bureau of Science, American and Filipino, and with the goodwill of the general public of Manila and of the Philippines, is probably due largely to the fact that during all my years in the Islands, I industriously stuck to my last and allowed no outside interests to draw me away from the work I had set myself to do. As editorially expressed in the leading native paper Vanguardia, I was to the Filipinos "casi mas Filipino que Americano." As Director of the Bureau of Science, where at times I was obliged to take rather strict administrative action, I never permitted myself to be influenced by racial prejudices but attempted to deal fairly and squarely with both Americans and Filipinos alike.

During the many years that I served in the Philippines it had been my great privilege to visit nearly every large island, nearly every province and many of the isolated smaller islands; in fact, few residents of the Archipelago had the opportunity of seeing so much of the group as I did in connection with my botanical exploration work. As noted above, these journeys took me to the most isolated and out-of-the-way parts of the Archipelago and many of these trips were arduous in the extreme; on two occasions I walked approximately thirty-six miles in a single day. Yet on all these trips I had no really serious adventures. True, I had my "escapes" in fording swollen streams and in landing through the surf on exposed coasts; I accidentally met a much wanted *ladrón* in hiding in a very remote forested region on one trip, but this gentleman, whom the authorities desired very much to see, was apparently more disconcerted than I was for he almost immediately abandoned his camp after our unexpected encounter. I did, in the Mountain Province, take undue risks perhaps in remaining over night in remote hamlets that bore ill reputations in the head-hunting country; I botanized on Bud Dajo in Jolo only a few months after this Moro stronghold had been reduced by American troops and had the gruesome experience of collecting plants in the partly filled trenches in close proximity to very recent human bones; I was marooned on Culion in the latter part of 1902 on very short rations; and again in the ascent of Mount Halcon in north-central Mindoro in 1906, marooned by heavy and continuous rains over a period of two weeks, which rendered the streams unfordable, had the experience of being obligated to live — or rather half starve — for a week on what food we could obtain in the rain soaked forest (and a man can come nearer to starving to death in a primary tropical forest than in almost any other part of the world). But these minor adventures were all a part of the days work. I had no real "thriller" until my second trip to Kwangtung Province in China in 1917.[4]

I arrived in San Francisco at the end of November 1923, met President Campbell the day I arrived, and the following day met the Committee on Agriculture of the Board of Regents at a luncheon at the Bohemian Club, San Francisco, for a general discussion of the situation. The next day I proceeded to Los Angeles to join my family. A few days before Christmas I was asked to come to Berkeley for another interview, whereupon President Campbell informed me that I would be recommended for appointment as Dean of Agriculture at the January meeting of the Board of Regents and urged me to come to Berkeley as soon as possible, in order that I might familiarize myself with the situation in some degree before actually taking office.

This was a most radical step on my part. I had had no experience with academic or research problems in Agriculture; knew nothing of the special problems of the College of Agriculture and still less regarding the problems of Californian agriculture. In my new position I soon learned many things that I had not even remotely surmised. Many times during my first year in Berkeley I gazed out over the Golden Gate, and fervently wished that I were on an outward-bound steamer en route to the distant green pastures of the Orient where,

[4] An account of this trip will appear shortly in Asa Gray Bulletin.

cp

Office of the Governor-General
of the Philippine Islands

DISPATCH BOAT APO, April 25, 1924.

Dear Dr. Merrill:

Upon your resignation as Director of the Bureau of Science and your withdrawal from the public service of the Philippine Government, I wish to commend you in the strongest terms and thank you for the work which you have done for the Islands during your long period of service here.

When I was here as military commander of the Philippines Division from 1905 to 1908 you were keen to participate, and did participate, in various difficult reconnoitering expeditions, involving much hard work and exposure; notably the ascent of some of our highest and most difficult mountains -- a work in which you were associated with the late Major Mearns of the Medical Corps of the Army.

You have done first class work in everything you have attempted and have gained the confidence, respect and support of those with whom you have come in contact. You have done much to build up the insular service and have added a vast amount of valuable information to our knowledge of the flora and fauna of the Islands.

Your conduct of the Bureau of Science served as an inspiration to all who worked under you and did much to re-establish this institution in public confidence.

Your resignation results in a great loss to the Philippine public service -- one which will be keenly felt and creates a vacancy which will be extremely difficult to fill. You will be missed both officially and personally. I feel that the University of California is to be congratulated on securing your services.

With every best wish,

Sincerely yours,

Leonard Wood

(Governor-General)

from long residence, I had a reasonable familiarity with the problems that came up from day to day. It was rather appalling to face the problems of administration in such a large institution as the College of Agriculture, with a faculty of approximately three-hundred fifty individuals, and an annual budget of $1,800,000, especially when one knew personally only one or two members of the entire staff.

In California, as in Manila, it was my fate to succeed an administrator whose policies, to a considerable degree, had failed. Reorganization and the rebuilding of the *esprit de corps* of the staff was essential; but what form should it take? How far could or should it go? What could be done on the basis of the existing staff, many of whom had permanent tenure of office? There were internal and external dissensions; groups in favor of this or in favor of that; a group that was bitterly opposed to the previous administration and another that was just as strong in its support; there had been a long continued and bitter discussion in the Academic Senate of the policies and standards of the College of Agriculture in reference to both instruction and research. The previous ten years had seen a tremendous expansion of the institution in its staff and in its financial support; it was distinctly overstaffed in relation to its material equipment; the problem of the proposed separation of the College of Agriculture entirely from the University of California and the centralization of all its work at Davis under its own board of regents, was by no means a dead issue; how to meet the issue of the insistent demands for the establishment of another branch of the College of Agriculture somewhere in Southern California? As it stood in 1923 the College of Agriculture, although having its headquarters on the campus of the University of California at Berkeley, with a Branch of the College of Agriculture at the University Farm, Davis, and the important Citrus Experiment Station at Riverside in Southern California, was not really an integral part of the University of California, but an institution apart, with strong tendencies to take its staff more and more to the University Farm at Davis. Was it to be in the future an entirely separate institution at Davis, or an integral part of the University at Berkeley? Is it any wonder that the *esprit de corps* of the staff was at low ebb?

In July 1924 a second step was consummated and I was made Director of the Agricultural Experiment Station, in addition to my duties as Dean of the College of Agriculture, which added to my problems but which also, in a way, made the ultimate solution of some of them distinctly easier. One policy was determined upon at the very beginning and that was, that such changes as manifestly must be made, would be made slowly and only after careful consideration of all factors as far as these could be foreseen and evaluated.

From the very first, the policy that the College of Agriculture was and should continue to be an integral part of the University was stressed. Ultimately to raise the standard of both instruction and research, all junior members of the staff were urged and encouraged to undertake graduate work for advanced degrees. This was directly opposed to the policy of my predecessor who apparently had been of the opinion that advanced training was not necessary in the agricultural field, and who did not permit junior staff members to take work for the advanced degrees until the last year of his incumbency in office, although general University regulations permitted all full time junior staff members to take a certain number of credits each semester.

Gradually certain Divisions were eliminated, the work being combined with other existing units, or new more comprehensive units were established, such as the Division of Agricultural Economics. Outlying units, such as the University Farm and the Citrus Experiment Station, were made as autonomous as possible. Promotions were made strictly on merit; fundamental research was stressed; new appointments were predicated on fundamental training with the Ph.D. or its equivalent as a basic requirement in most fields; in research the fundamental aspects were stressed and long term projects were favored; and, finally, the entire curriculum of the College of Agriculture was revised; numerous strictly informational courses were eliminated, and those that more or less duplicated others were abandoned; instruction in all divisions was built squarely on a mastery of the underlying basic sciences, and upper division work in agriculture was placed on the basis of a continuation of these sciences. The aim was a University education on the basis of Agriculture, opposed to vocational instruction in agriculture. No single curriculum would suffice to meet this situation and, accordingly, a half dozen or so professional curricula were set up and outlined. These changes made instruction distinctly more difficult for the staff and the subjects taught distinctly more difficult to the students, but a few years' trial clearly indicated that the changes were fully justified. These changes were made in the face of a radically decreased enrolment in agricultural students, and I have no doubt that they were more instrumental in checking the downward trend in enrolment and causing it to increase again, than any other single factor within the control of the faculty. There are evidences that other colleges of agriculture are beginning to think in like terms.

In connection with the advancement of requirements in standards of teaching, the Experiment Station staff was in part segregated as a distinct unit. The criterion was the ability of the man as a teacher or as a research worker, or both; in some cases teaching loads were increased, in others they were eliminated entirely, thus allowing certain individuals to devote full time to research; titles, salaries, sabbatical leave and retirement were made equivalent for both groups, with a salary differential in favor of the employees on an eleven months' basis as contrasted to strictly academic men on a nine months' basis.

In 1925 I established the technical periodical "Hilgardia" (a Journal of Agricultural Science) as an official publication of the Experiment Station. This was in it fourth volume at the time I left Berkeley. It was the first serial of its kind established by any Agricultural Experiment Station, that is, a publication with a short one-word title, the volumes with continuous pagination. Up to this time Experiment Stations generally had not advanced beyond the general titles of Bulletins, Circulars, Leaflets, Technical Papers, and the like, each separately paged. It was felt that the Journal form was more dignified for the type of data published therein, than individual bulletins or circulars, and there was besides the great desideratum of brevity in the title for purposes of citation. It pleased me also to establish in this title a continuing memorial to one of my predecessors, the outstanding individual who pioneered agricultural instruction and research in California, Dr. E. W. Hilgard, first Dean and Director of Agriculture at the University of California and one of the outstanding leaders in agricultural research in his generation.

During the six years that I served as Dean of Agriculture at the University of California, I devoted all my spare time to actual work in systematic botany and in building up the oriental reference herbarium of the University. This work was all done outside of office hours and some idea of its extent may be gained by the statement that in these exceedingly busy six years I added in excess of 110,000 mounted specimens to the University herbarium; in this time also I prepared and published one volume of 316 pages on the flora of Borneo and numerous shorter papers on the plants of China, Borneo and the Philippines. This work in systematic botany was indeed my "safety valve" for, once in the herbarium, whether early in the morning before my own office opened, at noon, after office hours, or on Sundays or holidays, I immediately forgot my administrative problems, and during these many hours devoted to botany, became merely a botanist interested in botanical matters only. At such times I never concerned myself with the numerous and pressing problems of the Dean of Agriculture.

For many years I continued to work in my chosen field without even thinking of recognition by others. I always managed to get back to botany, no matter what other duties were imposed upon me and the reason for this was that my primary interests were in my chosen field and my often self-imposed duties in it were a pleasure to me; it was not a task that must be done, but rather a task I preferred to do over and above all else. It was sufficient satisfaction to me personally to do the best I could with what I had to work with and under the environmental conditions in which I was placed. I was selected for the Directorship of the Bureau of Science with not the slightest intimation in advance that this was to be, and my being selected to fill the exacting position of Dean of Agriculture at the University of California came to me as a complete surprise. Each time, probably underrating my own ability and accomplishments, I had a feeling of mild surprise that I, rather than somebody else, should be selected.

In 1926 a movement was initiated to establish a Botanical Garden in Los Angeles and I was asked to become a member of the Garden Foundation, the holding corporation. The plan involved the purchase, at a nominal valuation, of a large tract of some 4500 acres in the Mandeville Canyon, Santa Monica Mountains, this to be financed on a bond issue. About 800 acres in the center of the tract was to be retained for development as a botanical garden, this to be financed and endowed from the sale of the surrounding acreage for residential purposes. All profits from the transaction were to accrue to the Botanical Garden. The possibilities of the establishment and endowment of a large botanical garden under most advantageous climatic conditions greatly intrigued me, although from the beginning it was realized that the plans might fail. I was strongly urged to accept the directorship of the embryonic institution and finally accepted on the basis of a part time leave from the University of California. For one year, 1927-1928, I held two exacting positions, Dean of Agriculture at the University of California in Berkeley, and Director of the California Botanical Garden in Los Angeles. As a part of each week had to be spent in Berkeley and a part in Los Angeles, these cities separated by a distance of some 400 miles, I became for the year a long distance commuter, making the trip back and forth once each week during the entire period. There are many more pleasant ways of spending two nights of each week than on Pullman sleepers! When it became evident that the Los Angeles project probably could not be consummated on the basis of the original plans, I still continued my connection with it until my removal from California at the close of 1929, rendering volunteer services and making the necessary trips to Los Angeles at intervals when my services were needed there.

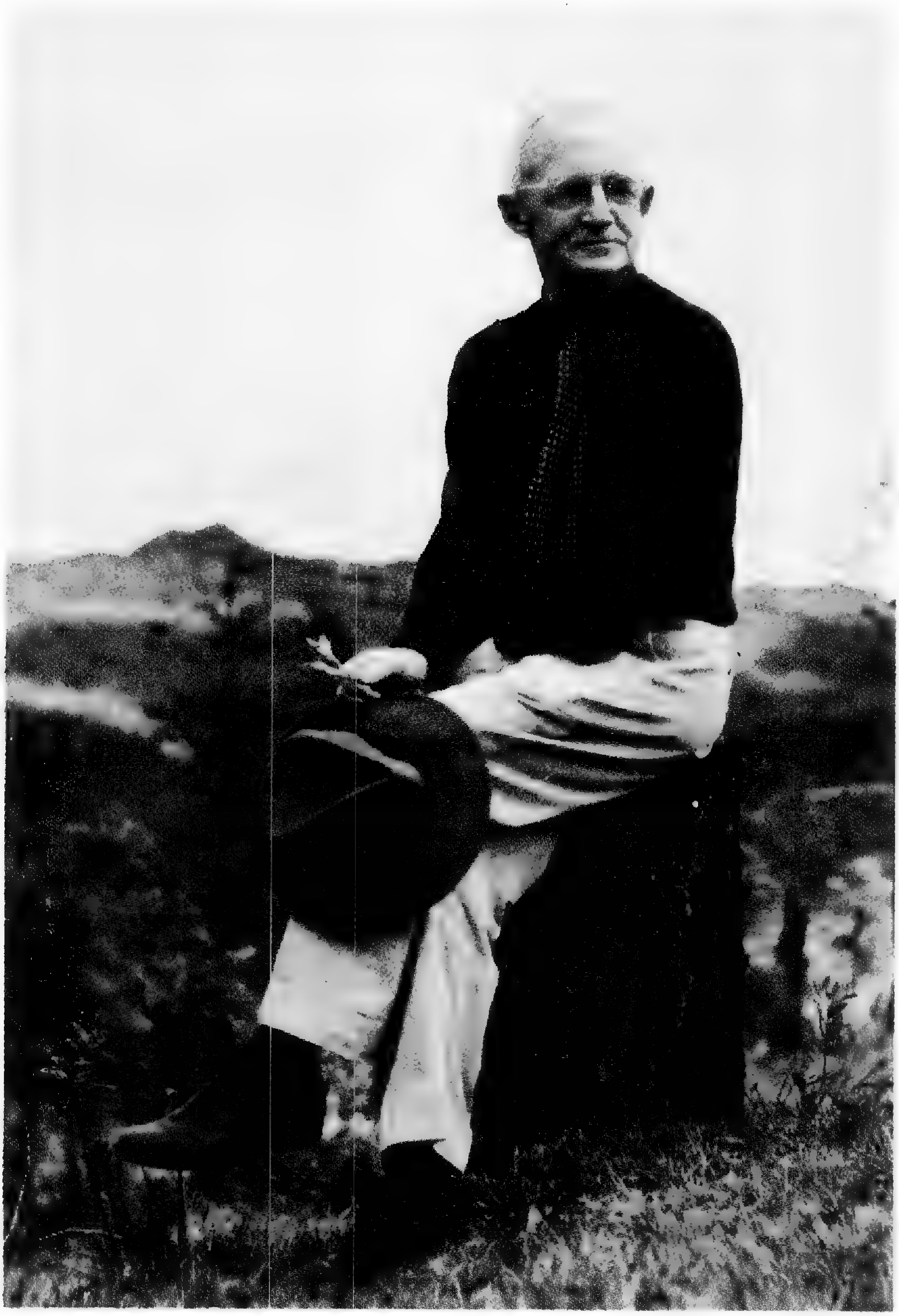
In accepting appointment at the University of California in 1924, I established my home in Berkeley with the conviction that this would be permanent. However, this was not to be, as some two years before I actually accepted appointment as Director-in-Chief of the New York Botanical Garden, I was tentatively approached with the view to finding out whether or not I would be interested in the appointment, if and when Dr. Britton retired. In June 1929 the matter came up in definite form and although no final action was expected before September, the Board of Managers of the New York Botanical Garden at a special meeting in July, held to accept Dr. Britton's resignation, appointed me as his successor, subject to my acceptance. My first intimation of it was the reading of an Associated Press dispatch in the San Francisco *Chronicle* on the day following the meeting. A hurried trip to New York followed, with the result that shortly after my return to California I officially accepted the appointment and with very great regret placed my resignation as Dean of Agriculture in the University of California, to be effective at the close of December 1929.

I had met with a certain degree of success in my administrative work in California and had the confidence of the agricultural community, the leaders in agriculture, the staff of the College of Agriculture and of the Administration and staff of the University. I had been brought to California to consummate certain definite things and these had, to a high degree, been accomplished. The perplexing problems of the institution had to a large degree been settled. Policies had been established which met with the very general support of the industry and of the institution. The staff had been increased; the material equipment very greatly enlarged; the annual budget augmented. In the period of six years the annual budget had been increased from about $1,800,000 to $2,500,000. Important new buildings had been provided for at the University farm, on the Berkeley Campus and at Riverside; in six years, funds made available for permanent improvements, including authorizations secured in 1929, approximated $1,500,000 — largely over and above the annual maintenance budget. During this period one large endowment came to the College of Agriculture, namely $1,500,000 for the establishment of the Giannini Foundation for Agricultural Economics. Why should one elect to leave California where one had met with a measurable degree of success, to take his chances, after middle life, in New York and in an institution that was more or less under fire? The reasons were varied.

First and foremost I felt that the policies established during the six years that I had been at the University of California would be continued under my successor, C. B. Hutchinson, and that there would be no retrograde in the standards of instruction and of research. Dean Hutchinson had been associated with me as Director at the University Farm during the first year of my deanship and the year before I left we had brought him back to the institution as Director of the Giannini Foundation for Agricultural Economics, soon after the endowment that made this Foundation possible was received. I felt that after all, agriculture was not my own field and that if it were my fate to continue in administrative work, I would personally prefer to do such work in the botanical field; it was assumed that in New York I might have more time available for botanical work. It was felt that there was a chance to make the New York Botanical Garden a still more outstanding institution than it had been in the past, especially as it was intimated to me that ample financial support for it would be forthcoming. There were also certain family reasons, unnecessary to discuss here. If one were looking merely for power one would not make the change, for the administration of an annual budget of $2,500,000 in a dynamic and rapidly expanding institution was in sharp contrast to the administration of less than one-fifth of that amount in an institution that had become almost static. Whatever the combination of reasons, I decided to make the change and, on January 2, 1930, I reported for duty in my new field. That I left California with very keen regret goes without saying, but I left with the pleasant feeling that my departure was regretted by the administration of the University, the agricultural public and its leaders, and by the staff of the University as a whole, as well as by my immediate colleagues in the College of Agriculture.

Perhaps because of my association with other workers in the general field of biology, perhaps because of my personal observations, perhaps because of the very opportunities that were opened to me through travel, I became somewhat intrigued at a comparatively early date with work being done in fields other than systematic botany. For many years, however, I was so immersed in the mass of details involved in my taxonomic work that I had little or no time to devote to other than my daily tasks. At about the time I assumed an administrative position I commenced to take serious mental excursions into fields outside of my own specialty. Probably one reason for this was the fact that as Director of the Bureau of Science I had, of necessity, to know something of the salient features of the work in the diverse fields covered by that institution. To explain what appeared to be an anomalous distribution of Malaysian and Australian plants in reference to the Philippines, I had to familiarize myself with geologic history, hydrography and climatology of Malaysia. In this same connection I had to go rather deeply into zoological literature, appertaining to the geographical distribution of mammals, birds, reptiles, batrachia, fresh water fishes, land and fresh water snails, and various groups of insects for the entire Malaysian region. These data were assembled in an attempt to correlate the present day geographic distribution of plants in Malaysia with the geographic distribution of animals and with geologic history. Later I became interested in some phases of leprosy and wrote one popular paper on this subject, with the view to help educate the general public to the apparent fact that leprosy is not a contagious disease and that it is doubtful if it can even be transmitted directly from one individual to another. Another field that attracted my attention was that of ethnology, or more particularly certain phases of ethnobotany dealing with the origin of cultivated plants in relation to the origins of civilizations, and the generally overlooked fact that pre-Columbian agriculture in America was based absolutely and wholly on native American plants and animals; and here I even ventured to help educate the rather large group of ethnologists, near-ethnologists, and popular writers, who would derive all the higher pre-Columbian American cultures from Eurasia. Certain phases of comparative philology engaged my attention at times, particularly in reference to Sanskritic, Chinese and Aztec plant names in actual use in the Philippines, with the view of determining when and how these elements reached the Philippines.

More within my own field I was, from an early date, more or less



Elmer Drew Merrill, from a photograph taken in Honduras in 1952 by Louis O. Williams.

an iconoclast in reference to currently accepted herbarium methods, involving field notes, the use of the field label, the abuse of the field note book, and even such apparently simple processes as gumming, strapping, labelling, distributing and the arrangement and storage of mounted material. In many institutions those in authority had been content to follow conventionalized practices, giving little or no thought to the improvement of processes, little or no thought to efficiency, less thought to the application of modern office technique to herbarium matters, and no consideration to the problem of making the herbarium a real source of information to workers in other fields; to a very large degree herbarium methods everywhere had become static. The very simple method of actually incorporating original descriptions in the herbarium in juxtaposition with herbarium specimens, by consistently attaching copies of such data, together with copies of critical notes, photographs of types, carbon rubbings of types or authentic specimens, and photostat copies of illustrations, to the specimens or on the specimen cover, was an innovation in this field. Necessity is the mother of invention and the necessity here was the very wide field I had elected to cover, extending from Manchuria and Mongolia, through Malaysia and Polynesia. To save time in making critical identifications of current collections from this vast region, I was forced to incorporate the essential data in the herbarium along the lines indicated; the time factor in looking up library references was the determining one.

These mental excursions into fields outside of my own specialty were to me stimulating in the extreme and I still, on occasions, venture far from the domain of systematic botany, fully realizing that a little knowledge of a special field may lead one to generalized conclusions that a specialist would hesitate to assert.

One year in New York is such a short time that no more than casual mention is called for at this time. It is too soon to predict success or failure; much too soon to attempt to evaluate any of the small accomplishments to date. History repeats itself, in that frequently I have questioned my judgment in accepting my present position. As in California during my first year or two there, I looked back to Manila with keen regrets that I had ever left that city, so I frequently look back to the University of California and wonder why I ever left such a dynamic, progressive, expanding institution, to cast my lot with an institution that was practically static, very badly under-financed and more or less under fire for its past policies and accomplishments. To rebuild the *esprit de corps* of the staff of one institution with reasonably ample and increasing financial resources is one thing; to attempt the same thing in another institution with totally inadequate financial support and little prospect of its increase is another. And so for the third time I change my administrative base: the Philippines 1919-1923, California 1924-1929, New York 1930—; three times I followed directors whose established policies were subject to very severe criticisms. The New York task impresses me, after one year, as being more difficult than the one in Manila, or that in California. Will it be a success or a failure? Only the future can tell. It may be that after all I will fulfill President Nicholas Murray Butler's observation, that individuals, who, coming to New York after middle life, after having attained a measurable degree of success elsewhere, rarely meet with outstanding success in New York because of their inability to adapt themselves to the city and its ways; and I am fifty-four years old.

Note by the Editors: The preceding account was written in December, 1930. As the world knows, Dr. Merrill was eminently successful as an organizer, administrator and scientist during his term of office as Director of the New York Botanical Garden. In 1935 he was appointed Professor of Botany and Administrator of Botanical Collections at Harvard University, at which institution he served with distinction until his retirement in 1946. More recently, with energy and vision unabated, he has continued the work in systematic botany that was interrupted by his administrative duties in his middle years. The Asa Gray Bulletin is gratified to be able to present this account, in his own words, of the early life of one of America's most distinguished scientists.

Our readers who are interested in other details of Dr. Merrill's career will find an account of his life and a list of his published writings up to 1946, as well as excerpts from some of his papers, in the volume called "Merrilliana. A Selection from the General Writings of Elmer Drew Merrill, Sc.D.,LL.D." (Chronica Botanica 10(3/4):127-394. illus. 1946). More will follow in Asa Gray Bulletin.

Elmer Drew Merrill at the Philippine Bureau of Science, January, 1918. Photograph by H. H. Bartlett.

THE TALL GRASS PRAIRIE AS SEEN IN OSAGE COUNTY, OKLAHOMA

Lloyd A. Schairer

The vast expanses of open range in eastern Oklahoma lie in the region described as the Tall Grass Prairie. In 1952 the members of the University of Michigan summer field course in botany, wishing to study a typical area of this kind, inquired of Mr. A. A. Sewall,[1] the county agricultural agent for Osage County, who directed us to the 4,000 acre ranch owned by Mr. Jack Walker of Pawhuska. The ranch is located six miles southwest of Pawhuska in Strikeaxe Township, Osage County, Oklahoma (R 8E - T 25N, sections 26 and 36). Forty to fifty acres of this rolling range land form a protected watershed for a stock pond. The plant collections were made at this one locality on a gradual southwest slope on the open range, about two hundred yards east of the pond.

The soil in the collecting area was derived from the underlying Carboniferous sandstone,[2] although Mr. Sewall pointed out that the west half of Osage County is mostly limestone.[3] An indicator for the sandstone-derived soils of the east half of the county is blackjack oak *(Quercus marilandica)* which was found on a ridge west of the stock pond. The collecting area was in the transition zone from sandstone to limestone as indicated by several nearby limestone outcroppings. The transition from sandstone to limestone soil did not appear to cause much variation in the vegetation except that the two cacti, *Opuntia comanchica* and *Coryphantha vivipara,* were found on the limestone ridge, and no others were seen there.

The amount of precipitation generally needed to sustain the tall grass associates and non-irrigated agriculture is around 20 inches annually. The year 1952, in Osage County, was so dry that the summer precipitation was insufficient to sustain the range grass because of the unusually heavy winds. The average wind velocity varies,

[1]The group is much indebted to Mr. Sewall for giving us an excellent first-hand account of range management as it is practiced in Osage County. To complete the picture of ranch life, Dr. W. W. Hansen and Dr. U. T. Waterfall, Professors of Botany at Oklahoma Agricultural and Mechanical College, joined us at Pawhuska and conducted us on a tour of local ranches. The instructive and enjoyable tour ended at the campus at Stillwater, where most of the plant specimens were identified by our local botanical hosts, whose kindness was greatly appreciated. For earlier accounts of the 1952 summer expedition, see Asa Gray Bulletin, n.s. 1:143, and 1:283-294. 1952.

[2]*Oklahoma Geological Survey,* 1917. Bulletin No. 27, p. 218. Norman, Oklahoma, Co-Operative Publishing Company.

[3]Fenneman, Nevin M., 1931. *Physiography of Western United States,* p. 9. New York, McGraw-Hill Book Company, Inc.

according to local information, from slightly more than 9 miles per hour in August to nearly 14 miles per hour in March and April. In the summer of 1952 the winds were much stronger, often between 30 and 40 miles per hour during a period of 3 to 4 weeks.

Good range, such as the Jack Walker ranch, has a carrying capacity of one head of cattle per 5 or 6 acres. When the capacity of a range is exceeded the first indication will be the destruction of the sod cover. The open ground gives a chance for the invasion of undesirable plants such as silverbeard *(Andropogon saccharoides)*, side-oats grama *(Bouteloua curtipendula)*, ragweed *(Ambrosia artemisiifolia)*, and blackjack oak *(Quercus marilandica)*.

Both accidental and controlled burnings have injured range lands for many years. The Indians often burned off large areas in the winter or spring because the grass would come up greener the first year after the burning. This burning had very little detrimental effect until the herds had grown to nearly capacity size for the range. Then the large herds grazed preferably on the burned areas and very badly overgrazed them, which led to the undesired type of plant succession. Burning in successive years did, however, have the economically desirable effect of keeping back the trees. The carrying capacity of wooded areas is about one half that of open range. About 1940 a clause was added to the rules governing the Indians, providing that no burning of range land would be permitted. The carrying capacity of a range is decreased as much as 15% by burning in successive years.

In order to collect as much as possible of the local flora, comprehensive collections were made by all members of our group. One or two persons handled the plant press while the others covered the area for specimens. In this manner a good sampling of the range plants was taken in a relatively short time.

Three quadrats, each one meter square, were described at intervals of 20 paces and in a northerly direction leading up a gradual slope toward a limestone crest. The slope was exposed directly to the sun and had only a slight southwest windbreak provided by a nearby wooded ridge. The quadrat data give a specific description of the "Osage Range" as it exists during drought conditions. The data, given in Table I, include the frequency and the per cent of the total population for each species. The culm count for each grass is useful in evaluating the forage density of the range.

The seven most abundant species, with their relative frequencies, are *Andropogon scoparius* (75.25%), *Panicum virgatum* (11.98%), *Bromus commutatus* (4.28%), *Ambrosia artemisiifolia* (2.19%), *Andropogon furcatus* (1.88%), *Lespedeza* spp.(1.94%). This group of plants gives a good indication of the condition of the range. The dominant species, *Andropogon scoparius*, is a highly desirable range

Table I. Quadrat data for a sampled locality of tall-grass prairie, near Pawhuska, Osage County, Oklahoma

	Quadrat No. 1		Quadrat No. 2		Quadrat No. 3		Quadrat totals	
	No. of stems	% of total no. of stems	No. of stems	% of total no. of stems	No. of stems	% of total no. of stems	No. of stems	% of total no. of stems
Ambrosia artemisiifolia	17	1.85	49	6.49	10	0.56	76	2.19
Amorpha canescens	2	0.22	4	0.52	--	--	6	.17
Andropogon furcatus	--	--	1	0.13	64	3.57	65	1.88
Andropogon scoparius	446	48.70	572	69.75	1634	91.20	2607	75.25
Asclepias verticillata	2	0.22	--	--	--	--	2	.06
Bromus commutatus	99	10.80	37	4.89	12	0.68	148	4.28
Ceanothus americanus	--	--	--	--	1	0.06	1	.03
Cirsium undulatum	--	--	--	--	1	0.06	1	.03
Dalea purpurea	--	--	--	--	9	0.52	9	.27
Elymus canadensis	--	--	--	--	1	0.06	1	.03
Euphorbia corollata	--	--	15	1.98	--	--	15	.43
Lespedeza sp.	--	--	--	--	38	2.12	38	1.10
Lespedeza sp.	--	--	29	3.84	--	--	29	0.84
Oenothera speciosa	3	0.33	--	--	--	--	3	.09
Panicum lanuginosum	4	0.43	--	--	--	--	4	.12
Panicum virgatum	327	35.70	81	10.70	7	0.39	415	11.98
Ratibida columnifera	--	--	--	--	14	0.78	14	.42
Solidago sp. (narrow leaves)	5	0.54	--	--	--	--	5	.14
Solidago sp. (wide leaves)	11	1.21	12	1.57	--	--	23	0.66
Sonchus asper	--	--	1	0.13	--	--	1	.03
Total	916		756		1791		3463	

grass. For a bunch grass, it forms fairly good ground cover and may even form patches of sod. This year's growth appears to have been below average, as indicated by the greater size of the basal remnants of earlier growth. The combined grass population produced a ground cover of 40 to 60%, and the total ground cover varied from 60 to 90%.

Panicum virgatum and *Andropogon furcatus* were the other two desirable grasses which made up a minor portion of the grass cover. *Panicum virgatum* was present in every quadrat so that its regeneration may be quite rapid during a normal year. *Andropogon furcatus*, however, had a scattered occurrence and undoubtedly would reseed itself very slowly on this south slope. *A. furcatus* is preferred by stock to *A. scoparius* and many other forage crops. *Bromus commutatus*, an annual, was well represented in every quadrat. This weedy European species may increase considerably in the next few years because it has produced seed plentifully and the drought had killed some other plants and opened more soil for natural reseeding.

Other weedy species, such as *Ambrosia artemisiifolia, Solidago* spp., and *Asclepias verticillata,* constituted a ground cover of 20 to 30%. Many immature specimens were found in this group of plants. Evidently favorable conditions existed for weed seedlings when the grass cover was reduced by the action of the wind. The presence of these weedy species gives the range a very unkempt appearance as can be seen in figure 1.

Two species of *Lespedeza* were the most abundant legumes found in the quadrats, but other legumes were found in all three quadrats. This uniform distribution of legumes, even though in small numbers, is essential for nitrogen fixation.

The number of species included in the quadrat data is relatively small, but when the data are considered together with the list of collected species, a good summary of the tall grass prairie vegetation of Osage County is given.

A description of a vegetation type which is utilized as extensively as the tall grass prairie is not complete without a few words about its maintenance and use. A good range must have an adequate water supply. Since there are very few permanent streams in the Osage prairie region, the water problem is solved by making artificial stock ponds. The subsoil is relatively impermeable to water so that the runoff from 30 to 60 acres is sufficient for a year-round water supply. The excavations are made with a bulldozer and are 12 to 30 feet deep, covering an area from a few hundred square feet to an extreme of sixty acres. This is some trouble from algal growth in the ponds but stocking with fish (bass and crappies) is considered to have helped to maintain a balanced condition.

During the winter season the grasses cannot furnish a balanced

Figure 1. The most common weeds on the range near Pawhuska, Oklahoma, are *Ambrosia artemisiifolia, Asclepias verticillata,* and species of *Solidago.* These species were especially conspicuous in 1952 because of the stunted grass cover. The woods in the background include oaks (*Quercus marilandica,* and some *Q. muhlenbergii* and *Q. prinoides*), junipers (*Juniperus virginiana*) and, in the dry river bed, ash *(Fraxinus pennsylvanica)*.

Figure 2. Winter hay storage is in small sheds built out on the range near a pond. Snow cover prevents grazing for only about ten days each winter. Some natural protection for the feeding area is derived from the trees and shrubs which have invaded this ridge.

diet for the stock. The protein content of the grass in June is 10 to 12% but by the last of August it is 3 to 5%. Cottonseed cakes are often used as supplementary winter feed from about November 10 to April 10. During the winter there is an average of ten days of snow cover. Baled hay is stored in small sheds which are built out on the range near a stock pond (Figure 2), and this hay is fed to the cattle during these periods of snow cover.

In recent years careful soil analyses have been made by county agricultural agents to determine the types and amounts of deficiencies. The most common deficiencies are lime and phosphates. Soil regeneration is a national conservation problem and for that reason the government pays half of the expense of applying these compounds. The cost of lime is about $4.00 per ton and an average application is one to one and one half tons per acre. Phosphates cost about $15.00 per ton and rock phosphate is frequently applied at the rate of five hundred pounds per acre.

Further soil buildup may be accomplished by introducing more legumes. Korean Lespedeza has been successfully introduced on overgrazed ranges, resulting in substantial increases in weight of the stock. Seeding of Lespedeza on large ranges is done by airplane. Work is being continued on the introduction of legume mixtures. One such mixture in common use includes Lespedeza, yellow hop clover and ledina.

The native tall grass prairie is undergoing a gradual transformation from an original natural association to an artificially tempered substitute. Burnings and overgrazing have opened the way for the establishment of new plants. Most of the first invasions by blackjack oak on this range have been dated at around 1900. The largest trees in some of the groves have only 40 to 50 annual growth rings. Direct plantings of many introduced species are intended to replenish the range vegetation.

Experiments are being carried out to determine the effectiveness of spraying scrub oak wood lots with "2,4-D" to kill the trees and open up otherwise useless land to pasture. The value of the good range land such as this in Osage County is very great. If one could find any land for sale, a recent estimate was 15,000 acres and 1,000 head of cattle for one million dollars.

The inevitable result of present trends will be one of great depletion, if not complete destruction of the native tall grass prairie.

The following list of plants represents all of the species which were collected on the Osage Prairie in conjunction with this report. Some of the specimens included vegetative material only, and for that reason their identifications are tentative. The location of the collecting area is described in detail on the first page of this report. All were made on June 20, 1952, and deposited in the Herbarium of the University of Michigan. The following sequence is that used by Waterfall in his recent Catalogue of the Flora of Oklahoma.[4]

Juniperus virginiana L., *Schairer 69*[5]
Andropogon scoparius Michx., *37*
Bouteloua curtipendula (Michx.) Torr., *54*
Bromus commutatus Schrad., *38*
Elymus canadensis L., *11*
Panicum lanuginosum Ell., *5*
  (P. tennesseense Ashe)
Panicum virgatum L., *13*
Cyperus strigosus L., *46*
Juncus interior Wieg., *77*
Quercus marilandica Muenchh., *76*
Quercus muhlenbergii Engelm., *66, 68*
Quercus prinoides Willd., *71*
Quercus stellata Wang., *70*
Quercus Shumardii Buckl., *79*
Celtis occidentalis L., *53*
Rumex crispus L., *27*
Lepidium virginicum L., *15*
Rubus (Idaeanthi Focke), *9, 23*
Amorpha canescens Pursh, *4, 44*
Amorpha fruticosa L., *51*
Baptisia leucophaea Nutt., *1 (a,b)*
Dalea candida Willd., *8* [*Petalostemum candidum* (Willd.) Michx.]
Dalea laxiflora, 49 (D. enneandra Nutt.)
Dalea purpurea Vent., *7* [*Petalostemum purpureum* (Vent.) Rydb.]
Desmodium sessilifolium T.&G., *31*
Desmodium illinoense A. Gray, *6*
Lespedeza (cultivated), *59*
Psoralea tenuiflora Pursh, *22*
Schrankia nuttallii (DC.) Standl., *14, 48*
Linum medium var. *texanum* (Planch.) Fernald, *40*
Euphorbia corollata L., *25*
Stillingia sylvatica L., *43*
Rhus glabra L., *65*
Ceanothus americanus L., *28*
Ceanothus herbaceus Raf., *50*
  (C. ovatus Desf.)
Callirrhoe alcaeoides (Michx.) A. Gray, *39*
Coryphantha vivipara (Nutt.) Britt. & Rose, *57*
Opuntia comanchica Engelm. & Bigel., *55*
Gaura parviflora Dougl., *36*
Oenothera speciosa Nutt., *45, 73*
Cornus drummondii Meyer, *75*
Apocynum cannabinum L., *2*
Asclepias tuberosa L., *58*
Asclepias verticillata L., *34*
Asclepias viridiflora Raf., *3, 12*
Asclepias viridiflora var. lanceolata (Ives) Torr., *20, 62*
Asclepias viridis Walt., *16, 61* [*Asclepiodora viridis* (Walt.) A. Gray]
Cuscuta pentagona Engelm., *18*
Physalis pumila Nutt., *29*
Penstemon cobaea Nutt., *52*
Penstemon tubaeflorus Nutt., *64*
Ruellia humilis Nutt., *42, 78*
Plantago virginica L., *30*
Symphoricarpus orbiculatus Moench, *41*
Viburnum rufidulum Raf., *74*
Achillea lanulosa Nutt., *26*
Cacalia plantaginea (Raf.) Shinners, *63*
Echinacea pallida Nutt., *33*
Erigeron strigosus Muhl., *24*
Hieracium longipilum Torr., *56*
Liatris pycnostachya Michx., *47*
Ratibida columnifera (Nutt.) Wooton & Standl., *17*
Vernonia baldwinii Torr., *10, 32*

[4]Waterfall, U. T. A Catalogue of the Flora of Oklahoma. 91 pp. The Research Foundation, Okla. A. & M. College, Stillwater, Okla., Oct. 17, 1952.

[5]The specimens were all assigned collection-numbers in my name; the name is omitted from the rest of the list for the sake of brevity, the number only being cited.

A LETTER ON THE UTILIZATION OF BIRCH IN TIBET

[A review of Dr. Ekvall's attractive book on Tibet appeared on page 65 of this volume. The following letter was accidentally omitted.]

c/o Institute of East Asiatic Studies,
University of California,
Berkeley, California,
23 June, 1952

My dear Mr. Bartlett:

Please excuse the long delay in answering your most interesting letter of 12 May, but at the time it reached me, we were just getting ready to move from Arlington, and the time intervening has been spent in travel to California and the process of getting settled.

Your enthusiasm for botanical information took me back to the days when Dr. Rock raved about the Botanical treasures of the Kansu-Tibetan border, but I am not a botanist, and although I have a fairly good idea of the various root, seed and fiber plants used by the Chinese and Tibetans of that area, and the different kinds of wood employed for different purposes, it is a comparatively vague sort of knowledge. I never collected or took specimens. If sometime you and I should meet, it is quite possible that with expert questioning I could come up with some information that might be of interest, but I feel completely unqualified to write anything on botanical materials, or even ethnobotany.

Your question about birches, however, does ring a bell. In the general area of Tak Tsang Lhamo some very beautiful birch forests are found in the 9 to 10,000 foot altitude level: a little bit above the pines, lower than the rhododendron, juniper and spruce. The rhododendron and juniper above the spruce. But to get back to the birches. There are both red and silver varieties and birchwood occupies a rather important position in Tibetan subsistence technique. Saddle trees, pack saddles and wooden bowls are made from birch. Lacking walnut, gunstocks are also made from birch. Birch bark is used to make various receptacles. The largest birch I ever saw in that area was about 15 inches in diameter. The gnarled and twisted red birch trunks are preferred for saddle trees.

Except for the very expensive graperoot wooden bowls and those made from another curly, unidentified wood from southern Tibet, the wooden bowls used by approximately 80% of the population are all made of birch. The wood-cut blocks from which books are printed are also made from birch wood.

With best regards,

Yours sincerely,
Robert B. Ekvall

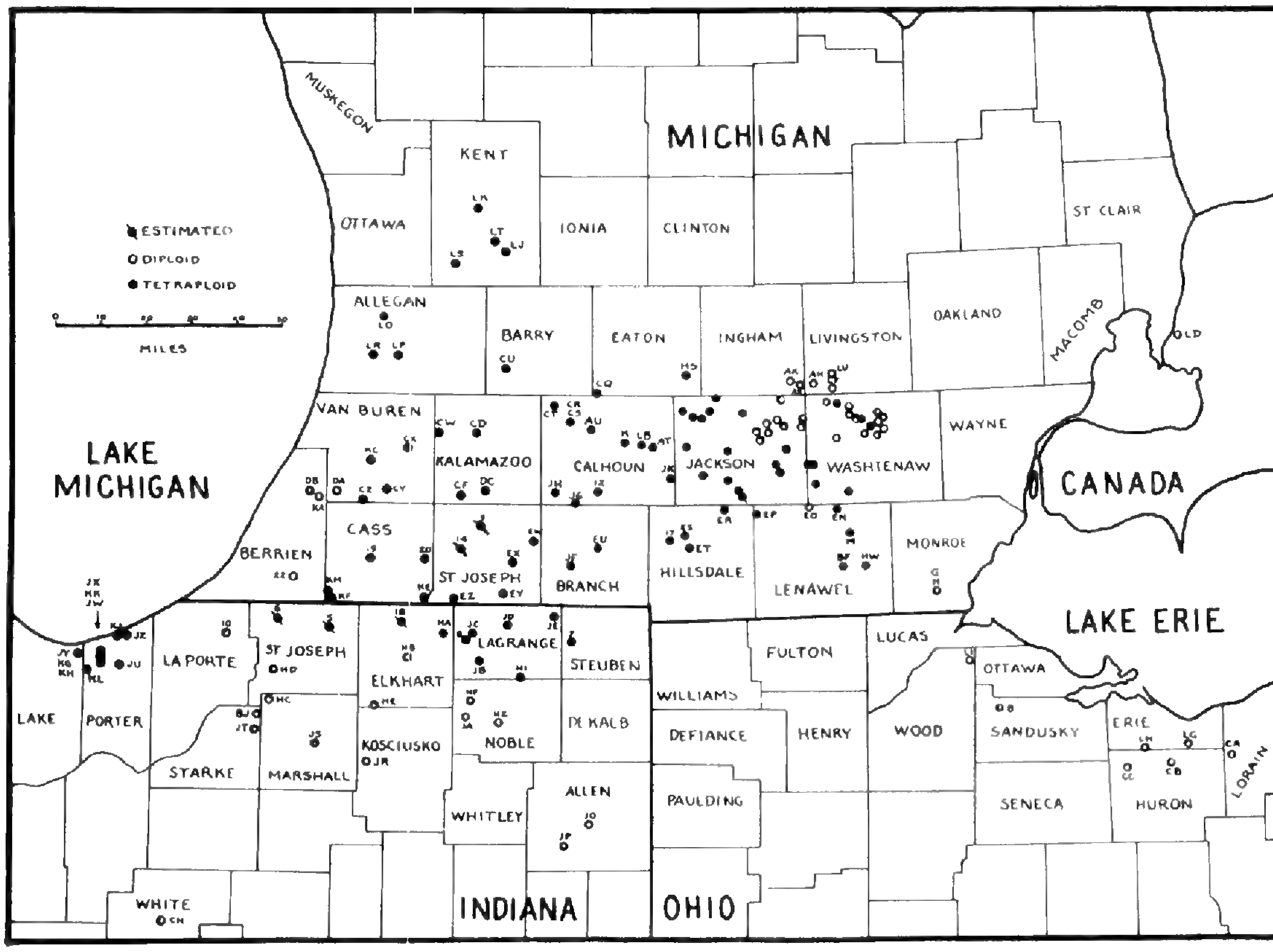
A STUDY OF TRADESCANTIA OHIENSIS IN MICHIGAN

Donald S. Dean[1]

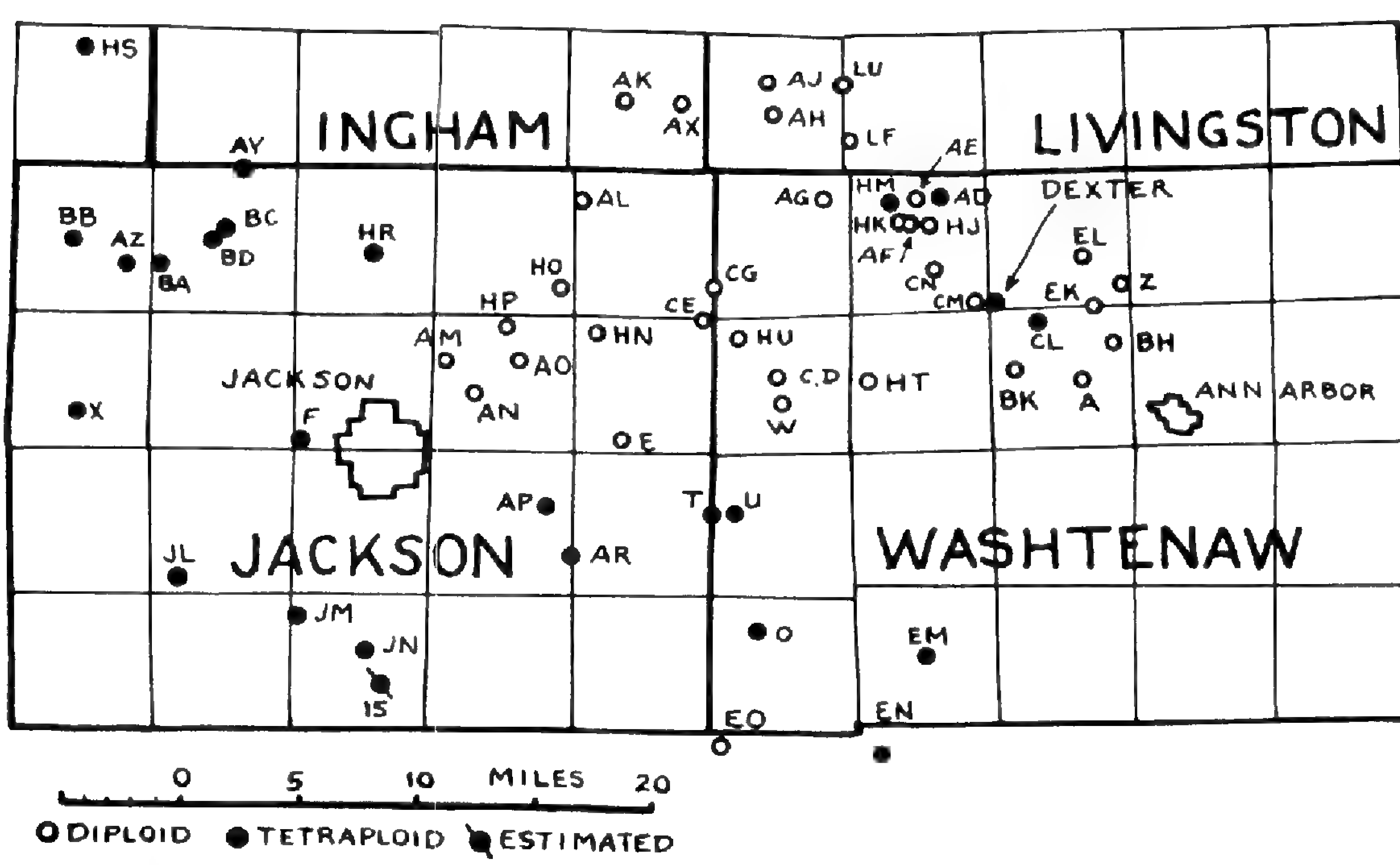
Tradescantia ohiensis is to the cytologist what the tomato plant is to the physiologist. Although *Tradescantia* has been a stern master to me throughout much of the past three years, I still think highly of the plant. Like other members of the Commelinaceae, it has a tenacious hold on life. It is so hard to kill, in fact, that it can even be raised by botanists. In the words of Dr. C. D. LaRue, it can be used to demonstrate almost every important feature introduced in an elementary course in botany except the structure of a dicot stem. In much of eastern United States, it is a common roadside weed. It can be raised from seeds or cuttings and can be made to bloom out of season by manipulation of the photoperiod. More important from the standpoint of the cytologist, it has large chromosomes and exists both as a diploid and as a natural autotetraploid. Aside from the fact that the tetraploids differ from the diploids in having 24 chromosomes in the somatic cells instead of 12, and the fact that there is a definite gigantism in the pollen grains and stomata of tetraploids, individual diploids and tetraploids can not be distinguished.

At the time Anderson and Sax (1936) prepared their cytological monograph of the genus *Tradescantia,* diploids were known only around Austin, Texas; Waterloo, Iowa; Noble County, Indiana; and at Dexter, Michigan. Tetraploids were known throughout much of the United States east of a line connecting Texas and Wisconsin. The diploids in Michigan were discovered by Dr. William C. Steere while he was still a graduate student. He used the nearest *Tradescantia* at hand for demonstrating meiosis to his elementary classes and found the plants were diploid even though this was contrary to the Tischler-Hagerup hypothesis that tetraploids should be found at the limits of the range of the species. The cytological monograph by Anderson and Sax showed that for the most part, however, *Tradescantia ohiensis* and closely related species demonstrated the sort of distribution expected from the Tischler-Hagerup theory: diploids confined mostly to a relatively small range about the probable center of dispersal of the species with the wide-ranging and aggressive tetraploids spreading out in all directions. Their paper had been widely cited as evidence in support of the hypothesis that polyploidy confers a special ability to colonize new areas and to spread into areas of severe climatic and edaphic conditions.

[1]Based on portions of a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the University of Michigan, 1953. --Eds.



Map 1. The distribution of *Tradescantia ohiensis* in Michigan and adjacent Indiana and Ohio. Named counties are those in which a search for plants was conducted. Chromosome numbers of plants at stations marked "estimated" were thought to be tetraploid because of pollen size. Other chromosome numbers were determined by count.



Map 2. The distribution of *Tradescantia ohiensis* in Washtenaw and Jackson counties, Michigan. Stations in adjoining townships of surrounding counties are added. Both diploid and tetraploid plants were found at the Dexter station.

The reader can trace my travels in pursuit of the plant by referring to Maps 1 and 2. Stations were numbered alphabetically: A-Z, AA to AZ, etc. Those marked with a diagonal bar through the dot were determined to be diploid or tetraploid by the size of their pollen grains. Chromosomes were actually counted from aceto-carmine preparations at the other stations.

Collecting for cytological examination is somewhat more difficult than collecting herbarium specimens. Buds must be in the right stage of development and, of course, the collection is useless if it is not in a vigorous state of health when examined.

Problems of collecting were further complicated by the fact that the petals deliquesce about noon and earlier if the day is particularly warm. The ideal way to scout for the plant is to follow a circular path tentatively outlined during the winter months by perusal of the literature and herbarium records and correspondence with such friends and friends of friends as you can impose upon. Once you have found the plant, your trips can radiate from that point until you are convinced that you have gone farther than the plants have. While trips were short, it was most convenient to collect living shoots and to rush them to the laboratory in a diaper pail of water (just the right size for the job). For unmarried investigators or when longer trips are necessary, it is desirable to carry a microscope and to count the chromosomes at a roadside table. This has the added advantage of amusing the passing tourists, mystifying state policemen, and impressing those who are sure that you are searching for marihuana on their property. I have found also that people who have been kind enough to help locate the plant are genuinely interested in looking through a microscope, in seeing a chromosome, and in learning that the plants growing on their own land have chromosomes. I have a profound respect for the keen observations made by many non-botanists who assisted me and feel that their aid, like that given me by professional botanists, was indispensable.

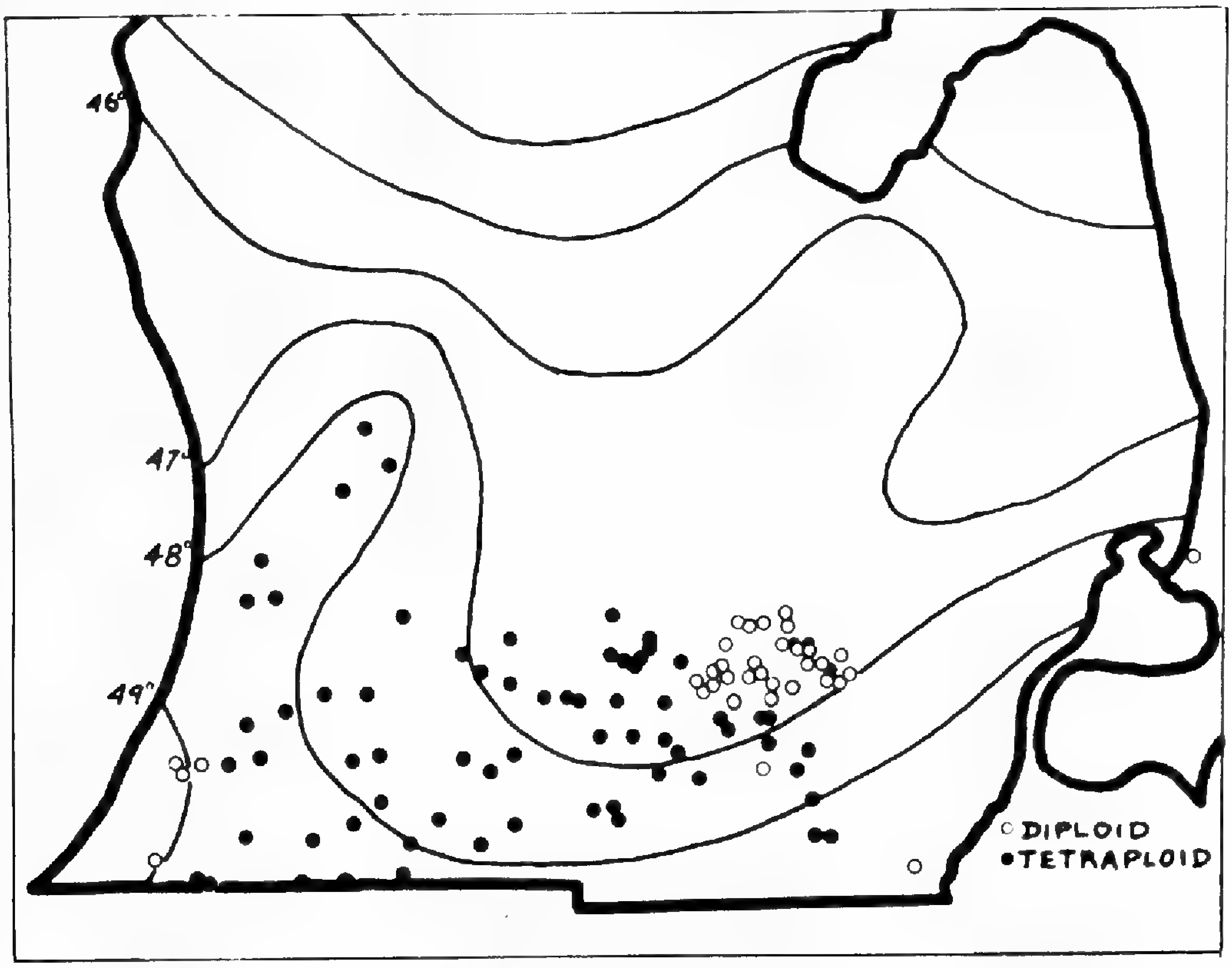
Another helpful idea is to stay at tourist homes while on collecting trips. In this way, time during the collecting season is not taken up with the business of sleeping and eating and one has a chance to talk to the people who have lived in that region all of their lives. I was told by the proprietor of one tourist home that she had rented rooms to deaf mutes and to a houseful of magicians who spent their time playing tricks on each other and making her household furnishings disappear, but she had never run into a botanist. This, apparently, was an experience to be encountered once in a lifetime. I did not want to spoil my position as a novelty by telling her that various institutions throughout the state were crawling with botanists. Incidentally, she knew the best *Tradescantia* stands in the region and where she had picked it as a child.

At Walpole Island, the Indian reservation on the Canadian side of the St. Clair River, the officials were especially gracious. At their invitation, I returned and took what must have been about 60 (and seemed to be about 200) Indian children on a nature walk through their school property. The excursion became somewhat chaotic when I expressed interest in a dragonfly darting by. My charges broke rank and ran down about a dozen live dragon flies, flailing at them with branches snatched from nearby trees. I thought that the trip might have been more educational if I had had a chance to learn what they knew. It seemed rather silly to tell an Indian about the out-of-doors. Their gift to me was an eight-inch corn plant with perfectly formed pistillate ears. It was growing in a can handsomely decorated with tinfoil and ribbon. Botanists should find that region untrampled and very interesting.

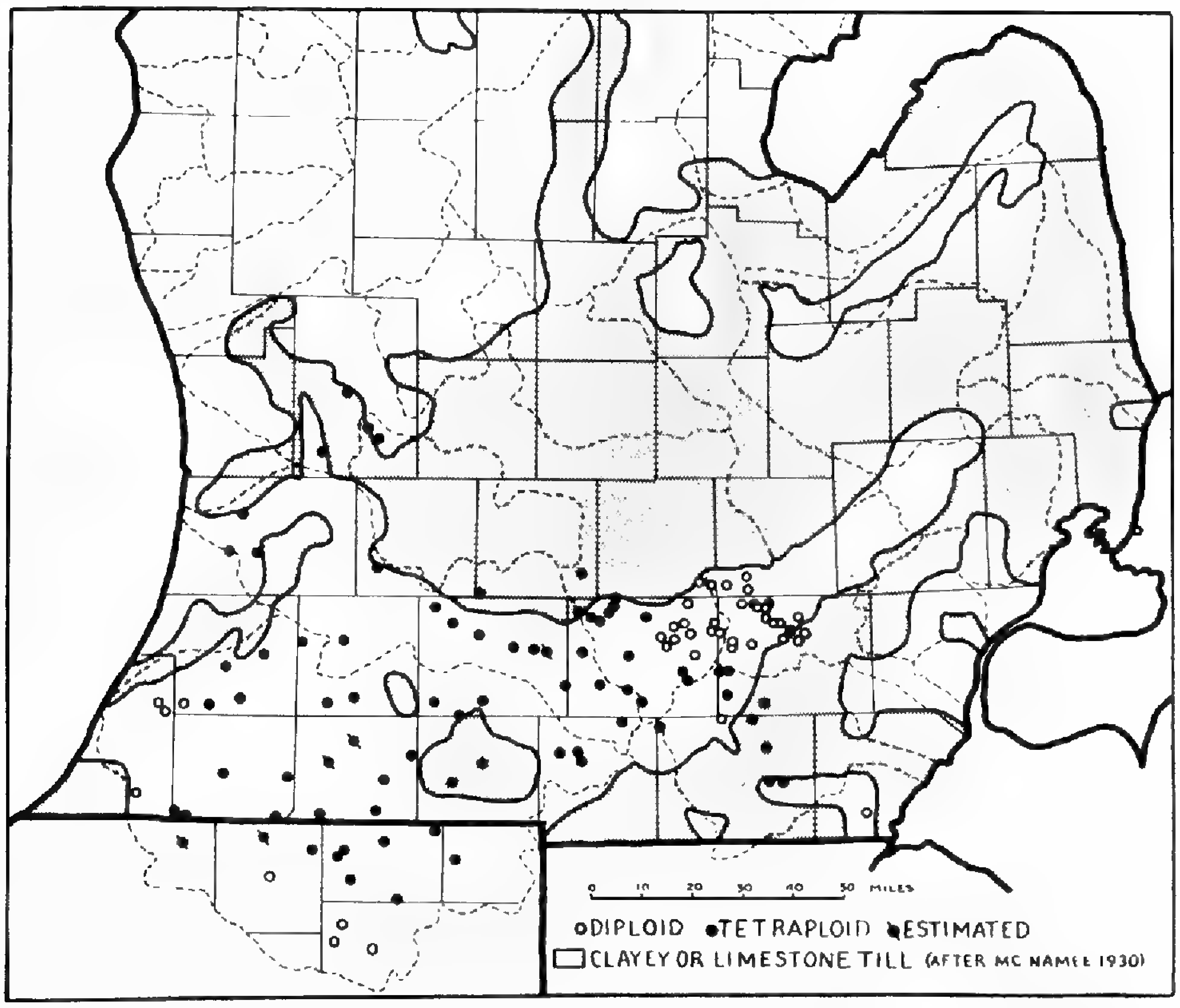
In my early collecting trips, it became apparent that Dr. Steere's station (A on Map 2) was not a single isolated diploid stand, but that diploids centered on the Washtenaw-Jackson County lines were of considerable number and covered considerable area. As the circle of exploration became larger, it was seen that this area of diploids was surrounded by the tetraploids on the south and west, but attempts to find tetraploids to the north and east were unfruitful. The discovery of such a large group of diploids at the northern limit of the range of the species was of special interest because they were far removed from other known diploids and because, according to existing hypotheses, tetraploids should have been growing there.

Diploids began to appear in surprising places. On the way to Michigan from my home in Ohio, we stopped at a roadside park near Woodville, Ohio, for lunch. There, along a roadside ditch was the first *T. ohiensis* I found in connection with this study. The car was so packed with Deans and household goods that it was impossible to get to any collecting material. We forced milk down the children until we made a bottle available. The bottle when stoppered, with about an inch of water in the bottom, made a very effective damp chamber. Since I had examined diploids at station A, I decided to see what tetraploid pollen mitosis was like, but when I examined the plants in the milk bottle I had been carrying about, I found to my surprise that they too were diploid.

Dr. Max Britton, who was teaching ecology in the summer session at Ann Arbor, brought back several collections of living material from a field trip across the state. These collections are indicated on maps 1 and 2 by numbers. They included diploids from Buchanan, Michigan and Smith, Indiana (22 and 10 on Map 1). These diploids, and others sent by Mrs. Charles Worster of North Liberty, Indiana, raised the question of whether these scattered diploids were connected with other diploid stations.



Map 3. The distribution of *Tradescantia ohiensis* in relation to mean annual temperature. Isotherms after Schneider (1917).



Map 4. The distribution of *Tradescantia ohiensis* in relation to clayey or limestone till soils. Soils map after McNamee (1930). Dotted lines represent drainage basins.

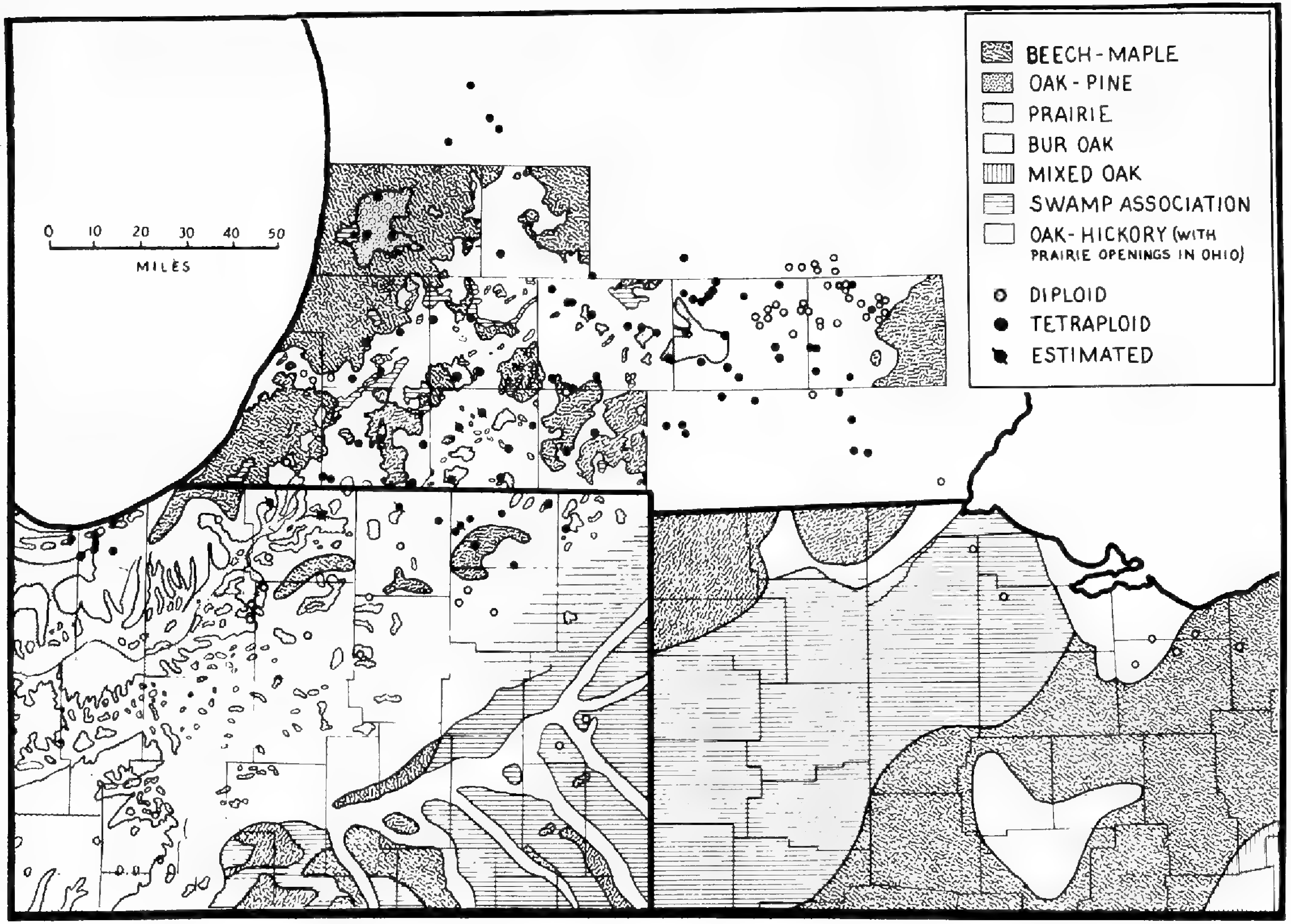
As more stations were discovered and plotted, it became apparent that there was a pattern to their distribution. One development which was very encouraging was that diploids and tetraploids did not overlap in their distribution to any great extent. By the last season of collecting, counts were entirely predictable when past experience was applied to a knowledge of where the plants were growing. Exceptions were confined to the area shown on Map 2. A tetraploid was first discovered in the fencerow in front of the old Dexter home west of the village of Dexter. There seemed to be something "sinister at Dexter" in this discovery since the other *Tradescantia* in the region was diploid as far as known. The whole stand was worked carefully, and it transpired that diploids and tetraploids were growing together. No triploids were discovered even though triploids later resulted from artificial crosses involving some of these same plants.

The maps enclosed tell the story of the distribution of the diploids and tetraploids. Map 3 shows that tetraploids are found farther north than diploids, but when one considers the mean annual temperatures, it becomes apparent that diploids grow in regions just as cold as the coldest areas where tetraploids are found. Temperature, then, does not seem to be a major factor in the distribution of diploids and tetraploids.

Map 4 shows that regions of clay soil are important in limiting the spread of both diploids and tetraploids. Even where the plants are shown on this generalized map to be growing in areas of heavy soil, field notes show that they were growing in local deposits of other types of soil. The correlation between the soils as shown on this map and the occurrence of the plant was very striking in the field in many places, particularly in Kent and Allegan Counties. Most *Tradescantia* was found in glacial outwash, and a large amount was found in moraine country. Very little was found in boulder clay or till. None was found in the clay of postglacial lakes. More tetraploids than diploids were found in regions of outwash, and the situation was reversed in moraine country.

The most striking diploid-tetraploid difference involving edaphic factors was the preference for different kinds of soil as classified by the county soil maps. Almost one-third of the diploids were found in peat or muck; whereas only 3.8% of the tetraploids were growing under like conditions. The tetraploids strongly favored sandy, well-drained soils. In addition, tetraploids were more abundant generally, and were more abundant in areas of great disturbance.

Map 5 shows the distribution in relation to the vegetation. It would seem from this that the distribution of beech-maple forests is another deterrent to the spread of *Tradescantia* in general. The species is most often found in regions of prairie vegetation or in regions of oak-hickory forest. A characteristic place for diploid *T. ohiensis* is at



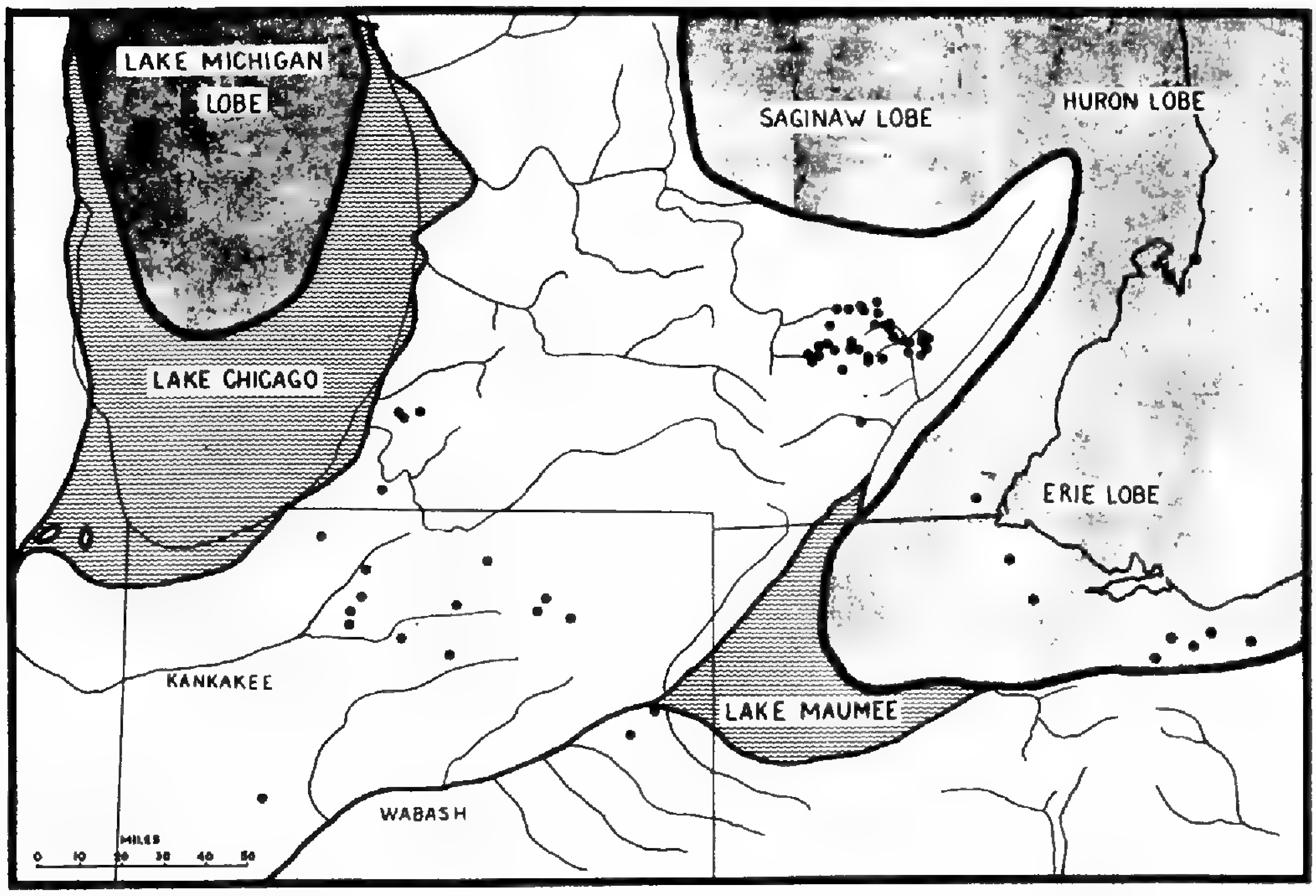
Map 5. The distribution of *Tradescantia ohiensis* in relation to vegetation. Ohio: original vegetation after Chapman (1944). Indiana: present vegetation after Gordon (1936). Western Michigan: original vegetation after Kenoyer (1930, 1934 and 1940). Washtenaw County, Michigan: original extent of beech-maple forest plotted after data from Merk (1951). Jackson County, Michigan: original extent of bur oak forest plotted after data from Hartesveldt (1951).

the edge of a wet meadow, spreading from there to nearby roads and railroads. Tetraploids are often found in very disturbed (and often extremely dry) places, and where prairie vegetation and oak-hickory forest meet. In several localities, the soil was so dry and infertile that vegetation did not cover the ground.

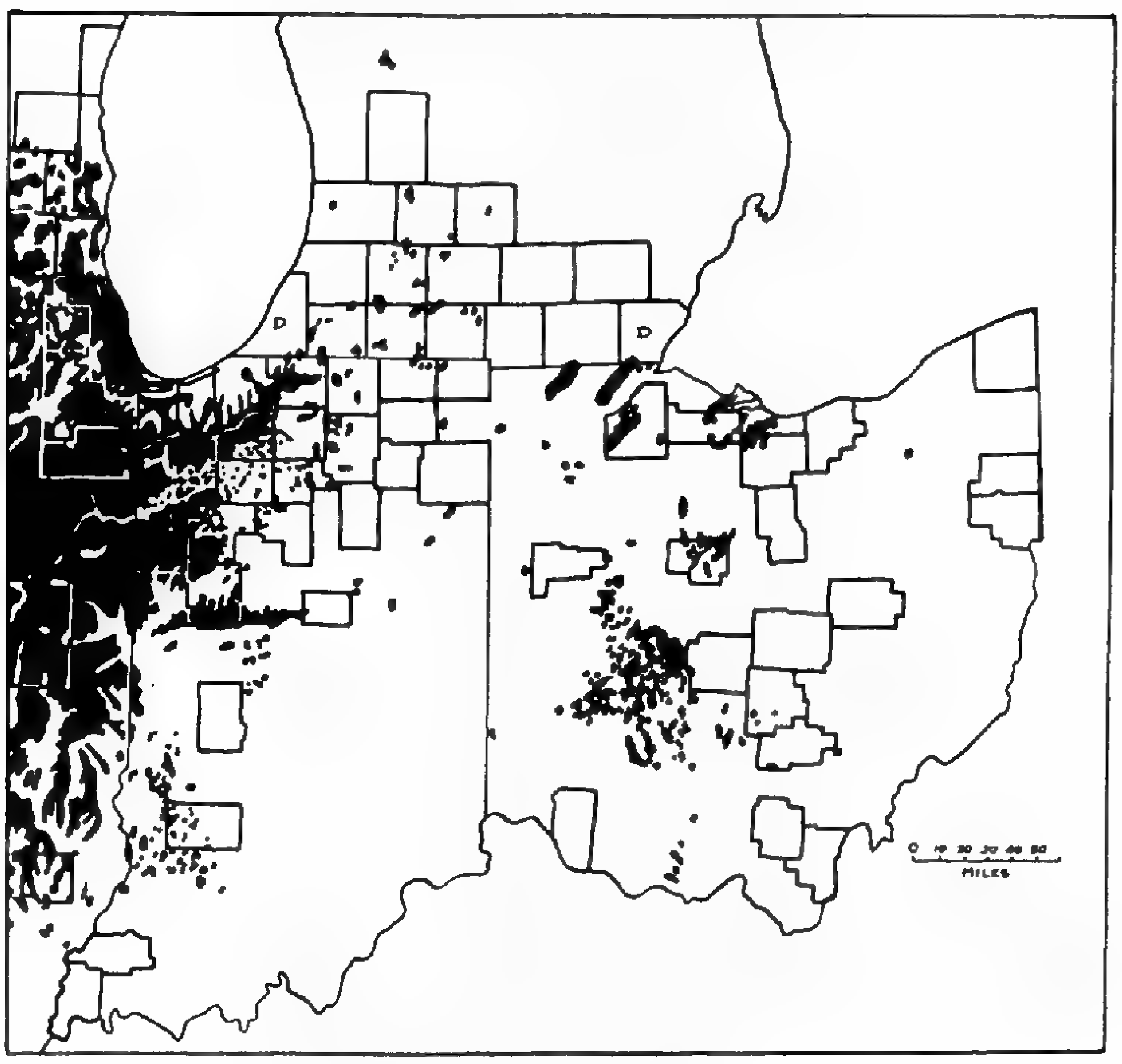
At Allegan State Park, the tetraploids were growing with *Opuntia, Amorpha canescens,* and stunted black oaks. I should say that in the days before man was so kind as to provide hot, dry railroad rights-of-way and dry, mowed roadsides, tetraploids were plants of the oak openings.

I spent a great deal of time trying to explain the disjunct distribution of diploids in light of a possible reduction of tetraploids to diploids, but in the end this seemed entirely unreasonable. It seemed more likely that the diploids are relics of a time when their distribution was continuous. I have proposed the hypothesis that the diploids entered the area in post-glacial times, about the time of the change from pine dominance to oak dominance, and that they entered along drainage paths which connected the Mississippi drainage system with the places where diploids are found today. Although I began this study too late for an eye-witness account, it seems reasonable to me that wet meadow situations could have existed along these drainage paths and that the subsequent change to closed forests restricted these light-loving plants to small relict areas. This statement is presented here without much proof, but Map 6 will show how the drainage system existing at the time of the first Lake Maumee, and the lake beaches subsequently left behind, form a system connecting known stands of diploid *T. ohiensis* in this area with other known stands of diploids. The habitats in which diploids are currently found lend support to this idea. Diploids frequently occur along abandoned channels of early post-glacial drainage.

The distribution of tetraploids conforms to the sweep of the Prairie Peninsula as shown on Map 7. This, taken with observations of habitat, suggests that the tetraploids entered Michigan with the advancing front of the Prairie Peninsula during the Xerothermic Period. The advent of man had a favorable influence upon the spread of the tetraploids, bringing together populations formerly separated by the development of closed vegetation. My cytological observations lead me to believe that the meeting of these tetraploids along railroads and roads was attended by an increase in cytological aberrations of considerable evolutionary significance. My study of *Tradescantia* is still going on. I am anxious to cross diploids from different areas and to determine by a study of the homology shown by the meiotic chromosomes of the F_1 generation just which populations are most alike and which have moved farther from the main line. If this experiment is successful, it should go a long way in showing whether I was right or wrong in some of my hypotheses. I am still anxious to



Map 6. The modern distribution of diploid *Tradescantia ohiensis* in relation to drainage features at the time of the first Lake Maumee. Geological features after Russell and Leverett (1915).



Map 7. The distribution of *Tradescantia ohiensis* in relation to the Prairie Peninsula. Map of the Prairie Peninsula after Transeau (1935). Counties outlined are those in which *Tradescantia ohiensis* is known to grow. Ohio: data after Schaffner (1932), Anderson and Woodson (1935), Dean (unpublished). Michigan: original data. Counties where only diploid plants were found are marked "D." Indiana: data after Deam (1940), Anderson and Woodson (1935), Dean (unpublished). Wisconsin and Illinois: data after Anderson and Woodson (1935).

know of stations where *Tradescantia ohiensis* grows. I am particularly anxious to know of new diploids, especially along the drainage of the Wabash, Ohio, and Mississippi Rivers.

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COLLECTING IN GRANT COUNTY, NORTH DAKOTA

O. A. Stevens

In 1907 Dr. W. B. Bell, then zoologist at the North Dakota Agricultural College, later with the U. S. Biological Survey, spent the summer collecting plants in "Morton County." This county was later divided so that most of the area is now in Grant County. Several species had not been found elsewhere, others only rarely. Since it appears that some were southern species coming into the State by the Missouri Valley and since western species occur on occasional buttes along the river, further exploration had long been desired.

In August 1952 I had an opportunity to spend four days in the area with Lloyd Shoesmith, a soil scientist. I knew this would be an ideal combination to make habitat observations but another advantage was realized later, i.e., that he knew how to get over the ground, an important asset to his botanist companion.

Dr. Bell's specimens included *Oenothera laciniata, Specularia perfoliata* and *Eriogonum "trichopes"* from Section 22, Township 131, Range 86 and *Acerates lanuginosa* from Sec. 3. An additional list of about 125 species was made for which we had no specimens from the general area. About 35 of these and others were secured.

The weather had been dry and hot but was becoming somewhat unsettled. A hard shower with some hail struck the town of Carson just after we arrived the first night. Next morning was glowery and side roads would be sticky. It was suggested that we could work a sand area located about five miles northeast of town.

We drove into a pasture for a better dune area and were invited to the farmer's house. He had a nice looking house well protected by trees, a fish pool and an unusual number of fruit trees. Most interesting to me were some beautiful mats of *Juniperus horizontalis* in the pasture. A landscapist would have given a good sum for such but the farmer was trying to clear them out.

In the afternoon we crossed the county to the State line and returned by a different route. The next day we started out to hunt for Section 22. My driver said he did not know if there was any road into it but we would see. Following one road down a creek we stopped to explore one of the northern eroded slopes and were fortunate in finding an *Eriogonum*. Dr. Lincoln Constance says it is not *E. trichopes* but it is not yet determined. The plants were small and could easily be mistaken for *Polygonum aviculare* which is so common in similar situations.

Back-tracking we found a farmer who said he knew of no road but the section belonged to his son who was cutting corn a little farther on.

We found the son who said there was no road to it but gave us directions how to approach it most closely.

Approaching from another direction we crossed prairie, skirted coulees and fields, then came to a conventional two-wire fence. Here I learned the art of crossing a fence without cutting wires or pulling staples. In dry, hard soil one simply lifts posts and replaces them. Down the sides of a broad coulee for a half a mile we came to a deep gully. A short walk brought us to the section line.

This wide coulee or valley had been the scene of great erosion. One huge, black butte stood near the west side, another on the adjoining section. The ground was littered with ferric nodules and other debris. A short climb up one shoulder revealed nothing of special interest and we did not attempt the steep sides. *Astragalus racemosus* was frequent along the drainage channel but we found no plants at all of the more generally distributed *A. bisulcatus.*

Just before we left the section Mr. Shoesmith remarked, "Would you be interested in this?" It was *Talinum parviflorum* that I had forgotten. Here it was in full bloom on bare ground between grass tufts. When the thick taproot was split it showed an astonishing green color inside. On a south slope nearby we found what appeared to be *Asclepias pumila,* another species collected earlier only in this county. The plants were small with closely crowded leaves and a few slender pods. In a coulee in the sandhill area we had found a quantity of *A. verticillata* with leaves all stripped by grasshoppers.

The next day we visited Pretty Rock Butte, which is grass-covered but one of the largest in the area. *Amorpha nana* was abundant on its west slope. This species seems partial to slopes where the lower soil is tight and promotes a slow sub-surface water movement. *Chrysothamnus* and *Artemisia longifolia* were usually present on large, bare buttes but we could not find *Artemisia tridentata* nor *Sarcobatus.* The Missouri Valley from Fort Yates southward was examined for Pierre shale exposures that proved to be small and local. At one place *Dalea enneandra* grew in abundance just at the top of this shale. No new records of southern plants were found there.

The geology of the area is interesting. Frequent evidence of Kansan glacial drift is found west to about R. 86 in southern Grant County and about six or seven miles south of Raleigh the gravel was extensive enough to use in road building. On some of the higher levels there is a gray, flint-like rock that often contains plant-materials. It is in somewhat the same position as the petrified wood that is frequent in the area. At one place two small hills were fairly paved with blocks of it. From one hill north of Elgin a large quantity has been taken to Garrison Dam. In a few places there are remnants of sandstone beds from which the dune sands were derived.

PLANT COLLECTING IN THE BAD LANDS AT MEDORA, NORTH DAKOTA

O. A. Stevens

When James Noonan, one of my former students, now county extension agent in Bowman County, asked me to come to his 4-H camp at Medora, it seemed a good excuse to do some collecting in that area. As a matter of fact, the vicinity of Medora is one of the most collected places in the state because it could be reached by train in the early days and the Bad Lands were a special attraction. However, systematic county collections had not been made until recent years and I was able to add a number of species to the record.

The camp area was a disappointment because it was on a ranch with considerable farm land and no evident natural attractions. I was especially interested in a *Crataegus* that I had previously collected at Theodore Roosevelt's Chimney Butte Ranch. One of the men kindly took me to the place and I got the specimens. This is located in an unusually large, very sandy "bottom." The road to it was devious, winding about among the hills to find a passage back to the river.

Most of my discussion will apply to the immediate vicinity of Medora which is readily accessible to the hurried tourist. I wanted especially *Physaria* and *Stanleya* that I had barely seen and did not know just where to hunt. I finally found both, the former in a very sandy cut in a butte, the latter on a broken north slope which is probably not its characteristic habitat.

Unusually abundant rains since late April had made the Bad Lands a lush green. Two years ago in August the roads were thickly covered with dust in which *Mentzelia decapetala* flowers opened uncannily. Prairie dogs were visible for long distances. This year the dogs were largely hidden by the grass.

The date was July 6-8. *Yucca glauca* was in full bloom, the single spikes usually two to three feet tall, and in some places abundant enough to be quite showy. The greatest surprise to me was *Calochortus Nuttallii.* I had seen little of it before and had formed the opinion that it was rather rare or local, but here it was everywhere (most abundant on north facing slopes). *Sphaeralcea coccinea* formed great red patches along roadsides. Personel at the Theodore Roosevelt National Memorial Park said it had attracted the most comment from tourists. To my mind *Lupinus pusillus* is a dainty thing but it is not too abundant and grows on the river bottoms where it is not likely to be seen. Plants of *Oenothera* (*Pachylophus*) *caespitosa* that Mrs. Chester Brooks had transplanted had grown to tremendous size.

Fig. 1. Typical Bad Lands scene, Theodore Roosevelt National Memorial Park. Photo by George Grant, National Park Service.

Linum Lewisii also surprised me by its abundance and size. It grows especially on north slopes. By contrast, *L. rigidum*, which is frequently conspicuous, especially on sandy soils, was very inconspicuous, only 4 to 6 inches high. The weather had been very dry up to mid-April and I thought perhaps that might have held it back. *Euphorbia dictyosperma* also was dwarf, only about 4 inches high though I had seen large plants in the North Unit at an earlier date in 1943.

Penstemons were present but not conspicuous. *P. nitidus* and *angustifolius* were past. *P. albidus* was occasional. *P. gracilis* was common but more so in depressions on the prairie than in the Bad Lands. The time was late for *P. eriantherus* (*cristatus*). Most of the plants bore one or two flowers at the top of the spike but a few good specimens were seen. *P. grandiflorus* does not reach that area.

The milkvetches were not abundant. *Oxytropis Lambertii* was mostly past bloom. *Astragalus bisulcatus* was abundant and showy in some places. One huge plant of *A. pectinatus* in fruit was noted but very few of other species. *Hymenopappus* and *Actinea* (*Actinella, Hymenoxys*) were in full bloom on the barren hills and *Opuntia polyacantha* was well in bloom especially on ridges. *Plagiobothrys Bradburyiana* (*Oreocarya glomerata*) was still blooming on the buttes and now had reached a foot in height. This had no common name so I called it "Butte Candle." The gray spikes are conspicuous quite early

Fig. 2. Bad Lands, Theodore Roosevelt National Memorial Park. Note contrasts on north- and south-facing slopes, and gullying action in grasslands. Photo by George Grant, National Park Service.

in the season and the overgrown ones of mid-July seem out of place. *Gaillardia aristata* was in bloom along the roadsides, *Agoseris glauca* sometimes made showy patches in the lower places. *Viola Nuttallii*, prominent in early spring, was now in mature fruit and overgrown by the taller plants. The silvery cushions of *Astragalus triphyllus* (*Orophaca caespitosa*) could easily be seen because they grow at the tops of the hills on practically bare places but they now lacked their large, creamy-white flowers. *Echinacea angustifolia* was coming into bloom on the warmer slopes. Later in the season *Solidago*, *Chrysopsis*, *Chrysothamnus*, *Aster* and *Mentzelia* will be the outstanding plants.

Hedysarum boreale has an interesting history. It was found by Nuttall in 1810, then completely overlooked by the "early modern" botanists until about 1920. At the date of my visit it was in full bloom, abundant and showy in some places, but absent in others. It seems to grow chiefly on north and east slopes, on or near quite steep slopes.

Among the surprises were two peony plants in a coulee where some one had lived 20 years or more ago. They were just out of bloom, apparently quite thrifty. *Hesperis matronalis* had run riot around the place. *Campanula rapunculoides* was there but had not spread much.

An account of the flora of the North Unit of the Park was published in the American Botanist for October, 1943.*

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*Stevens, O. A., North Roosevelt Park, North Dakota. Amer. Bot. 49:104-110, 1943.

SOME RECOLLECTIONS OF AN AMATEUR BOTANIST

Campbell Bonner

As well as I can remember, it must have begun when I was a child of four or five years, taken, along with a bevy of small cousins under the care of a nurse, to walk on the "commons" around Nashville, Tennessee. At that time Nashville was a small, dull, unprosperous city, still suffering from the ruin wrought by the Civil War. The poverty and depression of those times explained the existence of the "commons," which were simply unenclosed fields and grass lands, whose owners no longer had the money to fence them, nor to stock the pastures and cultivate the arable land.

Such fences and farm buildings as had once been on these commons were probably destroyed by war, for the Battle of Nashville had raged over this and many other areas round the city. The soldiers' campfires consumed every stick of fencing as well as doors, gates, and loose boards from stables and sheds. A line of earthen breastworks crossed our commons, and as we grew older we dug from the trenches behind those slowly sinking mounds such relics as broken bayonets, many heavy leaden Minié balls, grape shot, and even a small bombshell.

In younger days, however, our delight, as befitted our age, was in the wild flowers. Chief among these was the pink crowfoot, as we called it from its tendency to send out along the ground forking cymes studded above with rose-pink flowerets. It is really a stonecrop *(Sedum pulchellum)*, which, I believe, horticulturists are beginning to value as a rockery plant. Equally splendid in April is a low-growing plant with masses of yellow flowers, for which we had no name. It is Gray's *Lesquerella Lescurii*, and is believed to be found only in the vicinity of Nashville, where, after many years I saw it again, though the commons that I knew as a child are now covered with streets and houses. Then there was the wild larkspur *(Delphinium carolinianum*, perhaps the same as Michaux's *D. azureum*, but despite this alternative name it is also to be found with pink flowers or even white). From these flowers we used to make little wreaths scarcely more than two and a half inches across, that size being determined by the curve of the spurs, which we fitted into the throat of the flower next in order in the ring. Years afterward I have occasionally found one of these circlets dry and crumbly where it had been pressed in some convenient book.

All these flowers flourished where the soil was thin over the limestone on which and of which, to some extent, the city is built. Where there was deeper soil, good grass covered our commons, and dwellers on the outskirts of town used to take advantage of it by turning their cows out to graze until milking-time, when a boy was sent to drive his employer's beast back to her stable.

In waste places, such as the bed of a dry stream or the sides of a gulley, we met less desirable company among the plants and learned to know them, as children must, by way of pricks and scratches. Among them were the cockle-bur *(Xanthium)*, the ubiquitous horse-nettle *(Solanum carolinense)*, betraying its kinship to the tomato by its strong smell, occasionally the detestable *S. rostratum* (the host of the Colorado beetle), which even at that time was making its way eastward from its natural habitat, the western plains. There was one of these denizens of waste soil that specially fascinated us, *Martynia louisianica.* Its seed-pod, curved like the horn of an ibex, split as it dried into two curving horns, which taken together with the sooty color of the dry pod and the strong odor of the whole plant, produced a sinister effect that justified our name for it, "devil's horns."

Those childish rambles quickened my eyes and roused an interest in wild plants that has never left me. But the years of school brought other interests, and for long periods I learned of botany only what garden flowers and door-yard weeds could teach. In summer, however, there were new resources. We often spent some of the hot months on a farm; and I asked so many questions about the trees, many of which were new to me, that my mother hit upon a plan to satisfy my curiosity and keep me occupied and out from under foot at the same time.

Rummaging in a closet under the eaves she found a relic of the good intentions of some long-dead relation — a blank quarto volume, intended for a commonplace book, which the one-time owner had meant to fill with "elegant extracts." There was only a name in the book, and the good rag paper, though yellowed, was untouched and strong. "There," she said; "Now when you see a tree you don't know, bring home a leaf or two, and if I don't know it, Uncle Joe will. Then you can press a leaf in the book, fasten it with a strip of gummed paper across the stem, and write its name by it."

So began what I might call my *foliarium,* which, before the summer was over, bulged with pugent-smelling leaves of many kinds. It was probably a good sampling of all the species accessible in wood-lots, fence-corners, and roadsides within the circuit of a mile from the farm; but if my collection could truly have represented that tree-rich region, I might have needed several more blank books. As it was, I collected leaves of hackberry, ironwood (hornbeam), sassafras, tulip-tree, catalpa, pawpaw, sweet-gum *(Liquidambar)*, black-gum (tupelo, *Nyssa*), persimmon, coffee-tree *(Gymnocladus)*, yellow-wood *(Cladrastis)*, not to mention eight or ten kinds of oak, three hickories, four elms, black walnut and butternut, and one or two ashes. The red cedar *(Juniperus virginiana)* grew so thickly on the glades which were interspersed with good farm land that we thought of it as living a life quite apart from the deciduous trees, as indeed it did.

Needless to say, rambles in search of new trees brought many lesser plants to my attention, among them the tall ironweed *(Vernonia)*, a tough and dangerous enemy to the good grass of the wood-lots, dodder *(Cuscuta)*, the reddish yellow parasitic climber, unworthily called love-vine, and the day-flower *(Commelina virginica)*, with its delicate, short-lived sky-blue petals.

I was not to be a botanist. Throughout my years of school and college another interest ruled my choice of studies. I learned nothing of botany in any formal way except for a simple and useful course in systematic botany; in those days, in fact, there was little more to choose from. But when after my post graduate studies I returned to Nashville to take a teaching position, my amateur botanizing was resumed, now in the company of a colleague, also an amateur, who knew more about plants than I did. With him I went on long walks, often among the hills, where the elevation favored new flowers, like the birdfoot violet; and in the hollows between I remember finding hepatica, bloodroot, trillium (the "wake-robin" variety), and later, wild *Mertensia*, celandine poppy, and a beautiful crimson cup-fungus, probably *Peziza coccinea*.

At some time during those years, the last that I lived in the South, I was introduced to a venerable man who had earned the respect and gratitude of all lovers of southern plant life, and who deserved far wider recognition than he ever received. This was Dr. Augustin Gattinger, then a frail bent man near the end of a long life, who walked leaning heavily upon the arms of his two daughters. As a young Bavarian graduate in medicine he had been driven into political exile in the troubled year 1849, and had drifted from his port of landing to Tennessee and begun the practice of his profession. He devoted his leisure, which was probably much more than he wanted, to the investigation of the natural resources of Tennessee, a study for which his scientific training had well qualified him, and especially, of the trees, shrubs, and plants of his new home. Through many years he rode on horseback for great distances and over the roughest country, collecting and identifying the plants of the state, and discovering several new species which bear his name. This exhausting activity won a somewhat grudging recognition when in 1901 the State Legislature appropriated money to publish his *Flora of Tennessee*, a poorly printed but invaluable book.

Opposite its title page is a photograph — a plain, patient, benevolent face — and below it a most appropriate motto:

Gutta cavat lapidem non vi sed saepe cadendo,

"Not by force, by frequent fall alone
A drop in time carves out a stone."

The Latin verse is not from Horace, as the old gentleman's imperfect memory suggested, but from a modern Latinist who enlarged upon the first three words, which are indeed a proverb quoted by the Roman poet.

Memories like these were brought to mind, not many months ago, by a curious circumstance. In the course of some of the subterranean operations which, by this time, must have turned the underground areas of our Ann Arbor campus into a rather shabby catacomb, a half-yard or so of fill-dirt, brought from heaven knows where, was dumped in a corner near the Natural Science Building. Some weeks of sun and rain wrought a change, and when passing the spot one day, I stopped in amazement, for the seeds imbedded in that soil had germinated and sprung up into a rank growth such as I had often seen in the South, but not in Michigan. Here was a coarse, prickly, red-stemmed weed of which I have never learned the name (possibly *Amaranthus spinosus*), some ambitious shoots of ironweed, and — sure sign of southern or southwestern origin — some flourishing stalks of the tall ragweed *(Ambrosia trifida)*, which Tennessee farmers call horseweed, because in drouthy times, when the grass is dry, horses will browse upon the rank upper growth of the tall weed. But one of my uncles, who had lived in Texas for a year or two, said "Out there, it's bloodweed." He showed me why; crushing the greenish flower-head with his fingers, he forced out a few drops of juice that stained his skin a deep crimson.

I think the senior editor of this Bulletin, like myself, had been eyeing those alien weeds with some interest; but before either of us had time to examine them closely, a belatedly efficient force from the Department of Buildings and Grounds came and shoveled the whole mass away.

THE SECOND HOOGSTRAAL BIOLOGICAL EXPEDITION TO MEXICO, 1939

Virginius H. Chase[1]

This, the second Mexican Biological Expedition, planned and organized by Harry Hoogstraal, left Peoria, Illinois, about midnight, June 10, 1939. It was hoped that enough biological material would be collected to pay at least the expenses of the trip.

We went in an inclosed International Truck. There were six of us; two collecting insects, three collecting birds, mammals and reptiles, and one collecting botanical material.

Harry Hoogstraal, a student of the University of Illinois, from Chicago, an easygoing fellow of 23, an entomological collector, planned the expedition. Because the botanical collector on the previous trip had collected but little and the box containing the insect collection had been stolen by a native under the impression it was something of value, there had been but little to sell to offset the expense of the expedition and Harry had not been able to finance another for this year.

J. Van Gorkom, of Elmhurst, Illinois, was a law student of the University of Illinois who had been the announcer for the Champaign radio station the past year. He was a husky fellow with a good bass voice, and was a natural leader. He spent last summer traveling over Europe and being interested in seeing Mexico offered to advance the money for this expedition. He had no interest in any branch of science; in fact the only book he took with him on this trip was a handbook on "bridge."

Ralph Haag of Englewood, age 19, of the University of Illinois, was much interested in collecting insects, particularly butterflies and moths. He was a Boy Scout of high rank before he went to college, and one of the finest young men I ever met.

Bob Carsuth, age 19, was a big fellow who said (believe it or not) that his great-grandfather was an Admiral in the Norwegian navy. His interests included no science, but polo, aviation, boating and shooting. He carried three shooting irons and asked all along the way about big game. He claimed to have had some lessons in taxidermy

[1] Prepared from two papers presented by Mr. Chase to the Peoria Academy of Science, in September and October 1939, upon his return from the expedition which he describes in the following pages. We are glad to publish his lively account of one of the first biological expeditions that took advantage of the then new highway from Mexico City to Laredo, in the days when tourists were still a novelty there.

and before the trip Harry told me that Bob would help the taxidermist collect and prepare skins and would also have time to help me.

Bruce Wathall of Oak Park, who had done some work at the Chicago Academy of Science, an overgrown Boy Scout of 18, over six feet tall, went as collector and preparator of skins of birds and animals.

And then there was a fellow by the name of Chase who was supposed to collect ten thousand botanical specimens but fell short of his quota. And now having introduced the gang let us see the so-called Scientific Expedition on its way.

The evening of June 10th the representative of the Peoria Star waited hour after hour at the Play House (107 Park Place) expecting to photograph the Expedition as it was ready to start, but gave it up and it was nearly midnight before the last of the party arrived. Official papers from Mexico had not come and a strike in a munition plant had made necessary a trip to Chicago for ammunition. So it was 12:05 Sunday A.M. the 11th of June when we at last headed out for the Farmington Road. We crossed the Mississippi River at Quincy and at 5:15 A.M. had a blowout in Palmyra, Mo. Without proper tools and a rim rusted on it was a long struggle. Being Sunday morning not a garage was open. Van said he was going to church and I wondered if it was to get out of changing tires but throughout the trip he never missed an opportunity to go to mass even when it put him to some inconvenience. We finally got help but lost four hours before getting the old spare on. We had not eaten since Saturday night but it was not until 11:00 A. M. we stopped by the roadside for breakfast. The gasoline stoves were pulled out but no one seemed to be able to make them work very well in the wind. Van told me I might as well get busy frying cakes as I might have considerable of it to do. Since I have been doing my own cooking I have bought prepared pancake flour at least half a dozen times, tried to make pancakes and thrown the package out in disgust. To make a long story short, we wasted an hour and a half and cooked the dough and the boys ate it but there was never anything that looked like a decent pancake. With the blaze high or low, with little grease, a lot of grease or none at all it was just a matter of scraping the griddle to keep the mess from burning. I did not eat a bite and if anyone had come along going to Peoria the expedition could have gone on without me!

At 3:30 that afternoon we had a blowout at Chillicothe, Mo. After trying our jack we went and borrowed two more and finally got the rim off to a garage, bought an inner tube and had the mechanic put it on. It was after dark and we had lost nearly eight hours for the first day. I had had nothing to eat for over 24 hours so went to a lunch room and invited the gang to eat with me. We then rolled down the canvas and went to sleep. Near Cameron, Mo., we saw the only marijuana of the entire trip.

We reached Lawrence, Kansas at 2:40 Monday and Harry went at once to find the herpetologist at the University, Doctor Edward H. Taylor, but it was Commencement day. The walks were crowded with students in caps and gowns with many visitors. A group of science students gathered around but no one could locate Doctor Taylor. Two professors showed us the insect collections and then we drove below the hill and fried onions and potatoes and made coffee. After Harry made one more trip to Doctor Taylor's office, we gave it up and headed for Iola, Kansas.

Perhaps 15 miles out we stopped to check the tires, and Doctor Taylor, who had cut the evening entertainment and left his place on the platform vacant, overtook us and invited us all to go back with him. Bob and I said we would stay with the truck and the others all went back. The Doctor had much to show and much to tell, so they stayed late.

We drive the rest of the night and into Tulsa Oklahoma at 7:15 A. M. We had breakfast at 10:00 on eggs, rolls and coffee and were in Oklahoma City at 2:00 P.M. The boys went to the swimming pool and at 4:00 with a sardine sandwich in hand for dinner and supper we drove on. Tuesday night at 11:40 P.M. we entered Texas. Around Ft. Worth is beautiful black land, good dairy herds and turkey ranches. Near Hillsboro the right of way was bright with tall purple flowers which I guessed might be some species of *Centaurea*.

Near Bruceville we saw our first horned toad and noted our first buzzard, but probably we had passed many before. Near Austin we saw our first paisano, or road-runner.

Into San Antonio 3:30 Wednesday, 102 in the shade. Here the tavern signs read "Sap Depot;" not a bad term as applied either to the commodity sold, or to the consumer! Opuntias as high as the fences became common. For many miles there is a single yucca planted behind each roadsign, the vegetation becomes more tropical, with palms, citrus orchards and agave. After crossing Nueces River chaparral becomes predominant. From here to Laredo the road signs are put up in pairs, one in English and one in Spanish.

The custom inspection crossing into Mexico was tiresome. In applying for a passport I put myself down as Custodian of the Peoria Academy of Science but the word Custodian was too much for the señorita at the typewriter, so, after conferring with the cashier she put me down as "Superintendant of Museum of Peoria Academy of Science."

At the Custom House the personal baggage was opened and laid before a portly señora who looked much bored as she ran her fingers lightly around the edge of each suitcase and waved it aside. Our canned goods were piled on a scale, and weight and charges announced, but when we said "too much" they promptly offered to reduce the weight charged for and then when we said we would take it back and leave it in Laredo they made another substantial reduction; even then we may have paid too much as we never knew what the schedule might have been or who got our money.

At 5:40 P.M. we were on our way. You would enjoy the first stop which was Power's Restaurant at Sabinas Hidalgo: a large room with good food and a wonderful display of blankets and articles of Mexican handicraft for sale. Here, off the hard road four miles is Oja de Agua with traces of old stone fences and old trees planted many years ago when this was the home of the owner of a large Hacienda. A wonderful spring comes out among loose limestones from a face 75 feet wide making a pool from one to five feet deep of crystal clearness. One afternoon a party of señoritas came to bathe and one sat there in the water and sang for a half hour. While I am not a lover of music, I must admit there is charm in the voice of a mermaid. In this dry land picnic spots are rare so this place which is open and free is favorably known far and wide. A man comes every day with ice and sells coca-cola. On Sunday a party came down from Monterrey for a dance on the outdoor dancing floor and we and our bugs and reptiles became the center of attraction and the two or three who could act as interpreters were kept busy relaying information. Below the spring along the muddy border of the stream, butterflies were congregated in great numbers. *Papilio cresphontes,* one of the largest butterflies we have in Illinois, was there by the hundreds. I counted 50 in one group not two feet square. If you made no sudden move to startle them you could pick them up one by one. A small cave close by with a low ceiling contained bats, and large brown moths came to roost in the cave during the day, not far from the opening.

After three days of wonderful collecting here it was decided to go to Mexico City and collect on the way back. For 25 miles there was little to see but chaparral and stony soil; the land fenced and badly overpastured. Then up through Mamulique Pass and a stop to show our passports. Bruce jumped out but as soon as he found what was wanted he realized he did not know where his passport was so he scrambled back into the truck to hunt for it. He did not find it for a day or two but fortunately the inspector had not counted us so we were allowed to proceed. Then there came a place where dark colored millipeds about four inches long were crossing the highway, going east. I estimated one every five feet or over 3000 that we saw just on the pavement. The soil gradually became better and where cultivated, near Monterrey, showed nice green corn and agave fields. We saw several yoke of oxen plowing. The Mexican yoke is a straight piece of wood laid across the necks of the animals just behind the horns. It is made about a foot wide where it rests on the neck and is securely fastened by leather straps wrapped around the horns. An ox without horns would be useless to a Mexican.

Monterrey, 2000 feet elevation, is a beautiful place with some buildings that would be a credit to any city, as well as the old style Mexican buildings. We were unable to buy postage stamps because the entire post office force were taking their siestas. Not yet having our hunting permits we decided to go direct to Mexico City, so without breakfast we left the city at 1:00 P.M. After passing miles of chaparral we reached lower levels where corn became more abundant and Spanish moss hung from cypress trees and at 4:00 P.M. we stopped at Linares for breakfast of eggs, chicken and chocolate. Twenty miles further we entered the state of Tamaulipas and 100 miles beyond Linares we ate supper at Victoria 9:00 P.M. and then had to keep going 60 miles before we could get off the road and across the ditch anywhere free enough from cactus or other thorny vegetation to throw down our sleeping bags. Finally at a place where road repairs made it a one way road we put our beds behind the sign and slept on the slab. A sudden shower got us up at 5:40 the next morning and we resumed our journey, each with a handful of dry prunes. The road climbed a spur of the mountains to where ferns and mosses decked the walls; then out across a lowland of chaparral. We left Valles feeling better with venison under our belts. Passing El Bañito we noted bamboo for the first time and two-foot nests of the oriole became common. As we neared the mountains we could see cornfields on their slopes even up into the clouds, most of them at an apparent angle of 30 or 40 degrees. The crop was mostly corn but some fields were of bananas.

The natives were barefoot and the women by the roadside were carrying large pottery jars on their heads. Around Christmas time I have heard frequent mention of Tom and Jerry, so as I sat watching the passing panorama, jotting down an item now and then, and heard the boys on the front seat mention Thomas and Charley every once in a while I wondered if it might not be the Mexican variety of something similar. But I soon saw a village and the sign said TAMA ZUN CHALE! Children ran along the roadside holding up small quartz crystals for sale. Collecting looked good but we made no stop. As we climbed the mountain, ferns became common among the rocks, and great masses of yellow dodder covered shrubs eight or ten feet tall. One hundred miles out of Valles I have this entry in my Journal: "It is getting colder, the clouds are being whipped around the mountain and it looks as if a storm was in the making, we hurry into our coats and turn on headlights as the clouds thicken and go whirling around curves. A few miles more, the first pine trees and first Mexican poppies" and then, in my Journal there are some crumpled pages spattered with blood! It was 4:30 June 20. We had started a descent of five miles or more of interrupted turns and dips. The increase in speed was so gradual the danger was not realized until at a left turn it was found the brakes would not hold the load; a dip toward the jagged rock wall, which put the left hind wheel in the ditch; an instinctive turning of the front wheels toward the high outer side of the road and crash! The truck fell on its left side, skidding 20 feet and turning nearly around, striking the steel guard rail and wrecking three posts. Harry, who was driving with the door open, had fallen on the pavement and was carried along under the wreckage. Bob who was half asleep on the bedding back in the truck was buried under the supplies which fell from the shelving; a jar of snakes in alcohol was broken and poured down over his face nearly strangling him. It seemed a long time to me as I dug him out and probably much longer to him! Bad as it was, the turning over of the truck just then probably saved all our lives, for if it had gone over the edge it would have gone end over end down a steep slope and been dashed to pieces. The village of Jacala was in sight almost below us but two miles by road. Van Gorkom caught a passing car and hurried for a doctor. Bruce, who had a cut lip, and Bob, who had a cut behind his ear, followed in another car. Ralph stayed with Harry, and I went to work to line up the contents of the truck by the roadside. Tom Simpson, a restaurant keeper and a good samaritan if there ever was one, sent his waiter, Carlos Aguilar, to offer us a place to store our goods until we could make other arrangements and sent his truck to make good his offer. Soon Harry was taken to the local hospital and Ralph and I, assisted by many hands, not to say light fingers, transferred the load. I tied the guns together, Ralph took a picture of the wreck, put the camera in the case and tied it to the guns and, putting it on top of the load, rode down to Simpson's Restaurant. One bundle of botanical specimens came open and pages of the Peoria Star had a wide circulation! After we were unloaded it was found one gun had been stolen, the camera case was empty, nearly half of the ammunition had disappeared and a new rain coat I had when I left Monterrey and have never seen since probably changed hands at the same time.

Harry was taken to the hospital in Jacala where an American doctor and nurse cleaned him up and applied antiseptics and the doctor said he guessed he would be alright. It so happened there were three tourists, all American Doctors, at the Restaurant that evening and when we told them of Harry they said they would go and see him. In five minutes they said his pelvis was broken and his bladder cut and if he was not taken where he could have proper care that very night he would be dead within 24 hours. Our good friend Simpson borrowed a truck and furnished a driver, the good señora at Hotel Consuelo loaned a cot and about midnight Harry with Van and one of the doctors started for the American Hospital in Mexico City. The Doctor helped with the operation and so far as I know he did it as a friend in need for a fellow countryman, without compensation. Bruce had two stitches taken in his lip and Bob four behind his ear, by the local doctor. That night Ralph slept by the baggage at the restaurant while the rest of us had a room at Hotel Consuelo.

The following day we cleaned and repacked our goods so as to take up as little room as possible. The next morning a messenger came to the hotel, but as I could not understand him, he wrote a note which I took to Simpson. It was a summons for us all to appear before the magistrate. Mr. Simpson kindly sent Carlos Aguilar with us. The Magistrate was not in his office so we sat in the public square opposite his house. His secretary came out and questioned two of us (Carlos acting as interpreter), and made out a statement which we and Carlos signed, but we were told to report at the Magistrate's office next day at 10 A.M.

The next day we were taken to the upper floor of the jail, an old building with well worn floors of paving brick. The furniture was poor and home made. Old records, all in beautiful handwriting and some dating as far back as 1888, were all heaped in the corner. This time they furnished their own interpreter and the investigation was all begun over again. Each of us was questioned separately. An Indian took down the testimony, sentence by sentence on an old Oliver typewriter. They did not stop for noon but continued until they had it all down and then we put our signatures on the paper. In Mexico it seems the only "accident" that is permitted on the highway is the result of a "blowout;" anything else is criminal carlessness caused by improper driving or neglect to have the car in good repair. So we were all criminals before the law.

After the investigation was finished I had a little time to work, and from June 24 to July 15 I collected up and down the International Highway, going back into the more shaded ravines and struggling up the rocks of the mountain sides here and there, but all seemed equally dry. The sun was very hot but the temperature in the shade was comfortable, probably 70 or 80. The mornings were usually calm but the afternoons were apt to be partly cloudy and the breeze sometimes was too strong through the ravines for putting plants in press. Ralph found insect collecting good. Bruce shot and skinned some birds every day. Bob after a few unsuccessful trips for big game contented himself with killing a few small birds for Bruce.

Since Simpson was giving us our meals for half price he asked us all to come in at the same time. I was always in bed before 9 and up by 6 and changed plant driers and had to wait till 7:30 or 8 o'clock for the others who went to bed late. In this way I missed the cool of the day for collecting and often did not get out till nearly 9 A.M., returning about 3 P.M., attending to the plants and packaging any ready to be put away. In this way we had but two meals a day, and I may say here we never got more than two meals a day again until we reached home.

After staying in Mexico City with Harry for a week, Van returned. Then we moved all our baggage into vacant rooms in the building where Carlos lived and rested in our sleeping bags here on the brick floor every night for the rest of our stay in Jacala. Ralph worked early and late, collecting butterflies by day and moths by night, and in spite of the drought I added new things to the botanical collections every day.

Van had expected to have the truck repaired at once, but that was not to be. The Magistrate said our papers showed the truck to be the property of Harry Hoogstraal and we would have to present papers showing power of attorney before we could touch it. This necessitated another trip to Mexico City for Van.

June 29 was probably a Church day for about 4:30 A. M. a quartet of young girls sang for nearly an hour in the house adjoining.

As the afternoons were usually windy I found the patio a fine place to dry my blotters. The patio contained an avocado, a papaya and a peach tree, all with ripe fruit; also an orange tree with fragrant flowers and green fruit.

Carlos' wife could speak no English but understood some. They had a little brown-eyed girl of a year and a half, Adriana. Little Alberto, an Indian boy of eight years, was employed to run errands and to look after Adriana, and it was well for on one occasion we caught a live scorpion in the patio. When Adriana slept Alberto played with his Mexican yo-yo. Carlos Aguilar was an interesting fellow. His father, a devoted follower of Díaz, had to flee for his life at the end of the Díaz reign and went to California where the boy Carlos received his early education and played in the Boy Scout band on Catalina Island. Later he returned to Mexico and completed his education in Mexico City. At present he holds papers as an official Mexican Guide. He has had training in aviation and military tactics. He found his most profitable business a few years ago in Acapulco buying and selling pearls and shipping the shells to a button factory in Mexico City. He used to help a surgeon when he required an assistant; also repaired radios and earned many a peso doing little mechanical jobs, but his versatility was his undoing, for his ignorant neighbors said no one but a witch could accomplish all he did and one night he was compelled to swim a mile in the ocean and get help to escape. He had made 5000 pesos in six months so it was hard to give up and leave. He had occasion a few years after to stop at Acapulco for a day or two, and fellows he used to pay 200 pesos a ton for shells came begging him to take what they had for 35 pesos a ton, but he laughed at them and reminded them he had paid them more money than they had ever seen in all their lives and they had not appreciated it enough to protect him so now they might keep their shells.

One morning as I was walking up the highway I met an old Indian. He asked me for something but to my "no sabe" he crooked his thumb and finger to indicate something round and when I guessed centavo he nodded his head and shamefaced pulled down his hat and spread his fingers before his face, but not so but what he could see to accept the ten centavo piece I handed to him.

That afternoon as I came in with my load of plants a drunken soldier came out of a corner saloon and evidently wanted me to come in. I declined, as I have never tasted beer or whiskey in my life, but he laid his hand on my shoulder and repeated a word several times which did not mean a thing to me. I said "no sabe," and then he asked if I was an Americano and said "wisky-wisky-wisky," to which I admitted I did know what that was but wanted none! He then took me firmly by the arm and we went into the saloon. There was an old hag of a barmaid and an old toper steadying himself with one hand on the bar. The soldier ordered a drink and handed it to me. Now an ignorant foreigner like me has no business arguing with a drunken soldier with a gun on his hip; the directions said to take it and I did drink about one third of it and set the glass back on the bar. I could not see that it was any of his business but up came the old toper and tried to get me to take the glass again but I made a wry face to indicate I did not like it and waved it aside, made my best bow to the military, said "muchas gracias" and departed. I will never know what it was that I drank, but as I want no more the name is not important.

Ralph and Bruce caught a ride to Mexico City to see Harry. On July 4th Van got back with his credentials and obtained possession of the truck. He and Bob tore off the entire top but found the local blacksmith did not have proper tools for boring holes in the steel, so they drove to Pachuca and finding the blacksmith there did not appear to want the job, they drove on to Mexico City and had stakes put on and a tarpaulin for a cover and without wind shield or other protection we were ready to complete our journey.

While the rainy season was said to be due June 1st, it was not until July 10th we had a half hour of hard rain and another the following night. The boys were back with the truck the 13th and ready to go but I had heard so much about a cave a few miles away that I insisted we should investigate it. We wasted a day looking for the cave, but found nothing of interest.

The next morning we loaded the truck and stopped at our good friend Simpson's to meet the Senator. We had already paid 25 dollars fine for having a wreck and 100 dollars for injuring ourselves but there still remained the local doctor and nurse unpaid; the local hospital bill, the claim of the half dozen boys who handled the stuff the night of the wreck and then some of them thought we should pay for the damage we did to the roadside guard fence which we demolished. All this totaled 250 pesos. The Senator said if we would leave 100 pesos with him he would square all accounts. Van told him as he handed him the money that he might keep it for all we cared just so we got out of Mexico.

It was 2:40 P.M. July 15 we left Jacala and started on the back track, headed north. Van, who was driving, never had any scientific interests and had gone simply to see Mexico and I think would have gladly come home without stops, but as he had financed the trip and the only hope of getting anything back depended on collections being made, he did not insist. Our truck now was only a stake affair with tarpaulin over the goods and without even a windshield we had to face the wind. As we had no lights it was important to reach Tamazunchale before dark. I had enjoyed the beauty and novelty of the everchanging panorama of the mountains as we came in but now my nerves were a wreck and I could not bear to look down. The rush of the wind in our faces made our speed seem excessive. All I could do was to grip the seat and grit my teeth. Half the time we were driving through clouds of mist. We spent the night at a tourist hotel and left at 7:30 in the morning without breakfast and passed some beautiful collecting grounds in the foothills. We ate wheat cakes and honey at Bañito Courts in El Bañito, some hours later. The waiter, a native of Guadalajara, told us his troubles. It was his first week at the place and he thought it might be his last. His wages of one peso (20 cents American) per day plus tips of which he had seen none, really hardly seemed sufficient as they expected him not only to act as waiter and interpreter, but also to take the place of the cook and the bar-tender if either wished to be absent. He looked as if he had gone unshaven for a week but apparently he had never gone without his tequila for that long.

Two young men with a light enclosed truck, marked Maryland Academy of Science, had been at El Bañito a week or more collecting insects. As they were out collecting at the time of our stop, I wrote a card and put it on their car with "Greetings from University of Illinois and Peoria Academy of Science." We then went back a few miles and made camp in El Pujal on the Río Tampaon. The fellows from Maryland called on us before night as well as two or three times later. The Río Tampaon is a good sized stream, and very muddy, but a tributary flows in and follows the bank next to the village and affords a place where not only all the people get their drinking water and do their bathing but also where all livestock come for water. Our camp was within a half block of the river beside the street they all used. The first night at this camp we found our salt had been lost and the only salt for sale in El Pujal was unpulverized rock salt. It seasons the food alright but you have to spit out the larger pieces.

Plants, such as they were, were collected at El Pujal but the heat was terrific. Friday I went down the road, became overheated and had a chill. I forced my way under some thorny shrubs where there was a little shade and dropped down on my press. A half dozen buzzards flapping overhead began to circle around and I wondered if their presentiment might not be correct. Later it clouded over and I went on collecting. I was faint but think it was from lack of food rather than the heat. After five days here we moved on to El Bañito and collected two days more on a diet of pink salmon and rice.

Knowing that Van would be attending church in Valles on Sunday, and having never been inside a Roman Catholic church I thought I would go with him. But Saturday night I dreamed I had gone with him to church and as the collection was being taken up and I was about to drop in a ten centavo piece, the collector whispered in my ear "Peso, Peso, Peso" — when I awoke I could not remember what followed, but for some reason I had no desire to go to church, and I did not go.

Van wished to ship home some of our unnecessary equipment from Valles but the freight agent was not equal to the problem of accepting freight for export, so the project had to be abandoned. While in Valles an officious young man noted the truck bore but one license plate, so he commanded them to hold everything until he could locate an officer, but while he was gone the boys got out the other plate and had it in place when the officer came. He seemed much put out but saw nothing he could do about it.

From Villas we started for Hacienda Santa Engracia, but about ten miles beyond Victoria we were stopped by a motor cop who spoke some English and wished to see our papers. He noted our truck was listed as a bus, and Van, without thinking, told him we had had a wreck at Jacala and then we were in for it! He commanded us to go back to Victoria so he could telegraph to Jacala for particulars. When we got to his office and Van had a chance to talk he explained how we paid our fines of $25 and $100 so, after considering it a little, the officer told us we might go on.

The delay hindered us so it was after dark when we reached the Hacienda and camped by an artificial lake of perhaps a hundred acres. This Hacienda Santa Engracia contained, at one time, 500,000 acres, but lately the government has confiscated a part, at least, for the benefit of the poor. It sounds alright but "poor people have poor ways" and those who have never had anything and have nothing to do with, either in their heads or in their hands, are no better off than before. The Hacienda is being managed by a capable manager, and a supply of water for irrigation of several hundred acres comes through ditches from the mountains. Large orchards of orange trees were heavy with fruit, not yet ripe, and many more acres had been more recently planted. Tall corn was already in shock. Other fields of agave and henequen covered large acreage. The place is advertised as a tourist resort with good hunting. In winter sometimes as many as fifty guests are there at one time. The rates, I was told, are $6.00 American per day, but that includes horses, guides, guns and ammunition.

We slept under the stars among the cactus. Here by the irrigating ditch we had an abundance of water at least, but the canvas was never spread and I had to do all my work in the blazing sun. I had become nauseated by continued pink salmon and was so faint for food I could not collect much before breakfast and pancakes were never ready much before 9. It was hot and windy and they said the rainy season was not due there before September. Ralph found butterflies very scarce so he and Van went fishing in the lake and horseback riding and at least once dined with the manager at the Hacienda. Bruce got but few birds and Bob read his "Short Stories of Adventure" and "Ace" magazines and visited with the Mexican loafers.

Once as I was collecting plants along the margin of the lake I noticed what I at first took to be little frogs go spat, spat, spat on the surface of the water in a series of four or five jumps of as many feet; but, on looking closer I found them to be fishes about an inch and a half long, propelling themselves by a series of jumps and landing each time on their sides. When they landed on the moist vegetation they appeared to be in no hurry to return to the water, but would root around gathering the minute insects.

We had a call from Mr. Shaw of the United States Department of Agriculture who is residing in a cottage nearby working on the problem of parasites of the fruit flies, particularly in the interest of the citrus growers of Texas.

After three days Van decided to go on but we were delayed and did not get out until 3 P.M. but made Linares by night where we ate a supper of goat meat, eggs, pan blanco and chocolate, then drove a half mile and put up at Chester Courts and for five pesos got a room with a double bed (which they insisted on giving me) and room on the floor for sleeping bags for the others. There was running water, shower bath and swimming pool nearby.

After breakfast in the morning we went on to Galeana over a trail 63 kilometers off the International Highway. The trail, often a one way affair, creeps around the edge of a mountain, then drops off into the rocky bed of a stream and up along the other side awhile, sometimes dodging in and out among boulders as large as a house. It looks all but impassable and in case of a hard rain might be really dangerous. However a daily bus maintains a fairly regular service. We stopped at 2:00 P.M. by a little irrigating ditch where I began at once to collect. No canvas was spread and we slept under the stars, after those who could had eaten their pink salmon. The next day Van rented rooms in the village for one peso a day: dirty concrete floors, windows broken years ago. Without sweeping we piled all our goods in and threw down our sleeping bags and after supper of a boiled cabbage that had wilted two days in the sun on top of the load, and some tough beef, we went to bed. We were all sick and tired of pink salmon and had nothing to put on our pancakes.

This was pleasant country at an elevation of 5000 feet; typical short grass country with sparse vegetation and buffalo grass. There were barrel cactus, some 2-1/2 feet tall and nearly 2 feet in diameter. Cerro Potosí, 25 miles away, with an altitude of 12,000 feet was usually cloud-capped. While it was very dry, many interesting things were found growing along narrow benches in arroyos eroded 40 feet deep. Humming birds were numerous and large black squirrels lived in holes along the edge of the rim of the vertical walls of canyon-like water courses.

Every night the boys stayed at the cafe and played Chinese checkers with the girls until 11 P.M. at which time the electric light plant shut down. One night they went away and left the back door unfastened and a big dog got in and the door swung shut. He was in a terrible panic and tore back and forth from room to room barking and howling. I woke up but knew I could not talk to a Mexican dog so all I could do was to cover up my head in my sleeping bag and hope he would not blame me for his predicament. In about half an hour the boys came back and let him out.

The only apple orchard, the only stubble fields and the only fields of tobacco we saw in Mexico were near here. The finest 12 foot Opuntias or Prickly Pear Cactus were in the gardens of Galeana where they fruited to perfection. Laguna de Labradores covering several acres is about four kilometers west of Galeana and is said to have never been sounded. It is evidently fed by an underground stream for when, some years ago, two men were killed and thrown into a deep pit a mile or more away, the bodies appeared a few days later floating in the lake. The village people use the water but say fish cannot live in it. While we were there two young fellows from near Washington, D. C. went bathing and one lay down in the sun and went to sleep. When he came to go to bed he could neither sit down nor lie on his back and he sent over begging for unguentine, which we were glad to be able to give him.

Van hired a guide and horses and went to the top of Cerro Potosí but never thought to ask the rest of us if we wanted to go. I had six days of very good collecting but was too weak to enjoy it. The sun was hot but with an elevation of 5000 feet the heat was not excessive. Bob had a chance to ride with two American boys and left us. The seventh day, without any breakfast, I walked two miles up the gulch, sat down and went to sleep in the shade and waked up cold. Giving up the idea of collecting I walked back to the road, sat down and slept some more and then went on in. After attending to the plants in press I went to bed without tasting food all day. The next day I did not attempt to go out but ate two pancakes and four wormy prunes and got everything in shape to break camp. Monday when the truck was loaded it would not start and it was only after calling in two Mexican truck drivers we got away about 10:00 A.M. At Linares I got a bottle of root-beer and the boys filled up on candy. Now back on the hard road we put on speed, the hot wind fairly burning our eyes until we reached Villa Santiago. Here a rain threatened so we stopped at a restaurant for supper of beefsteak and tomato sauce, two slices of raw onion, two slices of tomato and four slices of fried potato and two hard rolls apiece with a pitcher of water. The waiter walked out and when Van had eaten he also walked out so we knew supper was over! After driving over a trail perhaps three miles we reached Horse Tail falls and pulling down the canvas, I went to bed and then Van declared he was hungry and led off to a nearby restaurant with Bruce and Ralph following. I thought something but did not say it. I guess Van went to the restaurant more than once for the camp cooking kept getting worse and we were all past eating pink salmon. Ralph got in one day collecting and I got in three. We were not accomplishing much. Van was anxious to get the trip over and worried about Ralph's health, so he sold what remained of the food stuff to the restaurant keeper and there we ate the best meal we had in Mexico, that night.

Horse Tail Falls begins with a series of rapids and cascades for a distance of perhaps 200 feet drop and then a main fall of over 100 feet. Most falls cut back each year but here it appears to be moving outward. At the present stage of the water at least, there is no overshot and the face of the rock is farther out at the bottom than at the top; vines and all vegetation at the sides of the falls become coated with mineral matter which eventually is built into the coarse stone being formed. From the vast amout of this rock all around it is evident that in years past there must have been many falls all around the end of this valley. Some of the stone shows where leaves have been built in and left their form before the leaf decayed. In some places the stone is much more compact than others and wherever a block has projected or fallen out of the wall men with six foot wood saws have sawed it into blocks for building stone. For a few hundred feet from the falls where the air is damp from the spray, katydids, somewhat darker in color than ours, are very abundant and noisy but out where the air is dry not one is heard.

By a strange coincidence Van met a fellow here who came back from Europe on the same ship with him last year.

After collecting here for three days we started for home, stopping several hours in Monterrey and reaching Sabinas Hidalgo after dark. Here as we were eating in Power's Restaurant, in walked Dr. Taylor. He said he had finished marking examination papers two days before at 3 P.M. and had left Lawrence, Kansas at 5 the same evening and had made the trip in 48 hours. He was on his way to Puebla and points south looking for lizards. If you have ever tried to catch a lizard you will appreciate the Doctor's reply when we asked his secret of how he caught them. He said "I grab where they are and not where they were"!

After clearing the custom house at Laredo we came on through San Antonio, Austin, Texarkana and Little Rock. Just out of Little Rock we were stopped for inspection and the truck weighed, one wheel at a time. When Van mentioned he was from Elmhurst, Illinois, the inspector said he used to have a sweetheart in that town, and further questions developed the fact that she was an older sister of Van's girl, surely a strange item to turn up in the middle of the night in the middle of Arkansas.

Although we had been seeing cotton-fields most of the way through Texas, the tallest cotton was in Arkansas where rain had been more abundant. Near Hoxie we saw our only field of rice. From Oakwood, Texas on there were pine trees in sight most of the time, some pure stands and quite dense.

We left Bald Knob, Arkansas at 4:20 the morning of August 15 and were in Peoria by 11:30 that night. On the way I saw Van piously crossing himself many times and there seemed to be need of something more than luck! Youth is ever optimistic; rather than spend a few more pesos in Mexico City where they had the truck repaired, they took a chance and drove all the way back to Monterrey without headlights and all the way from Mexico City to Peoria without a spare tire and there were many times when we were more than 100 miles from where we could have bought one.

I collected 824 numbers on the whole trip, somewhere between 5500 and 6000 herbarium specimens which have been identified by P. C. Standley. I always carried a cyanide jar and picked up some insects for the entomologists. I saw only two fossils, both of the nautilus type, in loose waterworn gravel in the state of Nuevo León, and never once a chipped artifact or even a flake of flint.

Under the law of compensation if weather was too dry for luxuriant vegetation, I at least had no trouble in drying what I did get and if we had run into real tropical downpours I doubt if with only the canvas cover we would have been able to save any botanical specimens.

I hope you may all see Mexico; if for no other reason, it would be worth while just to make you appreciate Illinois. The International Highway is a splendid piece of engineering and with good brakes and reasonable speed it is perfectly safe. It will save you some embarrassment if you accumulate a little Mexican vocabulary before you start. For a very reasonable price you may engage a bonded guide who will drive your car, act as interpreter and locate the points of interest much more quickly than you could hunt them up for yourself.

Summary of plant-collections

June 16-18	7000-7066	Ojo de Agua, near Sabinas Hidalgo, Nuevo Léon
June 23 to July 15	7067-7464	Within two miles of Villa de Jacala, Hidalgo, alt. 4500-5000 ft. Mountains and narrow valleys covered with trees and shrubs
July 17-21	7465-7540	Near El Pujal, San Luis Potosí, alt. 100 feet, near kilometer 455
July 22	7541-7559	El Bañito, San Luis Potosí, alt. 100 feet
July 24-26	7560-7616	Hacienda Santa en Gracia, Tamaulipas
July 28 to Aug. 4	7617-7780	Galeana, Nuevo León, alt. approx. 5400 feet. Mesa dissected by steep-walled arroyos
Aug. 8-10	7781-7824	Hacienda Vista Hermosa, Cola de Caballo, Nuevo León

Virginius H. Chase, from a snapshot taken in 1939, at the time of the trip described.

Harry Hoogstraal

MYRIANGIALES SELECTI EXSICCATI, FASCICLE 9 (NOS. 401-451), ISSUED APRIL 1953[1]

Anna E. Jenkins and A. A. Bitancourt[2]

Our Myriangiales selecti exsiccati, fascicle 9 (Nos. 401-450), United States Department of Agriculture, Washington, D. C., 1949, was issued in April 1953. It serves to distribute material of 19 species of Elsinoaceae (*Elsinoe* and its conidial stage *Sphaceloma*).

Among these are 11 species represented by type specimens as well as several of them also by paratype specimens. Of this group 9 were described from Brazil in 1949 (1) as follows: *Sphaceloma allamandae* on *Allamanda schottii*; *S. cassiae* on *Cassia splendida*; *Elsinoe centrolobii* on *Centrolobium robustum*; *S. cupaniae* on *Cupania* sp., *C. oblongifolia*, and *C. vernalis*; *S. gustaviae* on *Gustavia augusta*; *S. heliotropii* on *Heliotropium transalpinum*; *S. krugii* on *Euphorbia prunifolia* var. *repanda*; *S. psidii* on *Psidium guajava*; and *S. sapii* on *Sapium* sp. The other 2 species were described from the United States, viz., *E. corni* (2) on *Cornus florida* and *S. magnoliae* (3) on *Magnolia grandiflora*.

The remaining 8 species in the fascicle, which appear also in earlier numbers, are as follows: *E. ampelina* on *Vitis* sp. (cult.); *S. hederae* on *Hedera helix*; *S. murrayae* on *Salix lasiandra*; *S. plantaginis* on *Plantago lanceolata* and *P. rugelii*; *S. rosarum* on *Rosa* sp. (cult.); *E. veneta* on *Rubus occidentalis* (cult.); *S. viburni* on *Viburnum opulus* var. *roseum*; and *S. violae* on *Viola* sp., *V. langloisii*, and *V. tricolor*. The hosts not previously represented in the series are *P. lanceolata* and *V. langloisii*, the latter not signified earlier as a host of *S. violae*.

Following the precedent established for previous fascicles of this series, the 10 complete sets of fascicle 9 are distributed as follows:

1. Mycological Collections, United States Department of Agriculture, Plant Industry Station, Beltsville, Md.
2. Instituto Biológico, São Paulo, Brazil.
3. Department of Plant Pathology, College of Agriculture, Cornell University, Ithaca, N. Y.

[1]A contribution under the Point IV program operating in Brazil, under the joint administration of the Brazilian and United States Governments. For the United States the program is administered by the Technical Cooperation Administration, U. S. Department of State, through the Institute of Inter-American Affairs.

[2]Dr. Jenkins is Mycologist, Foreign Agricultural Service, U. S. Department of Agriculture, assigned to Point IV work in Brazil; Dr. Bitancourt is Director, Instituto Biológico, São Paulo, Brazil.

4. The New York Botanical Garden, New York City 58, N. Y.
5. Farlow Herbarium, Cambridge, Mass.
6. Department of Botany, University of California, Berkeley, Calif.
7. Commonwealth Mycological Institute, Kew, Surrey, England.
8. Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, Government of India, New Delhi, India.
9. Universitets Botaniska Museum, Upsala, Sweden.
10. Instituto de Botanica "Spegazzini," Museo, Universidad Nacional de La Plata, Eva Perón, Argentina.

As in the case of fascicles 1 to 8, folders of the labels of fascicle 9, accompanied with a title page, are available for distribution upon request. Fascicle 10 would have been distributed with fascicle 9, but for taxonomic reasons; that is, it contains new species names and new combinations being published in advance elsewhere. Dependent upon their publication, too, is the distribution of the general index to fascicle 1 to 10 (Nos. 1 to 500, 1940-49) already published (1950). As the several fascicles have appeared, more or less detailed accounts of them have been published (3, 4, 5). This plan is in continuance with respect to fascicles 9 and 10.

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MYRIANGIALES SELECTI EXSICCATI, FASCICLE 10 NOS. 451-500, ISSUED 1954

Anna E. Jenkins and A. A. Bitancourt

Fascicle 10 of our Myriangiales selecti exsiccati, issued 1954. The several species in the fascicle are listed as follows:

451. *Sphaceloma abutilonis**[1] on *Abutilon striatum*. 452. *S. aegiphilae** on *Aegiphila sellowiana*. 453. *S. amazonensis** on a Bignoniacea. 454. *Elsinoë annonae* on *Annona reticulata*. 455. *S. asclepiadis** on *Asclepias curassavica*. 456. *S. bidentis** on *Bidens pilosa*. 457. *E. boucheae** on *Bouchea prismatica*. 458. *E. chilensis* on *Ugni molinae*. 459-462. *E. corni* on *Cornus florida*. 463. *S. ditremexae** on *Ditremexa hirsuta (= Cassia hirsuta)*. 464-465. *S. erythrinae** on *Erythrina reticulata*. 466. *S. fagarae** on *Fagara riedeliana*. 467. *S. floridensis** on *Galactia elliotti*. 468. *S. guatemalensis** on *Centropogon cordifolius*. 469. *S. hesperethusae** on *Hesperethusa crenulata*. 470. *S. hoveniae** on *Hovenia dulcis*. 471-472. *E. ilicis** on *Ilex cornuta*. 473. *E. jatrophae** on *Jatropha curcas*. 474. *E. leucopsila** on *Camellia sinensis*. 475. *S. lobeliae** on *Lobelia hassleri*. 476. *E. mangiferae** on *Mangifera indica*. 477. *S. manihoticola** on *Manihot glazovii*. 478. *S. meliae** on *Melia azedarach*. 479. *S. morindae** on *Morinda roioc*. 480. *E. mulleri** on *Polyscias guilfoylei*. 481. *S. phyllocalycis** on *Phyllocalyx laevigatus*. 482. *E. piri* on *Malus sylvestris*. 483. *S. rosarum* on *Rosa* sp. 484. *S. sesseae** on *Sessea brasiliensis*. 485. *S. siphocampyli** on *Siphocampylus macropodus*. 486. *S. viticis** on *Vitex polygama*. 487. *Agostaea nigra** on *Eupatorium* sp. 488. *Bitancourtia cassythae** on *Cassytha filiformis*. 489-492. *Diplotheca tunae* on *Opuntia dilleni*. 493. *Myriangina mirabilis** on *Nectandra* sp. 494. *Myrianginella sabaleos* on *Sabal etonia*. 495. *Myriangium asterinosporium* on *Crataegus michauxii*. 496. *M. tuberculans* on *Carya illinoensis*. 497. *M. duriaei* on *Nyssa sylvatica*. 498. *Uleomyces purpurascens* on *Mimosa velloziana*. 499. *U. tetracerae* on *Tetracera alnifolia*. 500. *U. wellmanii** on *Phoradendron robustissimum*.

As the list shows, the 42 species in this fascicle are divided among 9 genera, viz, *Elsinoë* and its conidial stage genus *Sphaceloma* (31 species, 36 numbers), *Agostaea, Bitancourtia, Diplotheca, Myriangina, Myrianginella, Myriangium* and *Uleomyces* (among these 7 genera, 11 species, 14 numbers). Pertinent literature for the 24 species in the group of more or less recent description (1949-1954) as well as for the 3 new combinations made during the period indicated is cited as follows: (3) applies to nos. 451, 452, 453, 456, 463, 464-465, 466, 468, 470, 473, 475, 477, 480, 481, 484, 485, 486; (2) to no. 455; (6) to no. 457, description in English; (1) to no. 478; (8) to nos. 487, 488, 498; (7) to no. 494; (7) to no. 494; (5) to no. 500. To complete the number, descriptions of 2 species, nos. 469, 471-472, are in press.

The six species in the fascicle already represented by earlier numbers in the series are *Elsinoë annonae, E. chilensis, E. corni, E. mangiferae, E. piri,* and *Sphaceloma rosarum*. In this fascicle *E. annonae* is on a different host species as well as from another country

[1]Species represented in the fascicle by type, paratype or topotype material are marked with an asterisk (*) in this list.

(Central America). Similarly, *E. chilensis* is on a new host genus and species. The several numbers of *E. corni* are variously supplemental to numbers 407-408 as is readily apparent from a comparison of the labels and specimens. *E. mangiferae* (imperfect stage) is here from Puerto Rico; the earlier numbers, under *S. mangiferae,* are from Florida (146-148, 150) and Central America (149). With the issue of this fascicle, no. 482, State of São Paulo, 1948, affords the first published record of *E. piri* in Brazil. No. 483 constitutes an early Norwegian collection of *S. rosarum,* though not the first in that country.

We are taking this opportunity to acknowledge the courtesy of the collectors and contributors of specimen material in this fascicle. We wish also to thank those who aided otherwise in its preparation.

Our account of fascicle 9 (4) contains a general statement about the series as a whole. This gives the names of the institutions in which the 10 complete sets of each fascicle are deposited.

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PHILIPPINE JOURNAL II*

Pierre Dansereau

531120.

An interesting paper by St. John on *Cyrtandra*: what he has to say is always clearly defined, elegantly spoken. (Today he wears a tie, once more the Harvard man, not the Hawaiian emigré!).

W. R. B. Oliver on the floristic provinces of New Zealand. Shows where the major boundaries are situated in terms of the limits of large numbers of species.

Lunch for all U. S. delegates at the Waterworks. Cold beer and good food, and a swimming pool, with a chute. Tobogganing on my behind in borrowed pink Filipino trunks results in a rip and an exposure and much fun. The "geographers" sit together: Bob Hall, Quam, Nesbitt, Pelzer, Fosberg and I and others. Should there not be a Geography section? Hall will propose this to the Council. At the end of the meal, Ryerson makes a speech, short and to the point.

Afternoon session quite long. I am tired and would like to return early. Bus ride through this still unknown city, which I traverse twice every day. Freshness of the morning air, the shutters opening, the faces and geraniums both cool and smiling. Optimistic morning traffic; wilted evening chaos. The dirt, the shutters closing, the tired faces, the shrill honking. Our room at the Manila Hotel is something of an oasis. Shedding of clothes and a cool shower. The ever-smiling boy who brings in the ice. George and John and I have scotch. The sober Allan's conversation just as animate, possibly sharper than ours.

A dreadful dinner at the Columbian Club (we are honorary members for the duration). Quite a rotarian atmosphere. Another phony note.

And now the regular evening fare: two lectures. Two! Van Steenis shows some excellent pictures of Indonesia, especially Botanical Garden pictures. Interesting and earnest but quite encyclopedic. Alex Spoehr speaks no more than half an hour, manages to say a great deal and to arouse much interest.

As I leave the lecture room, I am accosted by a small, dark man, very angular and energetic-looking. Theodore Monod, at last, whom I

*See Asa Gray Bulletin, 2: 323-330. 1953.

have so much wanted to meet these many years. This is the man who has crossed the Sahara many times. Who is committed to Africa. (*"Ex Africa semper aliquid novi"*). A living St. Exupéry hero. We walk back to the Hotel from the Far Eastern University. Quezon Calle full of people at this hour, as we gently push our way through. Odours of fruit and gasoline and varnish. All faces open and friendly. I want to hear Monod speak of Africa and of France. I had expected him to be kind and modest and also earnest in a luminous and critical mood. He is. And something of a missionary. He speaks of many of our mutual acquaintances with a frankness directed to essential qualities, and a restraint that does not ignore their weaknesses but does not dwell upon them.

531121. — Manila — Baguio — Ambuklao — Baguio

As per instructions from Harold Coolidge, at 6:45 a.m. we are at the Bay View Hotel: 20 "distinguished scientists," especially invited to apply their powers (my dear Watson!) to the problems of a hydroelectric project at Ambuklao, in northern Luzon. The party comprises men from the U. S., Hawaii, Guam, Australia, France, Great Britain, British Borneo, New Zealand, and the Philippines. The following are represented: geology, geography, pedology, forestry, botany, ecology, conservation, anthropology, medicine.

After a certain amount of stalling, we are packed off to the airport where we fill in a certain number of forms under the guidance of our genial mentor, Dr. Eduardo Quisumbing. No less a vehicle than the presidential plane carries us off to our destination: Baguio in the North Luzon mountains. A bank of clouds ahead. Shall we be able to ascend into the high country? We pass through this blanketing mass and the air is clear beyond. The Manila Plain still below us. Large glistening gray strips like the stretched hides of reptiles: rice paddies and fish ponds. Soft green of maturing rice. The dark cone of Mt. Arayat, with its dense forest. The Huks are quartered there. The forest is partially secondary and even planted to teak, mahogany and dipterocarps. Drifting clouds brush against its sides, moistening the crowns of trees.

And now the plains give way to a brief piedmont and we fly over mountains. The lower altitudes used to bear a dense dipterocarp forest, but this is no longer visible. The sharply carved slopes are pink and yellow, dotted with clumps of dark green bushes, pale green bamboos. Flying at 6000-7000 feet above the Baguio area, we look down into the vertiginous highland valleys. The erosion scars on their sides are bright pink gashes in the matrix of yellow grassland with unevenly scattered pines. Hill after hill rises to a sharp crest, often bearing a long thin row of pines. The network of streams runs on blue-gray gravel flats in the bottoms, from brushy ravines in the

The approaches to Baguio and Ambuklao from the air. The dominant vegetation is a pine savana which becomes denser in the ravines where it is sometimes even replaced by broadleaf evergreen trees or shrubs.

The steep hills between Baguio and Ambuklao, showing where roads have been carved in the escarpment and rice terraces built on the lesser slopes.

sharp folds of the hills. All the flat surfaces are covered by a pine savana even on the steepest grades. Our plane dives and swerves to show us this lacerated landscape under all its angles. We descend almost within the shadow of the crests to glance at the gaping wounds of the eroded mountains. A few very fresh-looking evergreen copses nestle at the mouths of streams or in the depth of ravines.

This physiognomy strongly suggests, at first glance, a broadleaf-evergreen forest (subtropical or warm-temperate) degraded by man. Lumbering (or rather clearing); a patchy and migrant agriculture. Fire. Grazing. No sign of the latter from the air at this time. A few columns of smoke, however. The broad sweep of this pine savana reflects a long-enduring fire disclimax?

We land on a narrow and short strip at Baguio. An abrupt stop beautifully made. The Pines Hotel very plush.

Forty kilometers to the dam site at Ambuklao. Roads are narrow ledges in the flanks of the mountains. (They have admirable engineers here.) The strength and scale of solifluction in this hygroscopic clay are impressive: gigantic flakes have peeled off in a single landslide. Now that the pine savana is visible at closer range, it appears less homogeneous than from the air. In the immediate vicinity of Baguio (where there have been no fires for a long time?) the pines

A close view of one of the steep slopes near Baguio. Recent landslides have left large gaping scars. Fire has swept over pine savanas and left nothing but open grassland.

A scattering of *Pinus insularis* on a rather gentle slope at Ambuklao.

are close enough to form actual forest. But elsewhere, they are much more widely and quite irregularly spaced. Beneath the *Pinus insularis* extends a generally compact growth of grasses, from the tall *Miscanthus floridulus* to the smaller *Miscanthus sinensis*, *Rottboellia exaltata* and the yet smaller *Themeda triandra* and *Imperata cylindrica*. (What are the differences in ecological amplitude and optimal development of these several species that show conspicuous local dominance?) There are a number of other grases whose "weedy" character is more evident: *Pennisetum purpureum*, *Tricholaena rosea*. (Quisumbing says that, in a pasture survey prior to 1940, this grass is not even mentioned; it is a war introduction!) Very few tree ferns. Local abundance of *Pteridium* and of *Gleichenia linearis*. A *Blechnum* somewhat frequent also. Broadleaf shrubs very scattered. By far the most conspicuous forbs are invaders from America. The tall, lush sunflower, *Tithonia diversifolia*, with its ten-foot canes and beautiful yellow-rayed heads springs in thickets or roadsides and ditches, wherever moisture and light abound. *Eupatorium adenophorum*, on the other hand, withstands a good deal of shade; at this time, its leafy shoots of all sizes up to three feet grow close together, choking ravine bottoms in gregarious colonies and scatter on schist or gravel ledges as isolated individuals.

The dam site of Ambuklao itself is very reminiscent of major engineering works which I have seen in Canada's North Country: the temporary but comfortable shacks, the "House-and-Garden" cottages of the executives, the heavy machinery rumbling along the crude gravel roads. Also the looks in the eyes of the men: the eager engineer, the tolerant foreman, the motley recruits ranging from the carefree youngster on his first job as a man, to the disillusioned slum-dweller, the cheerful gregarious nomad, the half-tamed Indian from the woods, the slow-moving, uneasy farmer. And the land too: abused, eroded, scarred. How beautiful is a lone pine or one of these surviving evergreens: the *Nauclea* with its leathery, almost black leaves and its lovely sphere of small white blossoms (a close relative of our buttonbush), or the *Saurauia* with the fine golden rust on its twigs and under its leaves.

In the few minutes before lunch we scout around and the botanists identify a number of weeds and a half-dozen indigenous shrubs. At lunch, a foreman (or an engineer's assistant?) apparently American, volunteers the information that the rainfall here is 170 inches, 60% of which falls from late June to early September. If this should be so, it is not impossible that some kind of pine forest (and not broadleaf-evergreen) is climax here. This is more than an "academic" question to the engineers who have to think of consolidation by vegetation.

We spend the afternoon down by the river's edge, investigating a small patch of broadleaf-evergreen woods at the foot of a steep slope. Many vines and epiphytes; several ferns. Among the trees, a member of the grape family, *Leea aculeata*, upright and spreading, with bright red inflorescences. In the moist ravines, large arching clumps of the bamboo *Dendrocalamus*. From this meager sampling, it seems that this bottom-ravine or gorge vegetation is somewhat different from the riparian forest, remnants of which yield: *Casuarina equisetifolia*, *Pithecolobium dulce*, *Vitex negundo*, *Homonoia riparia*. (The latter looks very much like a willow and may be its ecological equivalent in occupying the stream-side belt of the floodplain?).

We did not get to see from the inside any pine savana or grassland, any broadleaf-evergreen forest, any riparian bush or marsh, in fact any extensive example of a natural community, primary or secondary. Therefore, returned to Baguio at nightfall with many ideas and hypotheses buzzing in our minds, but not many observations on record.

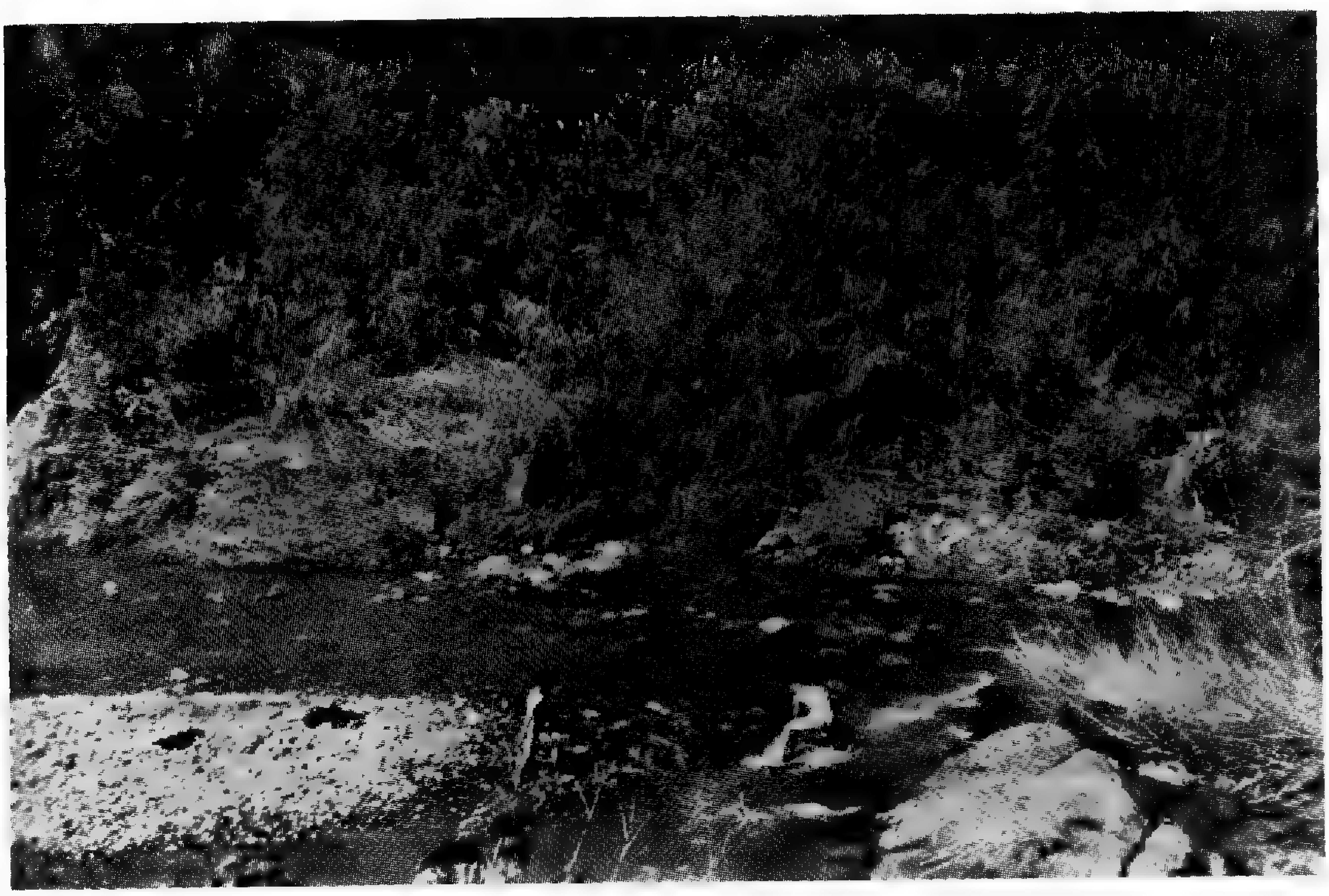
I, for one, will not sit up to discuss my interpretations. It seems to me I have not slept at all since I left Ann Arbor. I am going to bed, now. It is cold (yes, cold!). I shall sleep well.

531121. Baguio

I did. And this morning all seemed very bright, as I walked to church with Quisumbing. He looked so neat and civilized beside me in my field clothes (although my béret may be less exotic here than in Ann Arbor). He belongs here. Good morning right and left. Smiles and tipped hats. The church looks quite new as it stands high above the town, on a hill. Baguio was badly damaged by the Americans as they blasted the occupying Japanese from out of their ultimate stronghold. A large crowd at mass. Some of the Iberian paraphernalia remain, but the mood of these people is different. None speak Spanish. Few speak English spontaneously. Rather Tagalog. Confessions can be heard in Ilocano. But there is a good deal of the casual absent-mindedness of Latin America among these Catholics.

Quisumbing can remember many happy days here with his family and friends. (The mood that comes upon me in Gaspé.) He is a most pleasant man, well informed on many subjects and extremely well versed in the art of living. I should like to know him better and to understand how he has made such seeming harmony out of elements that lay unreconciled in most of his countrymen.

We spend the morning in the environs of Baguio. First, along Governor Pack Rd. to Kennon Rd., where we stop at the high point, the so-called Zigzag View. Stands of pine everywhere in various stages of closure. Many on steep limestone slopes and ravines, always with a grassy undergrowth. Edge of stream with dense brake of *Phragmites karka* and *Tithonia*. The Bued River flows a gray-blue silty colour (not unlike the Upper Inn). Soldiers posted as sentinels mount a benevolent guard at the road junction. Some of them, yards from



The shallow, swift-flowing Bued River, near Baguio. *Phragmites karka* on the far side.

The town of Trinidad, in its rich alluvial plain.

the main highway, have stripped and are bathing and playing in the stream. Would I be "letting down" the Eighth International Pacific Science Congress if I took my clothes off too?

The foresters proudly show us their plantations. Pines closer together than seems to occur under natural conditions. Fires here too. As an immediate result, very lush growth of tall grasses (not favourable to much pine reproduction?). Also very successful: *Alnus maritima,* especially on wetter sites. Not clear whether it is naturalized or not.

Trinidad. A large, flat, alluvial, rich-looking plain. The Capital of Cabbage. Beautiful bamboo baskets (or rather cages) are being made for packing and shipment to market. Well-tended fields, neat-enough homes, a near-California, Steinbeckian look.

As I see this landscape now. Principal vegetation types (as on diagram in position B, from left to right):

(1) *Riparian marsh.* Tall *Phragmites karka* formation, casting very dense shade; deep silt, constant wetness. *Tithonia* now a prominent member, especially of upper part.

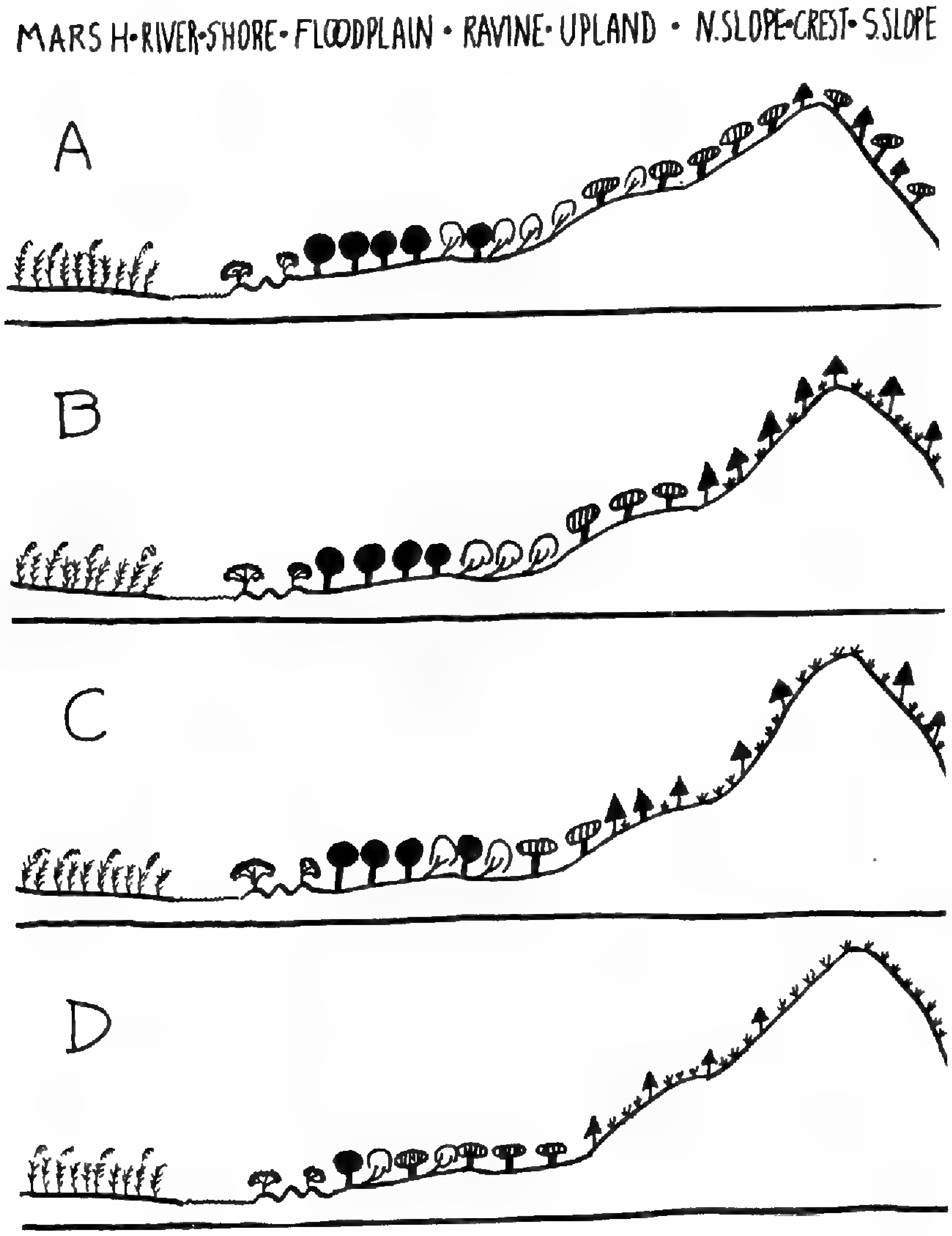
(2) *Riparian scrub* on rocky or gravelly shores. *Homonoia, Hypericum,* grasses. Resembling American and European riparian willow scrub. Much evidence of scouring by periodically high waters.

(3) *Riparian forest*, on flooded shores, gravelly, silty. Narrow belt of *Vitex*, *Pithecolobium* not much herbaceous growth, many vines. (Only fragments seen.)

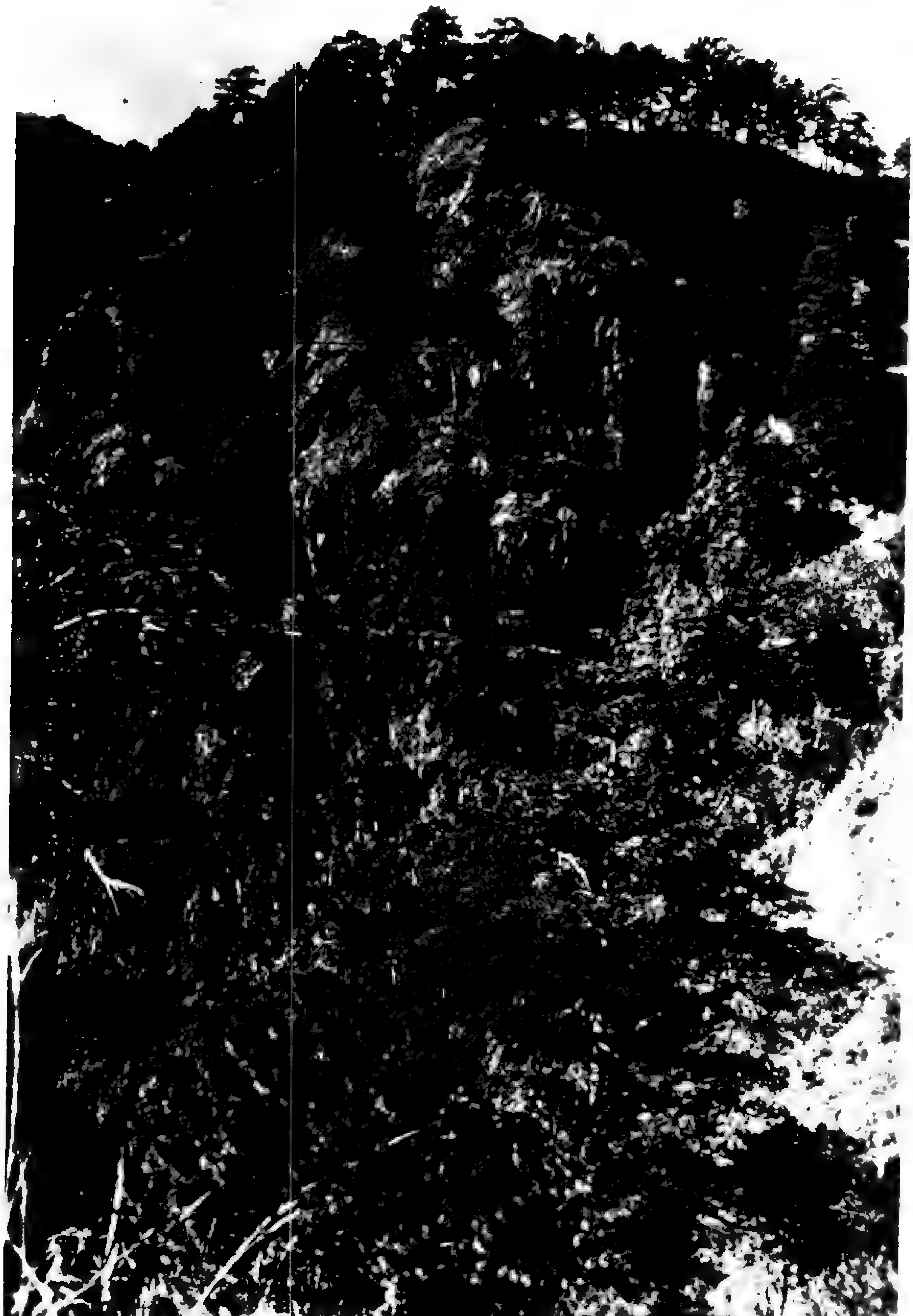
(4) *Hygrophytic broadleaf-evergreen forest*, in seepage area of ravines; with many aroids, herbs such as *Elatostema*, ferns, epiphytes and lianas.

(5) *Mesophytic broadleaf-evergreen forest*, dense, closed, maybe not very tall, with undergrowth of tree ferns, many epiphytes, little ground vegetation. Well-drained soil; possibly on all slopes even the steepest. (Hypothetical, not seen.)

(6) *Pine savana. Pinus insularis*, mostly scattered with apparently continuous growth of grasses, tall, medium and low. Few shrubs, few forbs. On all degrees of slope, even on rocky outcrops.



A diagram illustrating the possible cliseral movements of vegetation in the Baguio area. Very high and evenly distributed rainfall would allow the conditions shown in A to prevail in the undisturbed landscape, whereas very low and/or very unevenly distributed rainfall would induce the distribution indicated in D. The B and C lines show intermediate conditions.



Pinus insularis growing on the top of a ridge and on the neighbouring escarpments. Near Baguio.

(7) *Grassland.* Essentially as above, without the pines. Dominance locally by: *Imperata cylindrica*, *Themeda* and *Rottboellia*, *Miscanthus*, *Andropogon*. These facies no doubt correspond to different light, water and humus requirements, fire resistances, and historical sequences.

The climatic-edaphic-structural dynamics seem to me to work like this: the pines form a closed forest (sensu stricto!) under high and constant rainfall, northern exposure* (i.e. reduced evaporation), not too steep slope; they open up to savana progressively under lessened or irregular rainfall, southern exposure, steeper slope, eventually to grassland (without pines) under extremes of these. Conversely, broadleaf-evergreen mesophytic upland forest can overcome the obstacles of exposure and slope under high rainfall but must seek the refuge of flat, or low land (even swamp land?) under low rainfall.

Under the wettest set-up (as plotted on A in my diagram) there is little space for pine and grasses, which are virtually pushed out of the picture. (Can they have survived at all, if A-conditions ever prevailed, and if fire did not always maintain a situation edaphically similar to the climatic conditions of B?) Under B-conditions (to my mind the most likely prevailing now in the Baguio region) three principal primary associations dominate the landscape: the evergreen-broadleaf at the foot of slopes and on plateaus, the pine forest on steep north slopes, the pine savana on ridges and steep south slopes. The increased dryness of the C- and D-conditions relegate the broadleaved evergreens even farther downslope to wetter habitats. The D-aspect of the present upland landscape is not due to a D-type climate (nothing to do with Köppen's D, of course) but to D-conditions induced by fire, grazing and other disturbances.

This is the scale? These are the shifts? I wish I knew what the climate really is, and if its trends are strongly enough attenuated within a hundred miles to cause shifts of the climatic-edaphic dynamics.

Ray Fosberg and I spend the afternoon roaming around the town, especially the market. It is vain to look for works of art. The wood sculpture has none of the inventiveness nor the ingenuity of the primitive, none of the polish of the sophisticate. Crude rather than naïve. (And vulgar: a carved female casse-noisettes which lies in rows on every counter is quite sinister.) The cloths offered by the Igorote women are nice enough, but in very conventional patterns. Otherwise the market is an exciting place: the variegated odours and colours of fishes, the lovely faces of the young girls, the loud claims of the merchants, the live turkeys and ducks escaping. Bewildered, elderly Indians wearing a modified loincloth pass in and out of the shadows of

*Or, it could be eastern exposure if rainfall is higher on east than west slopes.

the eaves into the limpid sunlight among the streams of running children (the instincts and gestures, without the knowledge, of the Hopalong Cassidy set).

The evening is spent in conference. Our host shows up (in field clothes of excellent quality and taste): Mr. Filemon Rodriguez, a small, mild-mannered man, with dark, squirrel-black eyes and a patient smile. He is accompanied by an assistant, much more important-looking. They have driven up to Baguio, bringing with them E. H. Bryan, Roger Heim and Julian Huxley. (We recall 1946: a day in the Carioca hills in search of frogs with Bertha Lutz and Oliveira Castro).

Harold Coolidge has the flu and could not come, so Huxley presides over the meeting. Each group in order and in good order, under his kind but sharp command. Introduction by Bryan and reading of a credo of sorts printed in our programme and reproduced from an I.U.P.N. (International Union for the Protection of Nature) resolution (Caracas 1952).* Reports by groups.

Geology by H. Williams. *Soil Science* by James Thorp. Soils of the hills shallow but of fair quality. Best soil in lower reaches. This to be considered. Grass will hold soil at surface, but cannot be expected to prevent slipping. More deeply-rooted pines may do better. Erosion not an unmitigated evil: some buried minerals thus exposed restore fertility. (This has often appeared to me as a reason for the position of oak savana on the rises of the grassland interior valleys of California. Maybe also responsible for position and distribution of piñon-juniper in Utah?) *Geography* by Quam. Undercutting the most severe phenomenon to be expected. No amount even of actual planting of trees now could stop it. But need for power probably outweighs all other considerations. The question is posed of high and low dams. Or many, smaller reservoirs vs. few large ones. Rodriguez gives reasons for present choice. *Hydrology* by Theodore Arnow. Hopes that meteorological and runoff records will be made. Rodriguez states this is begun.

Botany by Fosberg. Ray says that, as far as we know, no valuable endemic species is likely to be destroyed. He gives a summary of our observations, listing the principal vegetation types we have actually seen. Hypothesizes a widespread broadleaf-evergreen forest, a narrow occupancy by pine in the primeval landscape. This present condition fire-induced. Rodriguez adds that, before the war, pasturing was very widespread and some areas overgrazed. Discussion of successional trends. Considerable doubt on the amount of work that "nature" can do in useful time to prevent landslides and other milder forms of degradation, even if fire protection is insured. Providing fire protection by placing responsibility upon Igorote chiefs a very good

*Printed in the General Programme of the Congress, p. 106.

idea, probably most efficient move. I naturally chip in with the proposition that a synecological study would be very rewarding. (No one in the P. I. is doing anything of the kind at present.) *Forestry* by Swift. Present nursery is due to be flooded.

Anthropology by Eggan. No archaeological sites of particular value to be flooded. Moving of populations (about 200 families over 400 hectares) to neighbouring areas, where all seem to have relatives, not much of a problem. Compensation should be made. (Rodriguez says 1000-2000 pesos/hectare.) Improvements "in trust for descendents" should be taken into consideration. Rodriguez outlines difficulties in advance planning of migration. Even present inhabitants working at damsite do not see the *reality* of what is about to happen. Actual flooding only is real. (I think of C. F. Ramuz' alpine villagers; their disbelief, their panic in the face of change.) This is a delicate issue. *Public Health* by Meyer. People should be moved away from large bodies of water such as this will be. Mosquitoes and encephalitis. We do not know how grave this disease is now. If Ambuklao is to serve as a recreation area the danger will be increased.

Many points in general discussion. Huxley pleads for one body (not State Foresters and Company both) to handle the entire reforestation programme. Roger Heim makes neat little speech (in French: only Huxley and I follow throughout ?) in three points: 1) draft report of present meeting for Pacific Science Congress Proceedings and for I.U.P.N. in Brussels; 2) ask Standing Committee on Conservation to request all countries to set up a national consulting committee on Conservation; 3) ask hydroelectric companies to provide facilities for field studies, especially in connection with congresses of this kind.

Huxley has presided this reunion with what can only be called authority: indeed with the brisk, considerate impatience of a truly democratic but consciously superior personality. The real hero is Rodriguez, who has quietly informed us that the issues we raised had already received consideration — some of them actual study. There is nothing suspicious about the verbal assurance and the smooth confidence of this man. But has this panel of international experts really earned its keep?

531123. — Baguio — Manila

A pleasant day. Gone is the tension. Beautiful drive in a Chevrolet station-wagon just like mine. (I learn of the unsuspected discomfort of the back seat.) Rodriguez and his assistant Ramirez, Thorp, Quam and Nesbitt. We go down the Zigzag Rd. (Kennon River) once more and I can observe th͘e changes from the mountain to the plain. Again, only surmises on the climatic situation. At the Zigzag, pines dominate the landscape as they do around Baguio. Near Kios, they are still visible hundreds of feet up the slopes, but in the canyon (Pliocene mountains, canyons cut in Pleistocene, says Quam) a very different vegetation prevails: lots of ferns and grasses in the open; many evergreen broadleaf-shrubs and trees. Most remarkable is the very frequent occurrence (in the somewhat disturbed forest) of large deciduous trees, apparently belonging to several species (genera? families?). They mostly have very smooth (possibly exfoliating) trunks. One of them is probably *Albizzia lebbeck* (shown to me by Quisumbing yesterday). Could there be such a thing as a *weak monsoon* effect in this valley?

Between Kios and Twin Peaks, steepness decreases. Larger patches of broadleaved forest. (Here careful drivers relax, apparently, for a roadside sign reads: "Drive like hell and you will be in hell.") On river edge *Pithecolobium dulce* (or something that looks like it, or like the Brazilian riparian *Piptadenia*!). Still a few deciduous trees, many small-leaved, almost no megaphylls (except the planted bananas). Bamboos are not overwhelming in disturbed and marginal habitats.

Through the Kennon Gate and across the broad river flat with its big tufts of *Saccharum spontaneum*, and we are back in the Plain where it is warm and humid. We stop many times to take pictures of naked children, old women winnowing rice, men driving carabaos (water buffaloes), young women walking elegantly with loads on their

A typical hut constructed mostly of bamboo and palm leaves, in the Manila Plain.

A woman winnowing rice. The house is constructed in part of sawed lumber, of galvanized iron and of bamboo and palm leaves.

heads or children in their arms, straw houses, pigs, mule-drawn carriages. The whole plain seems to hum. There is a feeling of carefree happiness. The faces of the children much like the open *Hibiscus* blossoms, the gait of the young women much like the insensible away of the lovely *Corypha* palms, the hard work of the men much as the growth pains of the sturdy flowering cane.

I spend the afternoon in my room at the Manila Hotel. A half-day's freedom from speeches in order to prepare a speech myself for infliction tomorrow. A quiet, warm afternoon of leisurely labour, the most productive conditions I know.

At five-thirty, Allan Smith comes home (home?) and after shower and shaving, we set out for Quiapo in a jeepney. (This hour of the day in all cities of the world is most revealing: the wet pavements of Paris in November, the myriad birds in the esplanade of Rio, the falling snow in the canyons of New York, the chanting vendors and streams of bats in Palermo.) As we cross the bridge into the crowded centre, the six lanes of cars seem to rub against each other in squeaking spasmodic advances. The arcades ring with sound and colour, as we jump from our vehicle. These jeepneys (very cheap collective taxis) have American-made motors and locally tailored bodies not unlike the old-time pony-carts of which they have the dimensions. Eight Filipinos fit into the two-facing benches quite well. Allan and I are not too bulky to cause them any discomfort, but some of our fellow-delegates of more Nordic or Alpine dimensions do not fit so well. An alternative means of transport is the bus, where one can read a number of signs that acknowledge an unfortunate tendency. For instance: "Do not stand near the entrance, many a wallet is known to have disappeared in this way." We deem it safer to have our wallets in our trouser pockets where their presence can be checked from time to time. This mean preoccupation is somewhat dampening.

We go from shop to shop, talking to people, asking about the origin of this and that. Quite unsophisticatedly touristic. Some are very eager to sell and quite unashamed. Others are disciples of Mr. Dale Carnegie and have the most exquisite counter manners. As may be expected in an economically low-standard population, there is a vast amount of bazaar merchandise although luxury items can be found in many shops. Prices are often not marked, or if so, well above what the item actually sells for. Bargaining seems to be in order. We have been told not to pay the full amount, but to argue. This could be exasperating. But we have plenty of time, and are in a mellow mood.

We engage in a dark side-street, cross a bridge over a smelly but picturesque canal (lined with shabby bay-windows, bamboo blinds, dilapidated terraces), into the Chinese quarter. It appears that all of the commerce here is in the hands of the Chinese. Allan reads Japanese fluently and can make out some of the signs, posters and labels. We enter several shops. They all have pictures of the Generalissimo and his lovely lady, both smiling in washed-out blue and pink chromos on the neat plaster walls. Also many books and periodicals, mostly published in Formosa or Hong Kong.

We come to a large square with a basilica in ruins, guarded by indolent-looking soldiers. We walk endlessly in the arcades almost trampling the young knife and shoe-lace vendors, the old women who sell fruit and pimento, the shopkeepers in ambush just outside their doors, the smiling girls at counters, the swarming children. Everyone looks clean in a newly starched shirt, in a bright skirt, in immaculate shoes. No sullen faces here.

The rest of the evening is not so gay. The official dinner at the Manila Hotel. Everyone in his best attire. Many of our people have purchased or have received as a present (for instance George!) the "barong tagalog," a very transparent embroidered pineapple-fibre shirt which is worn instead of a tuxedo on formal occasions (Marston Bates, I can see you applauding with both hands). The esthetic value of this is questionable: it is worn over a very ugly and plain jersey T-shirt with three buttons down the front. Comfortable? yes!

A roomful of distinguished delegates from all over the world eats the usual banquet fare and listens to uninspiring speeches. Under the assumption that we have worked hard enough all day and require relaxation, we are favoured with a genial homespun story-telling that seems to address itself to "the boys" in the lockerroom of a golf club. Even the more sensitive Oriental, who starts off with Confucius, makes a lame attempt at this travelling salesman's humour. Many middleaged adolescents beam. Depressing. Some people, just as highbrow and stuffy as myself on this chapter, do not applaud.

531124

I feel quite happy now, but this day did not start well. Maybe I boast too much that warm, wet weather suits me fine. I got up feeling shaky. The delicious papaya at breakfast, the sight of the magnificent *Barringtonia* just beyond the terrace, the good humour of George, Allan and John did nothing to restore me. Overcast sky. Bumpy ride to the University. When the stomach and the head are not steady the world revolves without you. (Yes, without you, *without* you. "Still is sitting, *still* is sitting." Sinister mood.) Consequently did I give a poor account of myself in my speech about my beloved temperate rainforest, which I anticipated by giving it in the morning, as I felt I would not last till my scheduled time in the afternoon.

I try to develop the idea of efficient and inefficient *climatic trends*. Main types of climate not so much hot and cold as equable and unequable. Rainforest areas (tropical to temperate) enjoy equability par excellence. Maybe the Northwestern European coast (with a heath climax ?) is equable too. Departures from equability are limited in number and kind. A good example is the monsoon tendency: strong in Burma, it determines a deciduous tree layer in the forest; weak in Southeastern Brazil, it determines a minor deciduous element in an otherwise typical rainforest. Such also are the mediterranean trend, the cool-continental trend, etc. Schimper's 15 formation-types (or some equivalent structural units) are the essential responses to the regionally high efficiency of these trends, their capacity to overcome contrary topographic, edaphic, floristic or historical elements.

I do not manage to say any of this with the oomph that the occasion calls for, alas! Some discussion, but not very much. To make matters worse, I am required to preside over the meeting.

A most interesting paper on the "tropical face of botany" by van der Pijl, given with assurance and gusto and re-emphasizing ideas which I hold to be important. "Do not ask why there is cauliflory in the rainforest, but why there is none elsewhere? That is the proper question." He also says that "anemophily as a primitive character is losing its hold." Many other assessments of evolutionary lines from tropical to non-tropical groups in leaf function, in corolla shape, in fruit dehiscence. Importance of frugivorous animals, especially bats!

Interesting report by Velasquez on 7 species of Philippine Algae tolerating temperatures up to 74° C and two of them 83° C. (In Japan 90° C, in New Zealand 87° C have been recorded.) This poses many problems concerning the range of coagulating point (these plants "thrive luxuriantly" at such high temperatures!), the anatomical and physiological defenses and the genetic adjustment to a highly fluctuating environment. (I am very much convinced that amphitolerance requires something *more* and something *else* than euryvalence!)

Ruy Cinatti's account of the vegetation of Timor is interesting. Brief and somewhat apologetic. (His English is not perfect, so we confer afterwards in Portuguese for supplementary discussion.) There is: (1) dry coastal forest; (2) mangrove (not much *Nipa*, mostly *Avicennia, Rhizophora, Bruguiera*); (3) evergreen lowland forests; (4) monsoon forest (central part of island); (5) montane forest (*Planchonella, Acer niveum*); (6) *Eucalyptus* forests (with *Euterpe*? Both of these are spontaneous. Are they indigenous?); (7) secondary forests (mostly *Eucalyptus* and/or *Acacia* dominate). Highest peak is 2900 m. *Podocarpus imbricata* and *P. amara* down to about 1500 m., attain 25 m. in height. Cinatti has a number of clear photographs that would look good in the "Vegetations-bilder" (a nice task to be taken up by the U. of Michigan Press!).

In the late afternoon, Allan and I again set out to explore Quiapo, the teeming centre of Manila. We are in search of cheap but attractive osier suitcases to load our accumulated Philippine acquisitions. We find nothing that could later be used as a picnic basket: it is all very crude work and too highly priced. We argue for the fun of it. The spectacle of the market, however, is rewarding. Under a vast roof, stall upon stall, row upon row of booths. Rice of many colours and grades, meat and glistening fishes. All very encumbered, narrowly piled up, but orderly, clean. Pungent, but good smell. I know nothing of oriental markets, but this one is not unlike mediterranean ones I have seen. (No fish market will ever be as beautiful as Venice's.) Half-humourously we are offered sacks of flour, large and small fishes, sides of beef. We do stop at a Coca-Cola "fountain" (on which the sun never sets!).

Late afternoon. Port Officer's Club. Cocktail to which I am invited by my unknown Michigan colleagues of the Institute of Public Administration, Ferrel Heady, T. H. Drews and their charming wives. Amos Hawley and his wife are there also, as well as Russell Fifield (whom I had never met in Ann Arbor). A lively reunion, which I leave to join the Santos', whom St. John, Walker, and I have asked to dinner at a Chinese restaurant.

As we walk back in the dark to our hotel across the square, the prostitutes come tugging at our sleeve. But they are not nearly so insistent as the taxi drivers who honk and shout in quest of fares.

531125.

Does the sun sparkle more in the air of a tropical morning in Manila than on the freshly fallen snow of Quebec? The symbolic *Barringtonia*, yards from our breakfast table, seems more powerful than ever. Its large black leaves are all neatly stretched and layered; its pale green fruits, in spite of their lantern fragility, hardly sway on their slender stems. The sunken ships in the harbour, the blue line of Bataan, the slow-moving small craft, the glistening sheet of water, the flashing arrows of bird-forms are a design of peace and hope.

In fact, no sooner do we leave the dining-room than we are swallowed by an optimistic onrush of white-clad people, pushing and cheering. The object of their enthusiasm is no less a personage than Ramon Magsaysay, the president-elect. He is a tall, good-looking vigourous man and moves easily with the crowd, shaking hands right and left. He wears that reassuringly adolescent smile which the people so enjoy in a politician. Standing beside me is a fellow-delegate, dressed with the slightly rumpled negligence which is the stamp of British style (how I wish I could achieve it!). He makes some half-disparaging remark about demagogues, whereupon (ever the oppressed Colonial!) I inquire whether public men in his country are quite above such deplorable habits. We do not argue the point too much, and quickly get on to more interesting considerations as we board the bus for the U. P. My interlocutor turns out to be Sir Edward Bullard, a man who can make more of casual encounters than airing his meteorological views and ascertaining that you are a regular fellow. It is a pleasure on such short acquaintance to have skipped preliminaries and gotten on to the origins of anti-intellectualism and the effects of cultural intervention.

Quisumbing again appoints me chairman of the Botany meetings. I also give a brief account in English of a French text by Léandri. At 10 o'clock, I declare a recess for mid-morning coffee. (Do I remember that in New Zealand anyone complained of these morning and afternoon recesses? Here, we just have not had enough of them!).

Julian Huxley is sitting at a coffee table. I talk him into coming to the Botany session where the Wallace line and the Huxley line are going to be discussed. I give substantial extracts (in English) from a lengthy and important review by J. Arènes (Muséum National d'Histoire Naturelle, Paris) on the opinions of the French biogeographers on boundaries in Indo-Malaya. Arènes' own thinking seems to run to the concept of zones rather than lines of demarcation. The discrepancies between Huxley, Weber, Wallace lines largely occur in these zones. This fits my way of thinking very well. It harmonizes on a larger time-scale with the climatic trends which I have described yesterday and which I believe are the true controls of vegetation zonation.

I ask for van Steenis' comments, as he knows the whole of Malaya better than anyone else (present or absent). He says that he can hardly do so in less than 10 minutes. I grant him 15. He takes 35. His exposé (for it is an exposé, not a comment) very usefully states the known facts as only he can state them. I then ask Huxley to say a few words. He develops the idea of trends and clines, but does maintain the existence of some very real breaks. Quisumbing, Oliver, Holttum also take part in the discussion.

Hosokawa is on next. He distributes a most interesting phytosociological chart. This follows the nomenclature and system of the Zürich and Montpellier School. As it refers to the forests of Micronesia, it is of special value since applicability of these methods in the Tropics has been contested. Hosokawa has added a good deal of his own thinking to the Montpellier procedures. It is to be expected that his work on aerosynusiae will be duplicated elsewhere!

I return to town with Holttum and we have lunch together at the Taza de Oro, a very pleasant little restaurant where one gets excellent native fish. Holttum is the imperfectible image of the British Colonial: colour, speech, manner, clothes. Reticent and reserved but cordial and tolerant. He is about to retire after about 30 years in Singapore. Will return "home," although he says that Malaya has become home to him by now.

Afternoon at Museum for a Museums conference organized by R. C. Murphy. His report is excellent, full of stimulating ideas. But somehow not very much discussion takes place. Roger Duff (New Zealand) proposes that queen Salote of Tonga be approached and persuaded more or less to yield the tombs of her ancestors as a museum. There are strong protests over this and the proposal is much modified.

ERRATA, VOLUME II

Page	Paragraph	Line	
4	2	10	for W. T. Turrill, read W. B. Turrill.
36	5	2	for *Anona*, read *Annona*.
45	4	lines 2 and 5,	for *Gliricidium*, read *Gliricidia*.
47	1	4	for *Ocatea*, read *Ocotea*.
49	4	7	for *Jacquina*, read *Jacquinia*.
139	4	20	for *Megoceros*, read *Megaceros*.
179	2	6	for Burr, read Bur.
180	2	7	for *Schizostega*, read *Schistostega*.
194	6	7	for *Abies*, read *Picea*.
195	1	10	for *pubens*, read *pubescens*.
203, last word,			for *Rynchospora*, read *Rhynchospora*.
250	1	1	for *chinensis*, read *chinense*.
294	3	12	for *Exostemma*, read *Exostema*.
377, right column, line 11 from bottom,			for *Symphoricarpus*, read *Symphoricarpos*.

NEW BOOKS: *Das Pflanzenreich.* The publication of this great project, which has as its objective the completion of a series of systematic monographs dealing with the plant-families of the entire world, was interrupted by World War II. Publication was aided from the beginning in 1900 by the Prussian Academy of Sciences, and 105 parts (German, "Hefte"), treating approximately one-fourth of the known families of flowering plants, had been published before the beginning of the war. With the destruction of the great Berlin herbarium in 1943 there seemed to be no further possibility of continuing the work in Germany. One manuscript already in the hands of the editors was published in Leipzig on May 25, 1943 as Heft 106. This was the treatment of the first half of the subfamily Lobelioideae (Campanulaceae),[1] by Franz Elfried Wimmer, of Vienna. Unfortunately this was another casualty of the war; before the edition of Heft 106 could be distributed it was lost in a fire in one of the bombings of Leipzig, and very few copies are known to have survived. Now we learn that *Das Pflanzenreich* has been revived and will continue, under the editorship of Professor R. Mansfeld, who takes over the work so ably begun by Engler, Harms, and Diels. On December 30, 1953, under the imprint of the Akademie-Verlag, Berlin, appeared Heft 107, comprising the second part of Wimmer's Lobelioideae.[2]

The present volume may well stand as a monument to the lifework of the author, who has spent three decades in intensive investigation of one of the most interesting of flowering-plant families, and a family, incidentally, which was extremely poorly known at the beginning of his work. Of the great American genus *Centropogon,* for example, no more than 36 species were known to the compilers of the *Index Kewensis;* the number of species treated in *Das Pflanzenreich* is 216, and most of the newly recognized species have been made known to science by Wimmer himself, in a long series of papers which began in 1924.

Since 1924 Herr Wimmer has examined personally practically all of the important existing herbarium material of Lobelioideae, and has revised the holdings of all the great herbaria in this country and in Europe. Unlike some of the earlier authors of parts of *Das Pflanzenreich,* he has borrowed freely from American institutions with rich holdings of American plants, and as a result his work has an international rather than a provincial viewpoint. His generic concept is broad; his species-concept is somewhat narrower (e.g., in the group of *Lobelia cardinalis,* where recent studies, including the cytogenetic investigations of Bowden, indicate the existence of a single species, Wimmer recognizes four species). The work is abundantly illustrated

[1]Das Pflanzenreich. Regni vegetabilis conspectus. IV. 276b, I Teil (106 Heft). 260 pages, with 4 maps and 55 figs. [incl. 4 plates]. Leipzig, Wilhelm Engelmann, May 25, 1943.

[2]Das Pflanzenreich. Regni vegetabilis conspectus. IV. 276b, II Teil (107 Heft). pp. I-VIII, 261 - [814], with figs. 56-112. Berlin, Akademie-Verlag, December 30, 1953.

Franz E. Wimmer

(From a photograph presented to the junior author in 1947.)

with original drawings. The keys to large genera I find difficult to use, chiefly because of the author's dependence upon somewhat subjective distinctions like the following:

1. Leaves oblong to elliptic, sometimes toward ovate or obovate.
1. Leaves oval to rounded.

These keys work well enough when one has in hand the types or authentically named material, so as to be able to see what the author had in mind, but they are not for the tyro who merely wants to name an unknown!

Taxonomic botanists everywhere will welcome the completion of this scholarly and useful monograph, and congratulate the author upon a labor of love well done. — R.McV.

SOUTHWEST CHIHUAHUA[1]

Irving W. Knobloch

From 1937 to 1940, the writer was employed by a mining company in the state of Chihuahua, Mexico. Week ends provided time to study the flora and the fauna and to collect specimens. The commoner reptiles, amphibians, birds and mammals were preserved and sent to various authorities. Having been trained somewhat in botany, I was especially interested in the varied and, as yet, unsampled plant life abounding in the region. Well over one thousand numbers were collected in this category. A few words about the region may be helpful to others working on the Mexican flora and some botanists may even feel constrained to visit the area.

Most of the collections were made at Mojarachic, Maguarachic, and at the nearby Barranca del Cobre, in the Sierra Madre Occidental, where the elevations run from near 5000 to about 10,000 feet. Since these localities are not found on ordinary maps, it may be stated that the first two are a few kilometers west of San Juanito, which lies just south of latitude 28^{0}, on the old railroad between Chihuahua City and Creel. Barranca del Cobre is almost due south of Creel, near the Río Urique.

The mean temperature is close to 18 degrees Centigrade and the rainfall from 20 to 48 inches. There is a dry and a wet season, a characteristic of tropical climates where the temperature does not vary as much as in the more temperate regions. Rains are frequent from May to October although they may not start in earnest until June.

The arboreal vegetation of the Mojarachic-Maguarachic region consists principally of pines, oaks, *Arbutus*, *Arctostaphylos*, and *Ceanothus*, with the pines mostly on the higher slopes and ridges. According to E. A. Goldman and R. T. Moore (Journal of Mammalogy 26(4) Nov. 1945) the region in question is in the Sierra Madre Occidental Biotic Province and the faunal district is the Tarahumare (named after the characteristic Indians of the region).

The rock is of volcanic nature. The surface rock is a solidified ash known as rhyolite and the bed rock is a bluish rock called andesite in which the largest amounts of minerals are found.

The streams in the area drain into the Río Oteros which, in turn, flows into the Río Chinipas and thence to the west coast.

[1]Contribution No. 65 from the Department of Natural Science, Michigan State College, East Lansing, Michigan.

Fig. 1. Yuccas at Maguarachic, Chihuahua.

Mining and lumbering are the principal industries. Pine lumber sold for seventy pesos a thousand feet when I was there. Pine needles, particularly those of *Pinus ponderosa*, were used in the construction of adobe bricks.

Many of the oaks lose their leaves from March to April but they seldom if ever become completely defoliated. The flowers on the oaks may be abundant in April (as in 1940). Such plants as *Arctostaphylos*, *Vaccinium*, *Gaultheria*, *Ilex* and *Arbutus* may come into flower before the rains.

The virtually unknown Barranca del Cobre, south of Creel, is one of the most awe-inspiring sights known to man. The Barranca joins with the Barranca de Tararecua to form the Barranca de Urique. This whole region, because of its eroded nature and because of the great depths encountered, is quite different botanically from the previously mentioned region. Kapok trees are common and tropical fruit culture is possible in the canyon bottoms. A footbridge across the Barranca del Cobre is on the main mail route between Creel and Batopilas.

Fig. 2. Road in the Sierra Madre, Maguarachic, Chihuahua.

A few notes about my collection may not be out of order. For this information, I am relying upon various authorities. *Gaultheria glaucifolia* Hemsl. was previously known only from the type collected by Seemann over 100 years ago. *Heterotoma macrocentron* was collected for the second time in history. *Quercus perpallida* was the third known collection. *Arctostaphylos polifolia* and *Ilex rubra* grow there at their northern limit. A few new species have come to light such as *Salvia betulaefolia, Quercus knoblochii, Potentilla knoblochii* and *Bommeria knoblochii*. No doubt other new species exist in some of the canyons. It is our hope to revisit this area and give it a thorough combing in the near future.

A Glimpse at Professor Ernst A. Bessey

We have recently received from Professor Ernst A. Bessey, of Michigan State College, the accompanying portrait of himself, which originally appeared in the *Spartan*, volume 2, number 4, page 10 (January 1938). The sketch was a part of a feature article entitled "Dean Bessey: Botanist Number 1," by Jack Gauntlett, then one of the Managing Editors of the *Spartan*. The Asa Gray Bulletin hopes in forthcoming issues to give its readers some of Professor Bessey's accounts of his own work and travels, and as a beginning the editors present this lively likeness of one of America's foremost mycologists and teachers.

EDITORIAL NOTES: PLANS FOR THE SUMMER OF 1954. As we go to press we hear of many activities that are being planned for the coming summer. Dr. Knobloch, whose account of an earlier sojourn in Chihuahua ends on the page before this one, is planning to return this summer, accompanied by Mrs. Knobloch and Dr. and Mrs. G. W. Prescott, to the Barranca del Cobre. We wish them all good hunting. The 8th International Botanical Congress, scheduled to begin in Paris on July 2, is attracting many botanists from the United States. Some have gone on ahead to work in European centers before the Congress begins. C. V. Morton left Washington some weeks ago and will spend several months in Europe studying the classical collections of pteridophytes. Elizabeth McClintock was on her way from California late in May. From Ann Arbor a considerable delegation will attend the Congress, including C. A. Arnold, W. R. Taylor, D. V. Baxter, Pierre Dansereau, Volney H. Jones, and your junior editor. Const. Alexopoulos, of Michigan State College, will spend the coming year in Europe, engaged in a study of the Myxomycetes of Greece and the surrounding islands. Grady L. Webster, who has been working at Harvard this last school year, will continue his work on *Phyllanthus;* this summer he plans field work in Jamaica, where he will be accompanied by Kenneth A. Wilson. James W. Hardin will join Dr. W. H. Duncan, of the University of Georgia, in a botanical survey of Sapelo Island off the Georgia coast. A. J. Sharp of the University of Tennessee will teach courses in Lichens and Bryophytes this summer at the University of Michigan Biological Station at Douglas Lake. Wm. C. Steere, after attending the Congress in Paris, plans to do bryological field work in northern Scandinavia. P. A. Munz is to be Editor for Botany of the "International Scholars Forum," a series of "Books by American Scholars" to be published by Martinus Nijhoff of The Hague.

DATES OF PUBLICATION OF THE ASA GRAY BULLETIN, Volume II. Volume II, number 2 (pages 101-232), was mailed August 12, 1953; Volume II, number 3 (233-332), was mailed February 27, 1954.

INDICES

I. GENERAL INDEX

II. INDEX TO PERSONS

III. GEOGRAPHICAL INDEX

IV. INDEX TO SCIENTIFIC NAMES OF PLANTS

TO BE EXPECTED IN FORTHCOMING ISSUES

Letters from Okinawa, by Robin Drews

Botanizing in the Tahquamenon Area, by Alexander H. Smith

Real Values, by Elmer D. Merrill

Preparation of Pinus Specimens for the Herbarium, by Roy N. Jervis

A Letter on Collecting Hawaiian Bryophytes, by H. A. Miller

Wilhelm Hillebrand, by Otto Degener

Persian Diary. I, by Walter N. Koelz

An Autobiography for his Family and Friends, by Cornelius L. Shear

Glimpses of the Natural History of Koror, by Peter J. and Alma Hill

Ekman, Botanical Explorer in the West Indies, by Siri Von Reis

Biographical Sketches of Louis H. Jordal, W. G. Waterman, Ray C. Friesner, Charles C. Deam, and Alice Eastwood

Wyoming Newsletter and Herbarium Report, by C. L. Porter

Observations on the Edwards Plateau, by Winifred O. Moore

Botanists's Visit to Mount Sisipitan, by José Vera Santos

Letters from Alaska, by Gertrude Frohne

Ethnobotany of Popcorn, by Volney H. Jones

Japanese Flower Arrangement, by Mary Cokely Wood

Collecting in the Aleutians, by Walter J. Eyerdam

The Everett G. Logue Collection of Hybrid Oaks, by H. H. Bartlett

Nathan A. Cobb as a Botanist, by Frieda Cobb Blanchard

Philippine Journal. III, by Pierre Dansereau

A Study of Mahogany, by F. Bruce Lamb

Expedición Oñate, by John A. Nystrom, translated by Siri Von Reis

Botanical Publications on the Ryukyu Islands, by Egbert H. Walker

Notes on the Flora of Agattu, by Harvey Alfred Miller

Personal Recollections and Military Record of Colonel Valery Havard, U. S. Army

Evaluation of Havard's Botanical Work, by Rogers McVaugh

Sphagnum Flora of the Vicinity of Douglas Lake, Michigan, by Bodil Lange

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Items for publication should be addressed to either of the Editors at the Department of Botany, University of Michigan, Ann Arbor, Michigan. Contributors of major articles may secure 100 copies of their contributions, at a cost of $1.25 per page or fraction thereof. Covers furnished without additional charge.

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MICHIGAN BOTANICAL GARDENS ASSOCIATION. — Founded in 1925 to include persons interested in promoting the development and current activities of the Botanical Gardens of the University of Michigan. There are no dues, but subscription to the Asa Gray Bulletin is invited. For further information, communicate with Dr. Frieda Cobb Blanchard, Secretary, 2014 Geddes Avenue, Ann Arbor, Michigan.

MICHIGAN BOTANICAL CLUB. —— The membership is about 350, made up of persons interested in the Michigan flora, nature-study, wild-flower protection, preservation of natural areas, and conservation. It has members at large and the following chapters: Southeastern, Bay County, Marquette, Wild-Life (Houghton). For information address the President, Mr. Paul W. Thompson, 17503 Kirkshire, Birmingham, Mich.