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GEORGE B. HINTON, COLLECTOR OF PLANTS IN SOUTHWESTERN MEXICO

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AMONG THE PLANT COLLECTORS of Mexico during the Twentieth Century, George B. Hinton stands preëminent. Hinton was a metallurgist who decided at the age of fifty that his real and final interest lay in botany. During ten years of intense activity, from 1931 to 1941, he collected 16,300 numbers, concentrating his efforts in 26,000 square miles of the most inaccessible parts of the States of Guerrero, Michoacán, and Mexico. His botanical explorations, made on muleback in areas far beyond the railroads and the highways, in areas previously unvisited by other botanists, constitute a contribution to the knowledge of Mexican flora without recent parallel, not only because of the great numbers of new species and new genera he discovered, but also because of the geographical extension his collections provided for the ranges of thousands of species known from other localities or other states. It is estimated that at this writing, his collections include approximately three hundred and fifty new species and four new genera, while future studies of his material will undoubtedly produce even greater numbers of new species.

Hinton was born in London in 1882, one of four sons of Charles Howard Hinton, author and professor of mathematics, as well as a novelist; and of Mary Everest Boole, also a mathematician and author. Hinton was the grandson of George Boole, now known as the inventor of computer mathematics. He was a nephew of George Everest, Surveyor General of India, whose name was given to the world's highest mountain. He was also a nephew of Mrs. Voynich, author, and of James Hinton, surgeon and author.

In 1889, at the age of seven, Hinton left England, never to return; his family went to live in Japan, where his father was a professor of mathematics at the University of Tokyo. After seven years in Japan, the Hinton family emigrated to the United States, where Charles Howard Hinton taught mathematics at Princeton, and later worked as a mathematician in the Patent Office in Washington, D.C.

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Until the age of fifteen, because of an extreme weakness of the eyes, Hinton's education was conducted by his mother and father at home. Thereafter Hinton attended various American universities, among which were the Minnesota School of Mines, Columbia University, the Arizona School of Mines, and the University of California at Berkeley. After the death of his father, Hinton paid not only his own way through college, but also that of his youngest brother Sebastian, by working during summers as an assayer in the mines of Mexico, which he probably first visited circa 1901.

In 1910, he married Emily Percival Wattley, who died in 1921, leaving him three sons, Howard, George, and James. When his children were grown he remarried twice, both marriages ending in divorce.

Once Hinton came to live permanently in Mexico, in 1911, he never left the country, not even temporarily during the worst of the revolutions. He was contemptuous of all those Mexicans and foreigners alike, who hastened out of the country at the first rebellion. He had come to live in Mexico for better or for worse, and there he stayed. Hinton loved Mexico and had a great affection for the people, especially the Indians and the peasants, in whose simplicity he found an echo of his own.

In the days when so many people despaired of the country's future, Hinton was one of the very few who kept the faith he had in the future of Mexico and its people.

Hinton worked in Mexico as an assayer, metallurgist, civil engineer, architect, industrialist, and finally as a botanical collector. During his apogee, he was considered the finest metallurgist ever to practice in Mexico, having solved problems which had defied the best metallurgical brains of the world for decades. He invented several important and widely used mining processes, as well as "Floating Cement," which was patented in Mexico, the U.S.A., England, Germany, and Sweden. A million dollar company had been organized to exploit his patent, when the collapse of Wall Street in 1929 obliged him to return to mining.

Hinton began his study of botany in 1931, as a hobby, first teaching himself the requisite Latin. In 1936, at the age of fifty-four, he retired from mining to dedicate himself full-time to his botanical explorations. In the early years of his botanical work, while still occupied with mining, he used as assistants Luis Martinez and Gerónimo Garcia. Upon retiring from mining, however, he enlisted the full-time coöperation of his youngest son, James, whom he sent to explore the remotest sierras of Guerrero and Michoacán. While he could ride horseback all day long, day after day, dismounting only to collect, an impaired heart prevented him from climbing mountains and cliffs on foot. Furthermore, a certain bronchial weakness prevented him from undertaking exploration of the highest sierras, where working and sleeping both cold and wet for days at a time was almost a condition of collecting at altitudes above three thousand meters.

The twenty-six thousand square miles where Hinton concentrated his explorations had remained botanically unknown for two main reasons, first, because of the banditry which had always, even to the present day,

characterized the area, and second because of the precipitous terrain, not only unpopulated, but virtually inaccessible.

The banditry obliged the collector to expose himself not only to great physical hardships but also to the possibility of loss of his life by assassination. While law and order had never been distinguished by their efficiency in the localities Hinton collected, a substantial portion of his work was done beyond their last outposts, where bandits and outlaws took refuge precisely because they were beyond the utmost reaches of the law. This hinterland of the great Guerrero and Michoacán sierras lay anywhere from one to seven days' journey by horse from the nearest agent of the law. The distance covered in a day's ride in this country, one of the most broken on earth, might be only five or ten miles, especially when barrancas over two thousand meters deep were encountered. But it was still a hard day's ride, or a hard day's walk. Botanical exploration took him as far as seven days on horseback from the nearest outpost of the Mexican Government, military garrison, post or telegraph office, and three days from the nearest human abode.

The only way of being allowed to work in such country, where many of the few inhabitants were outlaws, was to establish personal friendships with the people, and to live right in their huts, where the protection of their hospitality was of perhaps greater importance than the protection of their wattle walls or their leaky grass roofs. The first trip was the test, and Hinton had to arrive not alone but with a friend of his future host. Once under his roof, he was not only safe from his host but from the friends and companions of his host. Hinton then had to persuade his host to take him to the next hamlet or hut, and there present him with his following host, so that initially he was handed from one mountaineer to another, until he returned to civilization. Once the first shock of looking at a blonde and blue-eyed outlander was over, once the shock of fear and suspicion had been assuaged precisely by another of their kind, these mountain people were good friends to Hinton. He took presents to them and their children, and developed strong bonds of mutual respect and affection. He was so often implored to prescribe cures for their sicknesses, that little by little their plight caused him to overcome his extreme reluctance to prescribe medicine. He took with him such medicines as were most commonly needed, and gave them to his hosts, who received them with gratitude. When the nearest doctor, held in suspicious awe by the mountaineers, might be found only after a ride of several days, an effective remedy given by Hinton on the spot was never forgotten.

After the first trip Hinton came and went with impunity. Merchants, cattle buyers, missionaries, prospectors, and even soldiers often dared not enter the mountain fastnesses where Hinton came to feel more at home than in the towns and villages where his operations were based. Because they were not in any way participants of the feuds so numerous in the sierras, both Hinton and his son moved freely across areas infinitely wider than those permissible to the mountaineers themselves, who were locked into small localities by their fear of feuding enemies.

The second reason why those twenty-six thousand square miles had remained botanically unexplored was the nature of the country itself, broken, remote, without access other than by foot or by mule, and at the same time affording extremes of heat and cold without comforts or conveniences of any kind. Since he could not finance great caravans, Hinton had to live off the land, which often meant nothing but tortillas and salt, and sometimes plain hunger. For Hinton the privations of hunger and thirst, of barely passable living conditions, were of small account. Like the mountaineers, who chose freedom in the lawless mountains rather than the security of the village jails, Hinton chose freedom to explore the wild mountains rather than the comfort and the security of the cities where he might have lived well and long. Of his hosts he could ask for no more than what they themselves ate, and since they were so poor, their best food was often only corncakes and salt. While Hinton might enjoy good food and good liquor, he would permit neither to govern or influence his way of life. Although his explorations forced him to live for long periods on tortillas, with beans and cheese as an occasional luxury, his passion for collecting sustained him. These privations of diet were, of course, responsible for the acute anemia which, in part at least, was to cause his early death.

Since it was a financial and tactical impossibility to carry into the wilderness tents, furniture, or food, Hinton planned his expeditions to take advantage of every available hut or hamlet, where he might obtain shelter in which to prepare specimens, a place where he might obtain food not only for himself and his muleteer, but also corn and fodder for his animals. A typical shelter would be a one-room hut, with palm-thatch or grass roof, wattle walls, and too little space to accommodate the mountaineer, his wife and many children, let alone Hinton with his cot, his drying stove, and his gigantic tarpaulin specimen bags. The muleteer-assistant would sleep in the corn trough. During the dry season, of course, Hinton preferred to have his cot and his drying stove under a tree, thus avoiding the crowd in the hut. But in the tempestuous rains, he must crowd into the hut. Since there was usually no table available, Hinton used his tiny cot as a table for changing cardboards and packing specimens.

By using the lonely huts and the hamlets, Hinton relieved himself of the great difficulty of providing his own shelter and of preparing his own food. He would therefore stay in one hut or hamlet until he had thoroughly collected the vicinity, and then he would move to the next hut or hamlet, contriving of necessity to cover the distance between hamlets in a single day, however great that distance might be.

It was only the remotest mountains of the Sierra Madre del Sur which required camping out, and to these areas Hinton sent his son James, who made do using a pup tent now and then but who most often relied upon securing shelter in caves or under overhanging cliffs and often lay out the tremendous rainstorms under a riding cape, with the specimens well protected in their multi-layered tarpaulin bags. Riding through the rainstorms by day, James and the muleteer would strip naked, keeping their clothes

dry under the tarpaulin, and dressing again in these dry clothes once the storm had passed. For food they took "gordas," thick corncakes made with lard and cone sugar, which might last ten or fifteen days. Heated over glowing embers, these gordas were nutritious and not unpalatable. Monotony dissuaded gluttony, and, held to real hunger, a man could live two weeks at a time on a few kilos of gordas.

During his stay in the lonely huts of the sierras, Hinton could usually dispose of no more than a strip of seven or eight feet long by thirty inches in width, for both his cot and his stove, and this he must often dispute with dogs, sheep, chickens, cats, and pigs, all just as anxious as he to elude the icy driving rain. Quite often he must struggle with pigs or dogs scratching themselves or fighting ferociously under and over his cot, and from chickens defecating upon his cot from the rafters. Privacy was the one commodity that he sometimes really missed.

To the problem of exploring with an impaired heart the pathless solitudes of one of the most broken and mountainous areas in the world, Hinton replied with a superb saddle mule, the only item of expensive equipment that he permitted himself the luxury of using. His saddle mule, and his son's, were worth more than all the rest of their equipment combined. These saddle mules could not be bought with money alone. It was a question of money, luck, and skill. When a good saddle horse could be bought for fifty pesos, a fat cow for sixty pesos, and a pack mule for a hundred and fifty or two hundred pesos, Hinton had been offered as much as two thousand pesos for either one of the saddle mules. Pack mules they bought and sold every year, but the saddle mules they kept until they died. The first was Lenina, whom he bought in 1932, and who died in 1943. He gave Lenina to his son in 1937, when he bought Isabel, who died in 1956. His son James wrote to Dr. Carl Epling, asking that one of the twenty-six new *Salvias* she had helped discover be named after his saddle mule. Dr. Epling obliged by describing *Salvia leninae* Epl. Since a saddle mule was the pivot of Hinton's expeditions, she was lavished with every care. In planning an expedition, each day's journey must terminate where water and corn were available for the mules. If corn was not available, then it must be carried along, and whatever happened, the mules must have their corn at dawn and at dusk. When it came to finding food for himself and his muleteer, Hinton might give up late on a thunderstorming night. But until his mules had been fed, he would neither eat nor rest. An animal could not be denied, because, not knowing the reason, it felt only its hunger, but a man could bear his hunger because he knew the reason for it.

On an expedition, many stops must be made by the collector during the day, but the pack mules must go steadily on, else the journey would not be completed. The saddle mule must therefore be able to overtake the pack mules after long stops on the way, and to do this she must be a superb animal full of sinew and spirit, because the pack mules themselves had been carefully selected for speed and endurance. After each day's journey, Hinton's first preoccupation was for the mules, that after

they were fed and brushed, their backs must be carefully examined for the first sign of a crippling laceration. The eye could not be trusted to do the job, the fingers must feel the fur behind the withers, below the tail where the cruppers caught on the long downhills, and behind the forelegs where the cingle chafed on the upward steepnesses. Until the mules were fed and groomed, the men must abide their thirst and their hunger. Out in the wilderness, after eating their corn, the mules were let loose to forage for grass all night long. At dawn they would be back at the hut or the camp, squealing for their corn, which they loudly munched in nosebags while being carefully brushed and saddled and loaded. Each morning, in the lowlands, the mules must be scrupulously examined for the bite of a vampire bat, which, if neglected, would turn into a suppurating and sometimes crippling ulcer.

Such care did Hinton take of his animals that during ten years of using them to cover five or six thousand miles a year, no mount was ever lost. To this end a blacksmith was not entrusted to shoe his saddle mule, but he would shoe her himself, and during long expeditions, enough sets of new shoes were carried to reshoe his mule once every six weeks. Too often a blacksmith, if not watched closely as he worked, would save himself the hard work of paring down the hooves with the butteris and then rasping them down with a file, by chopping them down with a bolo, dumping the hooves as it is called, which results in destroying the animal's balance, often a question of life or death. Just as a nail driven into the quick may cripple a mule so can a dropped shoe. Aside from extra sets of shoes and nails, extra saddlepads and halters must be taken on an expedition for each mule.

Hinton had experimented with both horses and donkeys, but found that horses were too delicate and unreliable, while donkeys were not only too small for the deep river crossings and trails, but were cowed into utter helplessness by the incredibly fierce thunder and lightning storms which smote the mountains during the rainy season. Horses had too thin a skin, and no care was enough to prevent saddle sores caused by the excessive rocking of saddles on the broken terrain. Driven to utter exhaustion as might be necessary, they had not the mule's power of recuperation. Once burros or horses bogged down in a river or a swamp, they ceased to fight and resigned themselves to death. A mule, however, might be trusted to keep on struggling until she got out or killed herself trying.

While Hinton and his son were famed for their superb saddle mules, and while as a consequence they might ride farther and faster than the most knowledgeable of the mountaineers, this was the only good equipment they ever used. All other equipment must of necessity be cheap, because there was a strict limit to the amounts Hinton could subsidize with his small personal fortune. He was not able to afford good waterproof boots or leakproof riding capes, waterproof jackets, woolen socks, or adequate tents and sleeping bags. Neither he nor his son owned a pair of gloves. But if his life held many physical privations he was not even aware of them.

On various occasions prior to 1936, Hinton suspended his collecting for several months at a time because of the banditry. But this factor, which had been the real limiting factor to botanical exploration in the area he collected, was not a major problem for him. He had had so much experience with bandits during and after the revolution that he was confident of his ability to deal with any given situation. It was only when he had certain intuitive doubts about a group of robberies or assassinations that he stopped collecting the localities where these took place. That he had survived literally scores of bandit raids and scores of ransomings during the revolution did not seem to Hinton a matter of luck at all. He could always point out the glaring mistakes made by some one else who had been seriously wounded or had lost his life at the hands of bandits or rebels.

During his first years of exploring the remote sierras, Hinton reaffirmed the conclusion he had reached during the revolutions with respect to carrying firearms: that it was safer to go unarmed than to carry a gun. Not only did an unarmed person elicit less stranger-hostility from the mountaineers, but in a dangerous situation, he was forced to rely on his tact, on his skill, on his intelligence, and therefore he was safer than an armed man. A man's brain, used to the best advantage, was a better weapon than any firearm. A good weapon encouraged the folly of arrogance and pride. Moreover, in the lawless mountains, a pistol was one of the possessions most coveted by every man. If there were two things paramount in every man's mind, things for which he hungered, for which he sweated and strove, which completed him as a man and for which he might easily be provoked to assault or to kill, the first was precisely a good pistol or rifle. A good firearm put him on an equal footing with any man that lived. The second was a good saddle mule. Without these two possessions he was just any man. With them, he was a Don. With a good mule he was not only more able to defend himself against his enemies, known and unknown, but since anywhere he went, he must climb some of the steepest and roughest hills in the world, there was no greater convenience for him than a fine mule.

With their good mounts, Hinton felt that he and his son were already to a sufficient degree the objects of envy. It was unwise to compound the danger by carrying a good pistol. He finally compromised by carrying in his saddlebag a snub-nosed thirty-eight pistol, which he kept under his pillow at night. Upon one occasion, at a hamlet called Soyate, having been treated there with insulting harshness by the people, he strapped on his pistol openly, and required them to treat him civilly, which in future they did. However, when he moved to Aguililla, where every man carried a pistol and a cartridge belt, after the people had come to know and like him, they said to him, "In this country, it is the custom that every man should carry his good pistol. And if he does not carry one, then we take it amiss, and feel that he is a hypocrite, a man up to no good, a man to be mistrusted." Therefore Hinton said to his son, "When in Rome . . ." and in western Michoacán they carried pistols and cartridge belts openly.

In his house at Aguililla, Hinton kept his loaded pistol and cartridge belt hung from his bedpost, and he slept behind a locked door. The rise of banditry in 1940 led him to suspect that he might be taken for ransom, and he had as a young man been ransomed so often during the revolution that he had no patience for it now in his old age. If ever there should come a ransoming party for him, he said, he would shoot it out with them through the locked door, rather than submit to the nuisance of being ransomed again.

To a born naturalist like Hinton, the fears of the local inhabitants concerning wild animals brought only perennial surprise and amusement. The only creature to be feared, he often said, was another man. He could listen with fascinated pleasure at night to the roar of a jaguar nearby, while his muleteer cowered by the fire in horrified awe. Hinton knew that in his work as a collector, it was simply impossible that a jaguar would attack either him or his muleteer. It was even extremely unlikely that a jaguar or a mountain lion would attack his mules. And he lacked what was the native's worst fear of all — the fear of unknown, of imaginary beasts infinitely more terrifying than the jaguar, the puma, or the coral snake.

The dangers of being stung by scorpions or poisonous insects were ever present, but he had been stung so many times by scorpions that the stings were only a nuisance. What was to be really feared was an infected cut or scratch, especially in the lowlands, where scratches must be scrupulously treated and watched to avoid serious consequences. Another danger much greater than that of poisonous insects was the niguas, which, if given a chance, bored under the toe nails, spread over the sole of the foot, and in a month might cripple a man completely so that he would require massive surgery. This danger Hinton avoided by never touching the ground in the huts with his bare feet. In the lowlands, bedbugs, and in the highlands, fleas, required a man to sleep on a cot as long as he slept in a hut, else they would eat him alive.

The bite of a rattlesnake, or to a much lesser extent the bite of a coral snake, was a real and frequent danger, but to Hinton it was obvious that a man was much less likely to be killed by a rattlesnake in Guerrero than by an automobile upon a rare trip to Mexico City.

Diseases, from leprosy to typhus, from dysentery to spinal meningitis, were constantly encountered, but Hinton had a sublime confidence in his natural resistance to them. Moreover, there was often no choice. Once he had been in a hut for a few days and had come to the conclusion that his host had smallpox or typhoid fever, what could he do but refuse to be worried? He thought that as he had lived and worked in the Balsas River Valley, and had slept in the huts of families having pinto, from whose hands he received his tortillas, that sooner or later he would contract pinto himself. But did he not intend to live the rest of his life with the pintos anyway? And, after all, it was not a disease which incapacitated a man, it gave him only a startling complexion. Hinton's own frequent disease, malaria, he combated with prophylactic doses of 25 milligrams of quinine

sulphate a day. And the swarms of gnats and mosquitoes which pestered him in the lowlands, he combated felicitously with clouds of smoke from the cigars and cigarettes which he chain-smoked throughout his waking hours, both day and night.

It is, of course, one thing for a strong, healthy young man to bury himself in those wildernesses, and quite another thing for a man of later years, with an impaired heart and declining health. Every time he leaves the last railroad station, the last village, to ride into those solitudes, he is laying his life on the line. If he has put himself four or five days' ride from the nearest doctor, and six or seven days' ride from the nearest hospital, then any emergency of health may prove fatal, for he is far beyond medical help. When Hinton left the comforts of home and herbarium at Aguililla to explore the remote sierras, it was because he loved collecting as much as he loved his life. He was not only willing but quite literally eager to give his life to its pursuit.

In 1937, on the way to his herbarium at Los Placeres del Oro, he had an internal hemorrhage one night in Coyuca de Catalán, a hemorrhage he attributed to malaria. Passing and vomiting great quantities of blood all night, no doctor was to be found in all the village. He considered himself lucky in finding ice, which he ate until the bleeding stopped. He waited in Coyuca for a few days to regain his strength, and then rode on to Los Placeres del Oro, where he continued his work as if nothing had happened.

While Hinton was only too quick to point out that a man did not make his ancestors, yet certainly the accomplishments of his ancestors pressed him to think in terms not of immediate temporary gain but of lasting accomplishments. When he spoke of fame, as he rarely did, it was clear that his interest lay in being remembered only for having been of some lasting use to the world. There crowded upon him the work of so many ancestors who were remembered for their ideas, their books, their inventions, that he was driven to do things which he hoped would also be of permanent use to the world.

Having educated his family, and having acquired enough to live on for the rest of his life, Hinton could now devote himself full-time to the task which he loved above all others — plant collecting. Frequently, when he despaired of getting determinations from the specialists, when he saw this delay as a mounting obstacle to his work, he was tempted to get into taxonomy himself. But he would always realize that his greatest usefulness to Mexican botany lay not in taxonomy but in exploration. It was all very well to say that exploration could wait, that sooner or later, if he did not undertake it himself, some one else would. But no one knew better than he how swiftly the great forests were being destroyed by nomadic predatory farmers, who felled the great woods on the steep slopes, burned the pyre, planted a few handfuls of corn one or two years, and then, when the torrential tropical rains had denuded the slopes of their soil, moved deeper into the virgin wilderness. It was a job that had to be done now. By the time the area was crisscrossed with the roads that would bring in any and

all botanical collectors, the entire flora would have changed substantially and many of the species he was discovering would be lost forever.

At the end of ten years of botanical exploration, Hinton had inadvertently practiced so much medicine that he was contemplating a return to the University to become a titled doctor. There was such a crying need for medical knowledge everywhere he went, and he was so horrified by the witchcraft he saw practiced, that he had begun to think that if he was to continue to collect plants, if he was to continue to live at all, he must surely combine botany with medicine. That was the problem, to continue to live. He was under no illusions concerning his longevity. He came from a short-lived family, and he had lived a life full of hardships and privation. When he retired from mining in 1936, he often told those close to him that all he asked for was another five years of collecting plants. By 1943, he was indeed thankful for the eight years, and he did not know how he could live long enough to learn medicine. He could see himself breaking down physically, and when he died, he was satisfied that he had done as much as he could with his life. Feeling that in the future his work would be severely hampered by physical ills, he was not only ready but eager to die. Impatiently asking both doctor and nurse how much longer he must linger, he insisted that he could do no more, and his last words were that his work was done.

Hinton had the utmost confidence in the sure-footedness and intuition of his saddle mule, so that he rode down gorges and up precipices where only a mescal-crazed mountaineer would dare ride. When night found him still on the trail, he allowed his mule to find her way back to the hut, unworried and lost in his own thoughts. During a railroad accident, in which the train from Mexico City to Uruapan jumped a curve and rolled down an embankment, as Hinton lay recovering consciousness on the over-turned car, he heard something roll, and received a stunning blow on the hip. It was a castiron spittoon which had caught in the hat rack, and now rolled off and fell upon him. It broke his hip. But within six weeks he was not only out of plaster and out of the hospital; he was in the saddle collecting plants again, and anxious to forego travel by train.

During his last days, coming from Aguililla to Apatzingán, the truck he was riding in turned over, and he received a severe bruising which perhaps contributed to his death a few days later, from coronary thrombosis.

Hinton was unorthodox in much of his thinking. When he was collecting along the coast of Michoacán, below Coalcomán, in 1939, he was tracked down by a workman's commission from the Lane Rincón Mines. They delivered to him a petition signed by the 1200 workmen of the mine, who had received the mine from the company as payment of severance pay, back wages, and other legal benefits. They suspected that the mine had been sabotaged by the company, with the idea in mind that after a few months they would have to beg the company to come back and run the mine after the workmen had given up millions of pesos in benefits. Therefore Hinton left his beloved task of collecting plants in the twenty-six-thousand square miles of his garden and went back to the mine to help

his men. He found that the flotation mill had indeed been carefully and thoroughly sabotaged. However since he had himself built it, he had it running efficiently within a few weeks. And a few months later, he had the mine running at a profit. The grateful workmen not only rewarded him well, given their limited means, but made him a member of the union, Sindicato de Mineros, which at that time was so hated by both foreigners and upper class Mexicans alike. He used to show his union card to his friends at the British Club, remarking with delight that now he belonged to a "*real*" club.

To the physical problems of collecting in the mountain fastnesses on a limited budget, Hinton brought an inventiveness developed in engineering. What was needed was a system which would enable a collector to travel independently of a base for as long as three months, during which no new cardboards could be obtained, and during which all the specimens collected had to travel on the backs of two or three mules. Further, the specimens must be bright and crisp, and as impervious to moulding as quick thorough drying could make them. Hinton developed a drying furnace which could dry average plant specimens not with special blotters but with ordinary corrugated cardboards within twenty-four hours. First he designed several two-pack furnaces which he cached at strategic points in the sierras. Then he designed especially for his son a telescoping furnace, with a charcoal burner, and three compartments. The whole furnace, telescoped, formed only half a muleload. Set up, this model could handle two or three hundred specimens at a time. Quick drying not only retained the color of most leaves and flowers, but also permitted the preparation of excellent and beautiful specimens under the most difficult conditions. In addition it released cardboards for the next lot of plants. As paper folders became filled with specimens, these were tied into bundles, and the bundles forced into multilayered tarpaulin bags, which when properly tied resisted more than tempestuous rain storms of the Sierra Madre del Sur. They occasionally resisted the crossing of rivers when mules fell into unsuspected holes and had to flounder and swim their way out. These furnaces, had they required fuel from the outside, would have presented impossible requirements of weight and volume. But charcoal could be made anywhere and in any amount.

To Hinton, these were the happiest days of his life. He delighted in nature, and the idea that he could do something of small but lasting value for his adopted country and for botany filled him with satisfaction. He often commented that collecting plants satisfied the base instinct of acquisition and enriched science without exploiting anyone.

Hinton counted as a blessing each day that he could spend in the mountains, in sunlight, in cool shaded barrancas, on the sweltering plains, and under starry skies at night. Even the routine work of the herbarium, indoors, was not unpleasant to him. He said that as an amusement, handling the labels compared very favourably to playing cards, but was infinitely more useful.

When Hinton left mining to devote his full time to plant collecting, he

had to make a considerable adjustment in his relationship to those who worked for him. In mining he had been accustomed to nothing less than strict and immediate obedience to his orders. He had often had twelve or fifteen hundred men working for him. It usually did not take long for them to learn that here was a man who, while he might be exacting in command, was also uniquely and genuinely interested in their welfare.

While still at the Lane Rincón Mines, he had made an arrangement with the union for the company to provide an hour a day, and the men an hour of their own time, in order that the illiterate workmen should all learn how to read and write. For those who could read and write, he had set up classes so that electricians gave them lessons in electricity, mechanics in maintenance, carpenters in woodwork, etc., etc. He himself gave classes in metallurgy. It was understood that those who did not learn how to read and write within six months would be fired. Likewise, the literate must pass examinations in crafts and other skills. The result was that with the cooperation of the union, he was able to raise the level of skills and also of pay, because fewer and fewer men were able to do the same or more work.

But out in the lawless hinterland, he realized at once a very different problem: to use his own words, the unwillingness of the people to subject themselves to the indignity of being commanded by another for pay. Sympathetic with their pride and their freedom, he tried nevertheless to make use of the mountaineers but finally realized that it was simply impossible. They had not come upon a free life in order to work for a stranger, however unexacting the work. Therefore he used muleteers from the outside, and when they were not driving his mules from place to place, they helped him collect. This meant that he must often attend to all the routines himself, from collecting to drying and packing the specimens.

The first base that he used was El Rincón itself, from which he collected the District of Temascaltepec in the State of Mexico, and gradually extended his collecting southward to the Balsas River. During these years, from 1931 to the end of 1935, when he was becoming more and more intensely interested in the exploration, he collected on weekends and holidays, and had Martinez and Garcia collecting intermittently toward the Balsas, first from El Rincón itself, and then from substations at Tejupilco, Cutzamala, and Pungarabato.

As long as plant collecting was a part-time occupation for him, it was only natural that his main base should be at his house. El Rincón was very well situated for collecting the State of Mexico to which he devoted his collecting at the outset. Little by little, as he felt that the job neared completion, he extended his collections southward toward Guerrero.

Upon retiring from mining, he immediately moved his base to Los Placeres del Oro, Guerrero, which he chose, as he would choose subsequent bases, for the following reasons: First, because it was cheap, a factor of prime importance. Second, because Los Placeres was at the far edge of the area he had already collected, on the south side of the Balsas River and at the foot of the Sierra Madre del Sur, which he was to begin to collect.

The village had a postoffice, which was needed for mailing specimens, but beyond Los Placeres there was no outpost of law and order until the other side of the Sierra Madre, say, Petatlán, six days' ride away, on the Pacific Coast. From Los Placeres he collected for eighteen months, making one trip all the way to Atoyac de Alvarez, ninety kilometres west of Acapulco, an area which he afterwards entrusted to his son James.

From Los Placeres del Oro, the base was changed to Zitácuaro, Michoacán, a fifteen day trek with the entire herbarium packed into zinc cans and loaded on forty-eight burros. The trip was hard on the zinc cans, but for Hinton it was a leisurely trip with his son, more pleasant and cheaper than had he employed trucks, which he considered infinitely less reliable than burros. He had investigated prices in Zitácuaro, and found that they were attractive. What he wanted now was a base from which his son James could continue to make trips into the State of Guerrero, and from which he himself could make trips into western Michoacán.

Shortly after establishing the base at Zitácuaro, he established a substation at Coalcomán, Michoacán, whence he proceeded to collect westward to the coast, southward to Aguililla, while his son spent half a year collecting the area of Zitácuaro before resuming his trips to the Sierra Madre del Sur, with a substation at Atoyac de Alvarez, Guerrero. However, once the area of Zitácuaro had revealed excessive botanical similarity with Temascaltepec, Hinton found the base too far both for himself to collect western Michoacán and for his son to collect the Sierra Madre of Guerrero. Also, he felt the pressure of inflation in Zitácuaro. The last and final base was selected at Aguililla, Michoacán, which lay on no crossroads, and which, it might be said, lay at the end of the trail to nowhere. Like Placeres, it was the last outpost of law and order. (Once an outlaw crossed the Aguililla River, he would be pursued by no soldiers.) The village could be trusted to hold prices for some time, being at that time five days' ride beyond the nearest railroad or highway at Uruapan.

At Aguililla Hinton bought a house and store which he converted into a pleasant home and herbarium. He liked it so well that he planned to live there to the day he died. It was convenient for his exploration of the ranges between the hotland and the coast, as well as the coast of Michoacán itself. From there his son collected Mount Tancítaro, Michoacán.

Hinton had a respect for law which had no relationship to his personal opinion of a particular law. All his life he ran his businesses not as close to the margin of the law as he might, but rather as well within the law as he could. If a law was to a point senseless, Hinton did not chafe at it. He abided by it. He no more thought of violating the law than of falsifying scientific data.

During his time of collecting, and now also, it was the law that for each collection sent abroad one specimen must be deposited with an agency of the government. To comply with the law, Hinton began by taking duplicates of his early collections to the National Herbarium of the Instituto de Biología, a dependency of the Universidad Nacional Autónoma de México. Dr. Isaac Ochoterena, Director of the Instituto de Biología at

that time, refused Hinton's collections, first on the grounds that he had no room for them; and then on the grounds that he was not interested in Hinton's work, since there were already too many foreign names in Mexican botany. Actually, the Institute of Biology was not in any sense of the word a government agency, nor was there at the time any direct government agency to which Hinton might have presented his specimens. At Hinton's insistence, Dr. Ochoterena finally accepted a small number of Hinton specimens and gave both Hinton and his son letters designating them Honorary Collectors — letters which were certainly of considerable help with local authorities.

Thereafter, as his collections drew more and more attention abroad, and as Hinton realized their potential importance, he insisted more and more upon fulfilling his legal obligation by depositing one specimen of each of his collections in any government agency which might be induced to accept them, but to no avail.

In spite of his wishes, therefore, Hinton found himself in a position of being unable to comply with the law. This was a perennial source of worry, since it was obvious that his explorations might at any minute be stopped on the grounds that he was infringing the law. He tried therefore to obtain, for years, a letter from the Institute, in which they refused his offer of specimens, in order to be able to prove at any given time that he had tried without success to comply with the law. With the same insistence it refused his specimens, the Institute, with strict adherence to the law, denied him such a letter of corroboration.

Toward the end of 1939, several lots of specimens addressed to England, Switzerland and the U.S.A., were detained at the post office, and Hinton was required to produce a letter proving that he had deposited duplicate specimens with the government. Subsequently, he was informed that such a letter could now be obtained at the Instituto Biotécnico, a new department of the Ministry of Agriculture, (S.A.G.), and therefore a direct dependency of the federal government. To his great relief, Hinton found the Instituto agreeable to receiving a complete set of all his collections in return for a blanket permit to send his specimens abroad. Accordingly, the Instituto Biotécnico was presented with a set of nearly ten thousand specimens, and the lots at the post office were released. On the other hand, he was not given the blanket permit that he had been promised, nor were his specimens officially acknowledged. When his son went to the Instituto to recuperate the multiwalled tarpaulin bags in which the collection had been sent to the Instituto Biotécnico, he was appalled to find the bags half submerged in the water of a flooded cellar.

However, regardless of being denied his permit, he had no further trouble in shipping specimens abroad for another two years. During this period he continued to send a duplicate of everything he collected to the Instituto Biotécnico, which just as consistently refused to acknowledge them. In 1942, botanical parcels at the post office were once again seized, and Hinton was unable to obtain a permit in exchange for specimens

which he was equally unwilling to resort to smuggling or any other subterfuge to make the shipment.

His relationships with petty government officials in the provinces, say, on the level of village postmasters, garrison commanders, or municipal presidents were often marred by attempted impositions which he refused to tolerate. His work was frequently viewed with suspicious hostility. Actually, it could be stated in all truth that in Guerrero and Michoacán, a bandit-infested area, Hinton was more hindered by authorities than he was troubled by outlaws. It was a relief for him to ride beyond the last outpost of law and order, into the lawless and unexplored mountains, where the people went out of their way to help him because they admired him for his courage, respected him for his knowledge, and loved him for his generosity.

As far as could be done, Hinton used numeration chronologically. However, when two collectors worked simultaneously, especially during the four years his son collected for him, there would be one series of numbers available for his son collecting, say, in Teotepec, while he had another series of numbers for collecting, say, in Coalcomán. For this reason, numbers cannot be taken chronologically save in certain instances, when only one person was collecting at the time.

Hinton claimed to have acquired from his own father a strong collector's instinct, and had at various times in his life made serious and valuable collections, such as of metallic ores mounted on slides, orchids, and beetles. For many years he had collected orchids with his good friend Eric Ostlund, but he sold his orchid collection in 1929, when he went to live in Temascaltepec, and when his interest in plants became general. He collected beetles mainly for his son Howard, during the early 1930's. During other times he also collected sea shells and did some excavating for archeological objects. This latter field held great fascination for him, but he could never come to terms with its fundamentally illicit aspects, and therefore he abandoned it.

A major point of his satisfaction in living far beyond the last railroad or highway, of living life as it had been lived in the sixteenth and seventeenth century, was that he could enjoy its spiritual values, without being chafed by its lack of mechanical and material facilities. Hinton loved village life, with its definite but varied patterns, to the extent that he at last became a Catholic in order to partake more fully of Mexican village life. He had estimated that in Aguililla, the entire populace attended church once a day. When he was in the village, he loved to rise before dawn, bathe in a tub filled with cool water drawn by hand from a well, and then attend mass and come out from the church with the people in order to see the sun rise, to walk home slowly as the villagers went about their business, some on horseback to distant fields, some to the stalls to sell milk or to buy meat and fruit for the day, the blacksmith heating his forge, the merchant opening his store, the cowherd driving his cattle to pasture, and so on. He ate a simple breakfast of fresh milk, cheese, and tortillas topped off with hot black coffee from his own bushes.

Compared to the breakfasts he had out in the mountains, such a breakfast was luxurious to Hinton. Then he went into his herbarium and worked hard from seven to twelve, when he had a simple but to him luxurious lunch of broth, chicken stew, tortillas, Mexican rice, perhaps preceded by a cup of mescal and followed by black coffee. Then he slept until three o'clock and rose to spend another three or four hours in his herbarium. At night he supped on sweet bread with chocolate or coffee, and after taking a turn about the village square, retired early. In the village there were no professional people of any kind, except now and then a medical student doing his social service. His friends were the village craftsmen and the merchants, the graziers, and the mountaineers who came to visit him when he was at home and whose hospitality he was delighted to repay whenever he could.

He had felt the chill of patternless living in the cities, and now he basked in the warmth and charm of patterned living in the villages. That there was no electric light, no sewers, no refrigeration, and no communications bothered him not the slightest. He felt that the full daylight hours were ample for his work, and indeed they were, since there was no waste of time. He could visit the post office, the town hall, the church, the market, and be back in his herbarium within a few minutes. Not that he worked in haste. His pace was intense but unhurried. He enjoyed the dawns, the long slow days, the contented evenings, and the long quiet nights. He slept only a few hours, but spent long hours lying awake, rested, thinking and smoking while he awaited the coming of dawn. He enjoyed his friendship with the villagers, above all with the children, for whom he had swings built in his garden and often made little parties. He enjoyed having the time to consult his botanical works, of which he had a small but very good collection.

When the corn harvest failed in Aguililla in 1940, Hinton imported corn from the coast, and had it given to the children who came to ask for it. This he was able to do without incurring the hostility of the merchants who were speculating with high prices while he was giving it to those who could not pay such prices. During most of his time in the village, he gave English classes to those who wanted them and usually had a class of five or six adults to whom he gave an hour a day without charge. At the same time, while he hated to do it, he could not avoid prescribing medicine, principally to those who were too poor to buy the medicine or pay the doctor. His cures were so good that against his will he found himself obliged increasingly to prescribe for the most desperate cases.

In a financial sense, Hinton's big problem was not that his combined income from the theoretical sale of plants together with rent from houses could not cover the cost of exploring what he called his garden. During the four years that his son James assisted him full time, the sale of twelve specimens of each number, plus the income he had from his houses and other sources, would easily have paid for the cost of collecting. The problem was that he could not get determinations nearly as fast as he and his son could collect. The more determinations lagged, the more he had to

dig into his savings to finance the collecting, while his herbarium grew bigger and bigger. The additional specimens were a problem to collect and a problem to store. But the specimens in his herbarium could not pay the cost of collecting because they were increasingly undetermined. No more eloquent explanation of this point can be found than his letter to one of the herbaria responsible for determining his specimens, when he wrote in 1939: "You ask me to be patient about the determinations on the lots of plants sent you in 1934. *My mules have been eating corn for five years!*"

Once he had the collecting started, properly organized, he could hardly stop it. For one thing, he had the judgement to realize that his own lease on life would not wait. For another, he knew that his son could not continue to help him indefinitely. Therefore he must push the collecting NOW, regardless of determinations, regardless of the sale of specimens, trying to measure out his own personal fortune in proportion to his own life expectancy, but preferring to gamble rather than to play it safe. Having started with the herbarium at Kew as the principal institution in classifying his specimens, the advent of the war obliged him to change to the Smithsonian Institution and the Gray Herbarium. Finally, at the time of his death, he had in many cases provided four or five specimens, and he still did not have the determination which would enable him to sell the remaining specimens, if any.

In 1941, the war brought botanical exploration to a close. Hinton left his herbarium to solve metallurgical problems at Taxco, with the intention of serving the cause in this manner for the duration of the war and not unmindful of repairing his financial position. His son James went to work for the Rubber Development Corporation. After a year at Taxco, when Hinton returned to Aguililla, it was to find that during his absence, the cyanide poisoning he had left in the herbarium had vanished, and the insects had attacked his collection with an astonishing rapacity. After going through the entire collection, a work of months, he calculated that something like thirty or forty thousand specimens had been lost. At a later date, after his death, the collection was again ravaged by insects and sustained another loss almost as great, after which his son removed it to Mexico City where the collection would be more frequently watched.

It might be said that the difference in what Hinton spent collecting and what he received from the sale of specimens, was determined rather precisely by the loss of specimens destroyed at one time or another by insects. Had all his specimens been determined and sold, the collection would have paid for itself through the sale of specimens.

During his expeditions, Hinton constantly shrugged off the lure of gold. Most of his collections were made in gold country, and he seldom visited a hut where his host did not show him a piece of gold-bearing ore, or perhaps a nugget, and try to inveigle him into developing a placer or a vein. Being a mining man, it was perhaps easier for him to refuse to touch a host of bonanzas, not only in gold, but also in silver, copper, lead, mercury, guano, precious woods, and cattle. He had not the time to become

rich, he had barely enough time to explore his wild and lonely garden. He was also often lured to visit other areas in other states by natives who knew fabled wildernesses. At first enthralled by their tales of the vegetation, he would finally shake his head and laugh and tell them that he had time to collect only one place well. He did not want to skim new species here and there, he wanted to establish a permanent record of everything that had once grown in his garden.

During the four years of most intense collecting, between 1936 and 1940, Hinton distributed his specimens as follows: one specimen of everything he collected to the Royal Botanic Gardens, Kew, the British Museum (Nat. Hist.), the herbaria at Zurich and Geneva, Harvard University, and the Smithsonian. Frequent lots were sent to the Field Museum and Missouri Botanical Garden, as well as to the New York Botanical Garden. Special groups, such as lupines and salvias, were sent also directly to Dr. Charles Piper Smith and Dr. Carl Epling. Infrequent sets of a thousand specimens were sent to Naturhistoriska Riksmuseum, Stockholm; Catholic University, Washington, D.C.; Mrs. Douglas of Mexico City, etc.

Hinton had originally made only two or three specimens of each collection. When the possibility of financing some of his expenses out of the sale of duplicates came to his attention, he began to take six specimens of each collection, wherever possible. When his son James returned from studies in Canada to devote himself full-time to assisting him, the number of specimens in each collection was increased to twelve, with the idea in mind of being able to finance future collecting. By this time, also, it was apparent that in order to have anything left for distribution, it was necessary to provide as many as three or even four specimens of each collection in order to obtain a determination without which the collection had little or no commercial value.

At the ratio of three specimens for a determination, if only six specimens were collected at the outset, then the price of fifteen U.S. cents per specimen for three specimens gave him $7\frac{1}{2}$ U.S. cents per specimen collected. However, if twelve specimens were collected at the outset, and three given for a determination, then in theory the gross return rose to $11\frac{1}{4}$ U.S. cents per specimen.

After Hinton's death in 1943, his son transferred some fifty-six thousand specimens to the New York Botanical Garden, which distributed these to forty-four herbaria listed on page 160.

There now remain in Hinton's collection approximately twenty thousand specimens.

It is estimated that the total number of specimens collected by Hinton, including those lost to insects and at government agencies, cannot exceed 150,000. Total remuneration received from the distribution of specimens, including subsidies from the Royal Botanic Gardens, Kew, is estimated at twelve thousand dollars. His records show that Hinton subsidized his collections to the amount of roughly another twelve thousand dollars — and, of course, worked without personal remuneration, other than the

enormous personal satisfaction, which he would not have traded for any money, full-time for five years, and part time for another five.

Because of his drying system, Hinton was able to produce very ample specimens, to the degree that Kew and others were often able to divide one specimen into several, and even this, sent to some other herbarium was again divided. As a consequence, Hinton's specimens found their way to a great many herbaria impossible to record in this work.

As his collecting progressed and determinations lagged more and more, he began to perceive that the bottleneck to increased knowledge of the Mexican flora was not so much botanical collecting as it was botanical determinations. To this end, he began to work on a mechanical device to reduce the task of determinations. This was a punching device, later perfected elsewhere, which he did not live long enough to build himself.

Hinton's interest in botanical collecting was principally scientific. If he could find only one or two specimens, he collected and sent them to the herbarium or to the specialist. This, naturally, deprived him of a specimen for his own collection, and it deprived him of specimens which could be sold. But this was for science, which was his main purpose. Furthermore, he had the means to indulge his pleasure in collecting. Had there been no scientific interest in his work, it would have destroyed his sense of mission, that sense of accomplishment which was so important to him. But he would still have enjoyed the work, the use of the faculties it demanded. He also enjoyed the work for its own sake, the exploration of barrancas and mountains which had perhaps never been looked upon by a trained eye backed by an academic education. He enjoyed riding horseback, the awaking long before dawn, the brushing, feeding, and saddling of the mules, and the early start so that the sunrise might be appreciated out in the woods or the top of the hills. Hinton loved the wilderness, and had it not been botany, some other mission would surely have taken him to those solitudes.

It was only when he could collect ten or twelve sheets that he had eight or ten for distribution to the herbaria. These, then, were to defray expenses. While there were rare times when expenses were fully met, his system of collecting meant, of course, not only that he and his son worked for many years without any personal income, but also that he used both the interest and the principle of a good part of his personal fortune. Had he brought to collecting a business attitude, and had he collected only the species which could have provided at the moment large, remunerative numbers of specimens, his work would have lost much of its botanical interest and value.

On the other hand, Hinton collected also the most common of species, in order to establish a record of distribution of known plants in botanically unknown areas. Without these numerous collections of common plants, the proportion of new species he collected would have increased spectacularly, but he would have lost the opportunity of extending the known geographical range of common as well as of new and rare species.

The more valuable he thought a specimen, the less he wanted it in his

own herbarium, where it would receive the least protection. In his arrangement with the different herbaria which worked upon his collections, Hinton supplied large numbers of additional specimens without cost. In the final outcome, a great many of the determinations he received cost him as many as four specimens, and even for this number, a very substantial portion of his collections had not been classified before his death.

Basically, the purpose of his work as Hinton saw it was to place before the specialist ample or at least adequate botanical material in the best possible condition. His attitude toward collecting was one of uncompromising honesty. When, as inevitably happens, there arose any confusion between a plant and its label, he destroyed both without hesitation, for if the main purpose of his collections was knowledge, then he could not possibly be instrumental in the fabrication of misbeliefs and errors. The purpose of his collections was indeed knowledge, and he was richly satisfied that in his own small way, he had served this purpose well.

Institutions to which duplicates of G. B. Hinton's collections were distributed by the New York Botanical Garden after Hinton's death. (See comments on page 158.)

NEW YORK BOTANICAL GARDEN
Bronx, New York.

MUSÉUM NATIONAL D'HISTOIRE
NATURELLE
Paris, France.

SOUTHERN METHODIST UNIVERSITY
Dallas, Texas.

TEXAS RESEARCH FOUNDATION
Renner, Texas.

ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA
Philadelphia, Pennsylvania.

UNIVERSITY OF TEXAS
Austin, Texas.

UNIVERSITY OF WASHINGTON
Seattle, Washington.

CONSERVATOIRE ET JARDIN BOTANIQUES
Geneva, Switzerland.

U.S. DEPT. OF AGRICULTURE
Beltsville, Maryland.

SCIENCE MUSEUM, THE INSTITUTE OF
JAMAICA
Kingston, Jamaica.

ARNOLD ARBORETUM, HARVARD
UNIVERSITY
Cambridge, Massachusetts.

RUTGERS UNIVERSITY
New Brunswick, New Jersey.

UNIVERSITY OF CALIFORNIA
Berkeley, California.

DUDLEY HERBARIUM
Stanford, California.

UNIVERSITY OF MICHIGAN
Ann Arbor, Michigan.

INSTITUTO MIGUEL LILLO
Tucuman, Argentina.

UNIVERSITY OF ARIZONA
Tucson, Arizona.

FIELD MUSEUM
Chicago, Illinois.

POMONA COLLEGE Claremont, California.	JARDIN BOTANIQUE Leningrad, U.S.S.R.
NATURHISTORISKA RIKSMUSEUM Stockholm, Sweden.	JARDIN BOTANIQUE NATIONAL DE BELGIQUE Brussels, Belgium.
BOTANICAL MUSEUM AND HERBARIUM Utrecht, Netherlands.	BOTANICAL INSTITUTE OF THE ACADEMY OF SCIENCES OF THE U.S.S.R. Leningrad, U.S.S.R.
NATURHISTORISCHES MUSEUM Vienna, Austria.	UNIVERSITY OF ILLINOIS Urbana, Illinois.
ROYAL BOTANIC GARDENS Kew, Richmond, Surrey, England.	UNIVERSITY OF CALIFORNIA Goleta, California.
BOTANISCHES MUSEUM Berlin-Dahlem, Germany.	WASHINGTON STATE UNIVERSITY Pullman, Washington.
MISSOURI BOTANICAL GARDEN St. Louis, Missouri.	UNIVERSITY OF GEORGIA Athens, Georgia.
BOTANICAL MUSEUM, THE UNIVERSITY Lund, Sweden.	UNIVERSITY OF MINNESOTA Minneapolis, Minnesota.
BRITISH MUSEUM (NAT. HIST.) London, England.	IOWA STATE UNIVERSITY Ames, Iowa.
BOTANICAL MUSEUM AND HERBARIUM Copenhagen, Denmark.	UNIVERSITY OF OKLAHOMA Norman, Oklahoma.
UNIVERSITY OF WYOMING Laramie, Wyoming.	NATIONAL MUSEUM OF CANADA Ottawa, Canada.
BOTANISCHE STAATSSAMMLUNG Munich, Germany.	DUKE UNIVERSITY Durham, North Carolina.
SMITHSONIAN INSTITUTION Washington, D.C.	
CORNELL UNIVERSITY Ithaca, New York.	

NOTE: Dr. Rzedowski has prepared with meticulous care as complete a list as possible of determinations of the Hinton collections. Completion of this task was made possible through the cooperation of Mr. C. V. Morton, of the Smithsonian Institution, who made available records compiled from his own and other institutions, and also by use of reports found in Hinton's files. The list of collection numbers (with or without names) is almost 500 pages long making it too costly to print, as well as unsuitable for the pages of a journal. Therefore, until the end of 1972, the editors of the *Journal of the Arnold Arboretum* will undertake to have prepared, at cost plus postage charges, xerox copies of the list for those individuals or institutions finding a copy important for proper use of their collections. Charges will be about \$18.00 per complete list. — Eds.

PARTIAL LIST OF NEW TAXA BASED ON THE
COLLECTIONS OF G. B. HINTON

GENERA

- Hintonella* Ames (Orchidaceae)
Hintonia Bullock (Rubiaceae)
Onocleopsis Ballard (Aspidiaceae)
Symplocarpon Airy-Shaw (Theaceae)

SPECIES AND VARIETIES

NOTE: The number following the name of the authority is the number of the type collection.

ACANTHACEAE

- Aphelandra lineariloba* Leonard, 3156
Beloperone longibracteata Leonard,
2159
Berginia hintonii Leonard, 5956
Buceragenia hirsuta Leonard, 5318
Carlowrightia coyucana Leonard, 6129
Carlowrightia lanceolata Leonard, 2672
Carlowrightia mucronata Leonard, 5533
Dicliptera aquatica Leonard, 3337
Jacobinia capitata Leonard, 1354
Pseuderanthemum axillare Leonard,
3200
Stenandrium mexicanum Leonard, 4292
Tetramerium hillii Happ, 5724
Tetramerium hintonii Happ, 3375

ANNONACEAE

- Desmopsis mexicana* Fries, 15836

APOCYNACEAE

- Echites woodsoniana* Monachino, 15325

ARISTOLOCHIACEAE

- Aristolochia bullata* Pfeifer, 14569
Aristolochia cardiantha Pfeifer, 9096
Aristolochia glossa Pfeifer, 15151

ASCLEPIADACEAE

- Gonolobus megalocarpus* P.G. Wilson,
7141
Matelea hintoniana Woodson, 1450
Pseudomarsdenia lanata P.G. Wilson,
7602

ASPIDIACEAE

- Onocleopsis hintonii* Ballard, 3297

BEGONIACEAE

- Begonia asteroides* Smith & Schub.,
2206
Begonia cylindrata Smith & Schub.,
5042
Begonia extranea Smith & Schub., 993
Begonia fernaldiana Smith & Schub.,
9425
Begonia hintoniana Smith & Schub.,
2050
Begonia michoacana Smith & Schub.,
15186
Begonia nemoralis Smith & Schub.,
15063

BIGNONIACEAE

- Adenocalymma hintonii* Sandw., 3784
[fl.] & 7259 [fr.]

BORAGINACEAE

- Bourreria hintonii* I.M. Johnst., 10866
Bourreria longiflora I.M. Johnst.,
15908
Bourreria superba I.M. Johnst., 13834
Cordia coyucana I.M. Johnst., 8156
Cordia hintonii I.M. Johnst., 7740
Cordia subvelutina I.M. Johnst., 15066
Heliotropium cremnogenum I.M.
Johnst., 8514
Heliotropium fallax var. *hintonii* I.M.
Johnst., 3631

Heliotropium michoacanum I.M.
Johnst., 15069

BROMELIACEAE

Catopsis mexicana L.B. Smith, 4692
Pitcairnia flexuosa L.B. Smith, 3948
Pitcairnia hintoniana L.B. Smith, 2040

BURSERACEAE

Bursera citronella McV. & Rzed., 12299
Bursera coyucensis Bullock, 6895
Bursera crenata P.G. Wilson, 12025
Bursera denticulata McV. & Rzed.,
12021
Bursera dubia Bullock, 9349
Bursera fragrantissima Bullock, 9731
Bursera grandifolia f. *robusta* Bullock,
9774
Bursera heteresthes Bullock, 7812
Bursera hintonii Bullock, 6991
Bursera occulta McV. & Rzed., 12555
Bursera sarcopoda P.G. Wilson, 12293
Bursera sessiliflora var. *pubivalvis* Bul-
lock, 9052
Bursera staphyleoides McV. & Rzed.,
12073
Bursera trifoliolata Bullock, 6340
Bursera trimera Bullock, 6262
Bursera velutina Bullock, 6261
Bursera velutina var. *parvifolia* Bul-
lock, 9193

CAMPANULACEAE

Diastatea expansa McV., 2644

CAPPARACEAE

Forchhammeria hintonii P.G. Wilson,
7617
Physostemon aureum R.C. Foster,
10537

CARYOPHYLLACEAE

Drymaria grandis Bullock, 5427

CELASTRACEAE

Euonymus corymbosus Sprague & Bul-
lock, 325

COMPOSITAE

Bidens gracillima Sherff, 4546

Bidens minensis Sherff, 9453
Chaptalia hintonii Bullock, 3098
Coreocarpus hintonii Sherff, 9379
Cosmos hintonii Sherff, 10647
Cosmos purpureus var. *flavidiscus*
Sherff, 1700
Dahlia hintonii Sorensen, 14499
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Lantana hintonii Moldenke, 9307

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1801

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Collecting Localities of G. B. Hinton

The partial lists are arranged by districts (distritos), ancient administrative units, which were used by Hinton on his labels. Correspondence to modern municipalities (municipios) is indicated. The municipalities, access roads and coordinates were taken from modern maps and the position of a given locality on Hinton's original map may not coincide exactly with the corresponding listed coordinates. Altitude and vegetation data are taken from an archive of duplicate labels which was the main source of information in the elaboration of the list.

ESTADO DE MEXICO

DISTRICT OF TEMASCALTEPEC

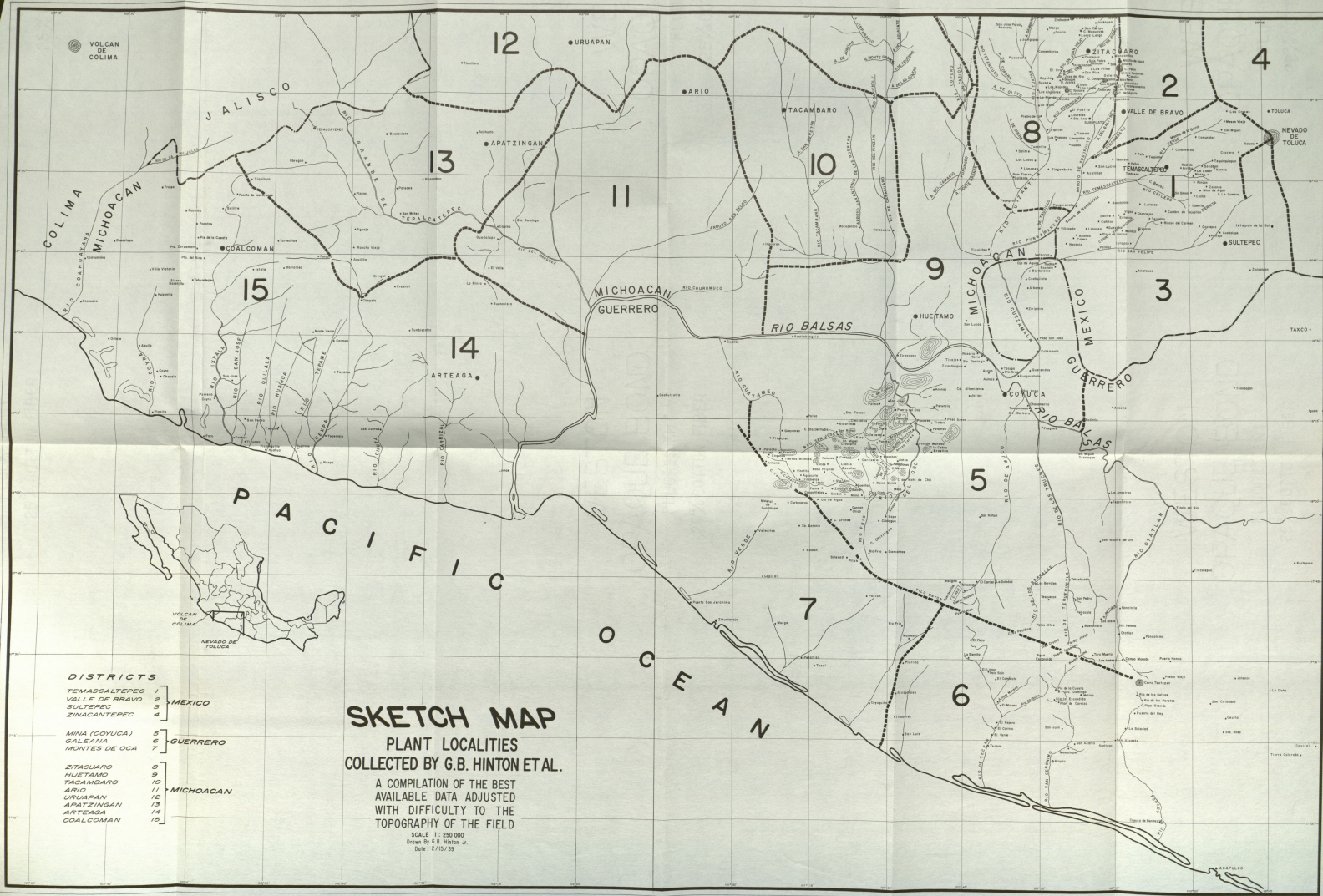
LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Acatitlán	Tejupilco	19°01'	100°19'	1130	Awdr * to Valle de Bravo and Tejupilco	Tropical
Anonas (Las Anonas)	Tejupilco	18°48'	100°22'	880	Awdr to Tejupilco and Bejucos	Oak
Bejucos	Tejupilco	18°47'	100°26'	610	Awdr to Tejupilco	
Berros (Cerro de los Berros)	Tejupilco	19°00'	100°05'	1950	Awdr to Temascaltepec and Tejupilco	Oak
Cajones	Texcalitlán	19°03'	99°53'	2460-2500 (2900?)	Awdr to Toluca and Sultepec	Oak-pine
Calera	Tejupilco	18°48'	100°24'	770	Awdr to Tejupilco and Bejucos	
Cañitas	Tejupilco	18°51'	100°18'	1000-1350	Awdr to Tejupilco and Bejucos	
Carboneras	Temascaltepec	19°03'	100°00'	1900-2030	Paved highway to Toluca and Temascaltepec	Oak-pine
Cerro de Los Berros (see Berros)						
Cerro Muñeca (see Ypericones)						
Chorrera	Tejupilco	18°55'	100°14'	1230	Awdr to Tejupilco and Bejucos?	Oak
Comunidad	Temascaltepec	19°08'	99°56'	2250-2750	Paved highway to Toluca and Temascaltepec	
Crucero (El Crucero)	Temascaltepec?	19°08'	99°50'	2670-3400	?	Pine-oak Fir-pine

Cruces (Las Cruces)	Temascaltepec	19°12'	99°53'	2900-3400	?	Fir-pine
Cucha	San Simón de Guerrero?	18°59'	99°59'	1960-2240	?	Pine-oak
Cuentla	Tejupilco	18°57'	100°02'	1960-2000	?	?
Cumbre (La Cumbre)	Texcaltitlán	19°02'	99°50'	2485-2950	Awdr to Toluca and Sultepec	Pine-oak- <i>Alnus</i>
Cumbre de Tejupilco	Tejupilco	18°57'	100°08'	1500-2000	?	Oak
El Crucero (see Crucero)						
Guayabal	Tejupilco	18°51'	100°18'	790	Awdr to Tejupilco and Bejucos	
Hornos (Los Hornos)	Temascaltepec	19°03'	99°56'	2500-2700	?	Pine-oak
Ipericones (see Ypericones)						
Ixtapan	Tejupilco	18°48'	100°09'	1000-1100	Awdr to Tejupilco and Amatepec	
La Cumbre (see Cumbre)						
Labor (La Labor)	Temascaltepec	19°02'	99°58'	1900-2100	?	Oak
La Sierrita (see Sierrita)						
Las Anonas (see Anonas)						
Las Cruces (see Cruces)						
Las Mesas (see Mesas)						
Las Vigas (see Vigas)						
Los Hornos (see Hornos)						
Limones	Tejupilco	18°50'	100°19'	(640?) 910-960	Awdr to Tejupilco and Bejucos	Oak
Luvianos	Tejupilco	18°55'	100°18'	1080-1450	Awdr to Tejupilco and Valle de Bravo	Oak
Mesas (Las Mesas)	Temascaltepec	19°01'	99°58'	2000	?	Oak
Mesón Viejo	Temascaltepec	19°10'	99°53'	2830-3300	Paved highway to Toluca and Temascaltepec	Pine-fir Pine-oak Pine-oak
Mina de Agua	Temascaltepec	19°00'	99°56'	1800-2000	?	Oak-pine
Nanchititla	Tejupilco	18°53'	100°28'	1100-1850	Awdr to Tejupilco	
Naranja	Tejupilco	18°48'	100°25'	860	Awdr to Tejupilco and Bejucos	
Ocoatepec	Tejupilco	18°52'	100°03'	1500		
Palmar (Palmar Chico)	Tejupilco	18°42'	100°24'	650	Awdr to Tejupilco	
Pantoja	Tejupilco	18°52'	100°01'	1500		Oak
Paso de Vigas (see Vigas)						
Peñón	Valle de Bravo?	19°08'	100°06'	1680-1960	?	?

* Awdr = All-weather dirt road.

ESTADO DE MEXICO
DISTRICT OF TEMASCALTEPEC

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Platanal	Tejupilco			?	?	Oak
Plaza de Gallos	Tejupilco	18°48'	100°18'	350-1200	?	
Puerto Salitre (see Salitre)						
Pungarancho	Tejupilco	18°53'	100°35'	950	?	Oak
Rincón	Temascaltepec	19°01'	99°58'	1930-2400	?	Oak-pine
Rincón del Carmen	Tejupilco	18°53'	100°08'	1340-1460	?	Oak
Salitre (Puerto Salitre)	Tejupilco	18°53'	100°17'	1300	Awdr to Tejupilco and Bejucos	Oak
San Lucas del Maíz				?	?	Pine-oak
San Miguel	Temascaltepec	19°08'	99°53'	2730-2770	?	Pine-fir
Sierrita (La Sierrita)	Texcalitlán	18°58'	99°55'	2200-2480	Awdr to Toluca and Sultepec	Oak-pine- <i>Alnus</i>
Socabón	Temascaltepec	19°02'	99°58'	2320	?	Oak-pine
Tejupilco	Tejupilco	18°55'	100°09'	1290-2000	Awdr to Temascaltepec and Valle de Bravo	Oak
Telpintla (Tempincla)	Valle de Bravo?	19°06'	100°04'	1800-1960	?	Oak
Temascaltepec	Temascaltepec	19°03'	100°02'	1700-2080	Paved highway to Toluca	Oak-pine
Tenayac	Zacazonapan?	19°04'	100°13'	1220-1720	?	Oak
Tequesquipan	Temascaltepec	19°04'	99°57'	2480-2800	Awdr to Comunidad	Oak-fir
Timbres	Valle de Bravo?			1660-1900	?	Oak
Tule	Valle de Bravo?			1500-1800	?	Oak
Vigas (Las Vigas, Paso de Vigas)	Tejupilco	18°55'	100°15'	1080-1300	Awdr to Tejupilco and Valle de Bravo	
Villaneda (Villa Neda)	Tejupilco			?	?	
Volcán (Volcán de Tejupilco)	Tejupilco	18°51'	100°09'	1380-1530	Awdr to Tejupilco and Amatepec	Oak
Ypericones (Ipericones includes Cerro Muñeca)	Tejupilco	18°48'	100°16'	1500-2300	?	Oak



DISTRICTS

- | | | |
|----|----------------|----------|
| 1 | TEMASCALTEPEC | MEXICO |
| 2 | VALLE DE BRAVO | |
| 3 | ZIMATLAC | |
| 4 | ZIMATLAC | |
| 5 | MINA (COYUCA) | GUERRERO |
| 6 | GALEANA | |
| 7 | MONTES DE OCA | |
| 8 | ZITACUARO | |
| 9 | HUATAMO | MICHOCAN |
| 10 | TACAMBARO | |
| 11 | ARIO | |
| 12 | APATZINGAN | |
| 13 | ARTEAGA | |
| 14 | ARTEAGA | |
| 15 | COATLOMAN | |

SKETCH MAP
PLANT LOCALITIES
COLLECTED BY G.B. HINTON ET AL.

A COMPILATION OF THE BEST
AVAILABLE DATA ADJUSTED
WITH DIFFICULTY TO THE
TOPOGRAPHY OF THE FIELD

SCALE 1: 250,000
Drawn by G.B. Hinton Jr.
Date: 2/10/39

GUERRERO

DISTRICT OF GALEANA

Agua Escondida	Atoyac	17°30'	100°21'	1700-2200		Pine
Alcaparrosa	Tecpan	17°23'	100°57'	260-560		
Atoyac	Atoyac	17°12'	100°27'	0-660	Paved highway from Acapulco	
Camalote	Tecpan	17°25'	100°38'	250-500		
Carrizo (see Plan de Carrizo)						
El Plato (see Plato)						
El Reparo (see Reparo)						
El Verde (see Verde)						
Florida	Tecpan	17°31'	100°57'	760-880		Oak-pine
La Soledad (see Soledad)						
Mescaltepec	Atoyac	17°15'	100°23'	120-140		
Molino (Plan del Molino)	Atoyac	17°22'	100°23'	750-850		Oak-pine
Moreno	Tecpan	17°23'	100°36'	175-250		
Palo Solo	Tecpan	17°31'	100°40'	600		Oak
Pie de la Cuesta	Atoyac	17°28'	100°21'	1800-3000		Oak-pine
Piedra Ancha	Atoyac	17°30'	100°19'	2500-3150		Oak-pine
Plan de Carrizo (Carrizo)	Atoyac	17°23'	100°23'	550-1050		Oak-pine
Plato (El Plato)	Tecpan	17°35'	100°39'	800-1400		Oak
Puente del Rey	Atoyac	17°20'	100°16'	1000-1160		Oak-pine
Reparo (El Reparo)	Tecpan	17°22'	100°36'	75-100		
Río de las Selvas	Atoyac	17°27'	100°14'	2820		Pine
Río de Parotas	Atoyac	17°26'	100°14'			
Río de Santiago (Santiago)	Atoyac	17°14'	100°21'	680-700		
San Andrés	Atoyac	17°17'	100°19'			
San Juan de las Flores	Atoyac	17°17'	100°22'	380-620		
San Luis	Tecpan	17°16'	100°51'	0-140	Paved highway from Acapulco	
San Vicente	Atoyac	17°17'	100°18'			
Santiago (see Río de Santiago)						
Santo Domingo	Atoyac	17°27'	100°21'	850-1500		Pine
Sierrita	Tecpan	17°33'	100°37'	450-950		Oak-pine

GUERRERO
DISTRICT OF GALEANA

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Soledad (La Soledad)	Atoyac	17°17'	100°14'	1080		Oak-pine
Tecpan	Tecpan	17°13'	100°37'	20		
Teotepec	Atoyac	17°28'	100°10'	1800-3300	Awdr to Xochipala	Oak-pine
Toro Muerto	Atoyac	17°31'	100°16'			
Verde (El Verde)	Tecpan	17°16'	100°37'			

DISTRICT OF BRAVOS

Pueblo Viejo	Tlacotepec	17°31'	100°02'	2000		Oak
Puerto Hondo	Tlacotepec	17°31'	100°05'	2100		Pine

DISTRICT OF MINA (COYUCA)

Aguacate	Coyuca	18°07'	101°17'	1100		Oak
Aguazarca	Coyuca	18°07'	101°00'	1400-1760		Oak
Alacranes	Zirándaro	18°14'	101°07'			
Alborejo	Cutzamalá	18°40'	100°32'			
Ancón (El Ancón)	Coyuca	18°23'	100°41'			
Animas	Coyuca	18°22'	100°41'			
Anonas	Coyuca	18°20'	100°52'	200-360		
Arcelia	Arcelia	18°18'	100°16'		Paved highway to Iguala	
Armenia	Zirándaro	18°08'	101°19'	2000-2400		Oak-pine
Arrastras (Las Arrastras)	Totolapan	18°01'	100°18'	600		
Balderrama (see Valderrama)						
Barrales						
Bejuco (Rancho Bejucos)	Coyuca	18°12'	100°54'	400		
Brasiles (Braziles)	Coyuca	18°10'	100°52'	400		
Buenavista	Totolapan	17°46'	100°16'	1650-2275		Oak-pine

Calavera	Coyuca	18°11'	100°57'	450-1000		Oak-tropical
Camarón (Camerón)	Coyuca	18°13'	100°56'			
Campo Morado	Tlacotepec	17°35'	100°11'	900-2780		Oak-pine
Carriceras (Carrizera)	Coyuca	18°05'	101°05'	1000-1500		Oak
Carrizal	Ajuchitlán	17°36'	100°37'	1300-1750		Oak
Casas Viejas	Coyuca	18°01'	101°15'	1500-1640		Oak
Cayunche (see Cuayunche)						
Cerro Azul	Ajuchitlán	17°37'	100°39'	2250-2550		Oak-pine
Chacamerito	Ciudad					
	Altamirano	18°18'	100°34'		Awdr to Ciudad Altamirano	
Chilacayote	Ajuchitlán	17°37'	100°38'	1450-1675		Oak-pine
Chirapitiro (see Zirapitiro)						
Chiriagua	Coyuca	17°54'	101°02'	1580-1860		Oak-pine
Cigarrillo	Coyuca	18°12'	100°55'	400-500		
Ciudad Altamirano	Ciudad					
	Altamirano	18°21'	100°40'	400	Awdr to Iguala	
Coyuca (Coyuca de Catalán)	Coyuca	18°18'	100°41'	200-400	Awdr to Iguala	
Cruz Pacífica	Totolapan	17°33'	100°28'	2500-3050		Oak-pine
Cuahuilote (Cuajilote)	Cutzamalá	18°41'	100°32'	640		
Cuayunche (Cayunche)	Zirándaro	18°12'	101°11'	500		
Cuchara	Coyuca	18°06'	101°02'			Oak
Cuevas	Coyuca	18°05'	101°03'	1350		
Cuirio (Quirio)	Coyuca	18°18'	100°41'		Dirt road to Coyuca	
Cundán (Cundán Chico)	Coyuca	18°01'	101°08'	900-1320		Oak
Cutzamalá	Cutzamalá	18°27'	100°33'		Awdr to Ciudad Altamirano	
Diamantes	Coyuca	17°52'	101°00'	2320-2520		Oak-pine-fir
El Ancón (see Ancón)						
Espadines	Ajuchitlán	17°34'	100°37'	1500		
Espinazo del Diablo	Coyuca	18°04'	101°01'	1040-1400		Oak-pine
Filo Mayor	main crest of the Sierra Madre del Sur					
Fraguas	Tlapehuala	18°14'	100°29'		Awdr to Iguala and Coyuca	
Fresnos	Zirándaro	18°12'	101°17'	1260-2180		Oak-pine
Fundiciones	Coyuca	18°06'	100°59'			Oak
Guayameo	Zirándaro	18°17'	101°15'	560-900	Dirt road to Zirándaro	

GUERRERO

DISTRICT OF MINA (COYUCA)

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Idolo	Coyuca	18°03'	101°16'	1140	Dirt road to Coyuca	Oak-pine
Jaripo	Coyuca	18°18'	100°44'			
Jiotes (Jiotis)	Coyuca	18°06'	100°57'	500		
Juntas (Las Juntas)	Tlacotepec	17°34'	100°10'	1500		
La Soledad (see Soledad)						
Laguna	Zirándaro	18°18'	101°23'	1500-2500		
Lagunas	Zirándaro	18°09'	101°18'	1900		
Las Arrastras (see Arrastras)						
Las Juntas (see Juntas)						
Las Rosas (see Rosas)						
Llanos de Zacatlán (see Zacatlán)						
Los Barrales (see Barrales)						Oak
Manchón	Coyuca	18°07'	100°59'	1100-1760		
Manguito	Ajuchitlán	17°42'	100°38'	1500-1750		
Mesa Cuaxtle (Mesa Queisle)	Coyuca	18°03'	101°04'			Oak
Mesa del Frijolar	Coyuca	18°03'	101°11'	1000-1140		
Mono	Coyuca	18°02'	101°07'	800		Oak
Nancintla	Totolapan	17°43'	100°13'	1460		
Ojo de Agua	Cutzamalá	18°43'	101°30'			Oak
Ojo de Agua	Coyuca	18°00'	101°15'	1500-1640		
Otatlán	Totolapan	17°40'	100°13'	950-1550		Pine-oak
Palma	Coyuca	18°03'	101°15'	1050-1100		
Paracho	Zirándaro	18°10'	101°23'	2300-2400		Oak
Paraje Javalín	Totolapan	17°47'	100°16'	2000-2500		
Parancio	Coyuca	18°17'	100°52'	320		Oak
Parotas	Coyuca	18°08'	100°58'	800		

Paso de Arena	Coyuca	18°17'	100°50'		Dirt road to Coyuca	
Paso de San José	Cutzamalá	18°31'	100°33'		Dirt road to Cutzamalá	
Patambo	Coyuca	18°12'	100°51'	400-450		
Petlacala	Totolapan	17°47'	100°18'	1950-3000		Oak-pine
Pilas	Coyuca	17°51'	101°07'	1000-1660		Pine
Pino	Zirándaro	18°10'	101°05'	620-700		
Pinzán Morado	Coyuca	18°10'	100°53'	400		
Placeres (Placeres del Oro)	Coyuca	18°13'	100°53'	300-800	Dirt road to Coyuca	Oak-pine
Pochote	Cutzamalá	18°43'	101°29'			
Poleo	Zirándaro	18°17'	101°08'			
Poliutla (Policla)	Tlapehuala	18°15'	100°23'		Awdr to Iguala	
Puerto del Oro	Coyuca	18°16'	100°56'	400-800		
Puerto del Clarín	Zirándaro	18°12'	100°59'	750		
Puerto Rico	Ajuchitlán	17°38'	100°40'	1600-1850		Oak-pine
Puerto Suspiro	Zirándaro	18°07'	101°05'	1340		Oak
Pungarabato (see Ciudad Altamirano)						
Querendas	Ciudad Altamirano	18°20'	100°37'		Dirt road to Ciudad Altamirano	
Quirio (see Cuirio)						
Rancho Bejuco (see Bejuco)						
Río Frío	Coyuca	17°52'	101°05'	1260-2000		Pine
Rosario	Coyuca	18°25'	100°45'			
Rosas (Las Rosas)	Totolapan	17°40'	100°17'	1550-1600		
San José	Zirándaro	18°17'	100°58'	230-320		Oak
San Miguel	Coyuca	18°15'	100°37'			
San Nicolás (San Nicolás del Oro)	Totolapan	17°54'	100°15'			
San Pedro	Totolapan	17°40'	100°22'	1400-1600		
San Rafael	Zirándaro	18°12'	101°08'	800		
Santa Ana (see Santana)						
Santa Bárbara	Ciudad Altamirano	18°18'	100°38'			
Santa Rosa	Coyuca	18°18'	100°38'			

GUERRERO

DISTRICT OF MINA (COYUCA)

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Santa Teresa	Zirándaro	18°16'	101°05'	450-1040		Oak
Santana (Santa Ana)	Coyuca	18°04'	101°13'	1100-1350		Oak
Santo Domingo	Coyuca	18°23'	100°43'			
Sapo (Zapo)	Coyuca	17°55'	101°00'	740-860		
Soyate (Zoyate)	Zirándaro	18°09'	101°21'	2140-2400		Oak-pine
Suspiro (see Puerto Suspiro)						
Tanganhuato	Ciudad Altamirano	18°17'	100°35'			
Tario	Coyuca	18°25'	100°45'			
Tehuehuetla (Tejuehuetla)	Totolapan	17°48'	100°25'	1200		
Teotepec	Tlacotepec			1500-3600		Oak-pine-fir
Ticuiches (Tequeches)	Zirándaro	18°14'	101°18'	1650-1880		Oak-pine
Tierras Blancas	Coyuca	18°09'	101°17'	1400-1800		Oak
Timbre	Coyuca	18°15'	100°52'	400		
Tinajas	Coyuca	18°21'	100°41'			
Toro Muerto	Totolapan	18°31'	100°16'	1800-2900		Oak-pine
Totolapan (San Miguel Totolapan)	Totolapan	18°01'	100°18'	600		
Trincheras	Coyuca	18°05'	101°16'	1200-1300		
Truchas	Cutzamalá	18°44'	100°28'		Dirt road to Cutzamalá	
Vacas	Coyuca	18°04'	101°10'			
Valderrama (Balderrama)	Cutzamalá	18°43'	100°31'		Dirt road to Cutzamalá	
Vetarrón	Cutzamalá	18°43'	100°29'		Dirt road to Cutzamalá	
Vinatita	Coyuca	18°06'	101°16'	1250		
Yesqueros (Yesceros)	Totolapan	17°47'	100°29'	1600-2250		Oak-pine
Zacatlán (Llanos de Zacatlán)	Coyuca	18°05'	101°07'	1500		
Zapo (see Sapo)						
Zihuaquio (Zihuagio)	Coyuca	18°02'	101°14'	1050-1100		Oak

Zirandarangio	Coyuca	18°20'	100°41'	
Zirapitiro (Chirapitiro)	Cutzamalá	18°35'	100°33'	Dirt road to Cutzamalá
Zoyate (see Soyate)				

DISTRICT OF MONTES DE OCA

Balcón	Petatlán	17°51'	101°11'	560-720	
Banco	Petatlán	17°37'	101°02'	560-800	
Buenos Aires	La Unión	17°56'	101°15'		Oak
Capirial	Petatlán	17°47'	101°17'	840-960	Oak-pine
Carboneras	La Unión	18°01'	101°19'	1150-1400	
Ciruelo (Ciruelos)	La Unión	17°53'	101°21'		Oak
Filo Mayor	main crest of the Sierra Madre del Sur				
Guadalupe (Mineral de Guadalupe, Real de Guadalupe)	La Unión	17°59'	101°18'	900-1200	Oak
Mameyal	Petatlán	17°35'	100°59'	700	
Murga	Petatlán	17°39'	101°17'	100	
Pasión	Petatlán	17°38'	101°06'	400-1000	Oak-pine
Petatlán	Petatlán	17°31'	101°16'	100	
Pilas	Coyuca (?)	17°49'	101°07'	2100	Paved highway to Acapulco
San Antonio	La Unión	17°57'	101°17'	800-1040	Oak
Soledad (Soledad Palma)	Petatlán	17°50'	101°08'	720	Oak-pine
Tusal (Tuzal)	Petatlán	17°26'	101°15'	0	Paved highway to Acapulco
Vallecitos	La Unión	17°55'	101°19'	400-760	Oak-pine

MICHOACAN

DISTRICT OF APATZINGAN

Acahuato	Apatzingán	19°10'	102°20'	800-1400		Pine
Aguafe	Tepalcatepec	19°00'	102°43'	200-350	Awdr to Apatzingán	Thorn
Aguililla	Aguililla	18°44'	102°47'	800-1100	Awdr to Apatzingán	
Apatzingán	Apatzingán	19°04'	102°22'	300-400	Paved highway to Uruapan	Thorn
Buenavista	Buenavista	19°12'	102°33'	400-800	Awdr to Apatzingán	Tropical-thorn

MICHUACAN

DISTRICT OF APATZINGAN [cont.]

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Rancho Viejo	Buenavista	19° 12'	102° 40'	700	Awdr to Apatzingán	Tropical-thorn
Tepalcatepec	Tepalcatepec	19° 11'	102° 50'	300-400	Awdr to Apatzingán	Tropical-thorn
Tiquiluca	Tepalcatepec			700	Awdr to Apatzingán	Tropical

DISTRICT OF URUPAN

Tancitaro	Tancitaro			1600-3900		Oak-pine-fir
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DISTRICT OF COALCOMAN

Aquila	Aquila	18° 37'	103° 30'	50-250	Awdr to Tecmán, Col.	Tropical
Barroloso				1300-2900		Oak-pine-fir
Chacalapa				150-250		Tropical
Coalcomán	Coalcomán	18° 46'	103° 09'	1000-1250	Awdr to Apatzingán	Oak-pine
Huizontla	Villa Victoria	18° 09'	103° 24'	350-1050		Oak & tropical
Ocortá	Coalcomán	18° 36'	103° 07'	850-1700		Oak-pine
Ostula	Aquila	18° 30'	103° 29'	550		Tropical
Parotas	Coalcomán			750-800		
Puerto Las Cruces	Coalcomán			1200-1450		Pine
Puerto Zarzamora				1200-1800		Oak-pine
Salitre	Coalcomán			1100-1800		Pine
San José	Aquila			750-1600		Pine & tropical
San Pedro	Aquila	18° 15'	103° 06'	450-600		Tropical
Sierra Naranjillo	Coalcomán			450-1550		Pine-oak
Sierra Torrecillas	Coalcomán			1400-2700		Pine-oak
Tizupán (Tizupa)	Aquila	18° 11'	103° 02'	0-50		Tropical
Trojes	Coalcomán	18° 57'	103° 21'	400-500		Tropical
Villa Victoria	Villa Victoria			500-1600		Tropical & pine

DISTRICT OF HUETAMO

Huetamo	Huetamo	18°36'	100°54'		Awdr to Morelia	Tropical
San Lucas	San Lucas	18°34'	100°47'		Awdr to Huetamo	Tropical
Santa Cruz	San Lucas	18°25'	100°36'			Tropical
Tacupa	San Lucas			380		Tropical
Tario	San Lucas					Tropical
Tiquicheo	Tiquicheo	18°55'	100°45'	450-600	Awdr to Morelia	Tropical

DISTRICT OF ZITACUARO

Aguila (El Aguila)	Zitácuaro			2700-2800		Pine-oak
Ahorcados (Los Ahorcados)	Zitácuaro			2400		Pine-oak
Alumbres (Los Alumbres)	Zitácuaro			1250		
Anganguco	Anganguco	19°36'	100°18'	2100-2200	Paved highway to Zitácuaro	Pine
Aputzio	Zitácuaro			1950-2300		Oak
Benito Juárez (see Laureles)						
Bosque	Zitácuaro			1800	Awdr to Zitácuaro	Oak
Cacique	Zitácuaro			2350-3350		Pine-oak
Campana (La Campana)	Zitácuaro			2000-2300		Oak
Canoas (Las Canoas)	Zitácuaro			2600-2650		Oak-pine
Capulín	Estado de México	19°22'	100°18'			Oak
Cerro de los Magueyes	Zitácuaro					
Cerro Pelón (Pelón Hill)	Zitácuaro			2600-3600		Pine-oak
Coatepec	Zitácuaro			1950	Awdr to Zitácuaro	
Copándiro	Zitácuaro			1900-2600		Oak-pine
Coyota	Zitácuaro			1700-1900		
Dos Ríos	Zitácuaro	19°20'	100°28'	1800		
El Aguila (see Aguila)						
El Puerto (see Puerto)						
El Sauce (see Sauce)						
Enandio (Nandio, Salto de Enandio)	Zitácuaro			1500-1850		Oak

MICHUACAN

DISTRICT OF ZITACUARO

LOCALITY	MUNICIPALITY	APPROXIMATE COORDINATES		ALTITUDE METERS	ACCESS ROADS	PREDOMINANT FOREST VEGETATION
		LAT. N.	LONG. W.			
Encarnación	Zitácuaro				Awdr to Zitácuaro	Tropical
Florida (La Florida)	Zitácuaro			1300-1600		
Galeras	Zitácuaro			2400-2500		
Guajes (Los Guajes)	Tuzantla			1000-1350		
Guanoro	Benito Juárez			1500-1900	Paved highway to Zitácuaro	Tropical
Ipazote (Ypazote hill)	Zitácuaro			2150-2450		Oak
Jungapeo	Jungapeo	19° 28'	100° 30'	1500-1850		Oak-fir
Jurungueo (Jurungeo)	Zitácuaro					Tropical
La Campana (see Campana)						
La Florida (see Florida)						
Las Canoas (see Canoas)						
Las Lomas (see Lomas)						
Las Pilas (see Pilas)						
Laureles (Benito Juárez)	Benito Juárez	19° 18'	100° 27'	1200-1700	Awdr to Zitácuaro	Oak
Loma Larga	Zitácuaro			1850-1950		Oak
Lomas (Las Lomas)	Zitácuaro			1900-1950		
Los Ahorcados (see Ahorcados)						
Los Alumbres (see Alumbres)						
Los Guajes (see Guajes)						
Los Macheros (see Macheros)						
Los Pinzanes (see Pinzanes)						
Los Tepehuajes (see Tepehuajes)						
Macheros (Los Macheros)	Zitácuaro			2300-2400	Paved highway to Zitácuaro	Oak
Macho de Agua	Zitácuaro			2300-2400		Oak-pine
Mango	Zitácuaro			2000-2100		
Manzanillos	Zitácuaro			2100-2200		

Nihuatlán	Donato Guerra,				
	Estado de				
	México ?			2500-2550	Pine-oak
Ocurio	Zitácuaro			2000	
Pelón Hill (see Cerro Pelón)					
Piedra de Cal	Tuzantla			1300	Tropical
Pilas (Las Pilas)	Zitácuaro			2100	
Pinzanes (Los Pinzanes)				950-1300	Tropical
Puerto (El Puerto)				1450-1550	
Rincón					
Salitre	Tuzantla			675	Tropical
San Andrés (San Andrez)	Zitácuaro			2050-2150	
San Felipe	Zitácuaro			1900-2000	Oak
San José del Río	Zitácuaro			1900	
San José Purua	Jungapeo			1450-1950	Paved highway to Zitácuaro
Santa Ana	Benito Juárez			1325	Tropical
Sauce (El Sauce)	Zitácuaro			1550-1900	
Seis Palos	Zitácuaro			2400	Pine
Sicate (see Zicate)					
Silva	Zitácuaro			2100-2400	Oak
Tepehuajes (Los Tepehuajes)	Tuzantla			600	Tropical
Tiamoro	Tuzantla			1300-1500	Tropical
Tiripitío (Tiripitillo)	Tuzantla			1000-1150	Tropical
Tuxpan	Tuxpan	19° 35'	100° 28'	2300	
Tuzantla	Tuzantla	19° 12'	100° 33'	700-800	Tropical
Ypasote hill (see Ipazote)					
Zicate (Sicate)	Benito Juárez			1900	Oak
Zirahuato	Zitácuaro			1900-2900	Oak
Zitácuaro	Zitácuaro	19° 26'	100° 22'	1600-2200	Paved highway to Mexico and Morelia

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