BREAKING TRAILS THROUGH 'LOST WORLD' OF VENEZUELA

By JULIAN A. STEYERMARK
CURATOR OF THE PHANEROGAMIC HERBARIUM

AFTER FIVE MONTHS in the field, the Chicago Natural History Museum expedition to the famous "lost world" of Venezuela, led by the writer, returned on August 7 with 1,500 numbered collections of plants amounting to at least 10,000 herbarium specimens.

The objective of the expedition—to reach the summit of Chimantá-tepuí and collect its plants—was finally attained after months of cutting trails and establishing various camp sites. Chimantá-tepuí, together with the adjacent Acopán-tepuí, is the largest of the tepuís (table mountains) in Venezuela. During the first month of the trip the western edge of Chimantá-tepuí was climbed and four camp sites were established along a trail originally started by the Venezuelan ornithologists, William H. Phelps, and his son, Billy Phelps, Jr. Later the expedition climbed this mountain from its southern side, the first time this had ever been attempted. Nearly two weeks were spent approaching this side from the Río Caroni and Río Tirica, poling the three canoes upstream past dangerous rapids and portaging over high waterfalls. Beyond this point at approximately 3,000 feet altitude the first base camp along the Río Tirica was established in dense rainforest. After two weeks of collecting in this area the expedition moved to a new camp site nearly twice as high at the base of the main wall of vertical sandstone bluffs, whose rosy-pink sides towered a thousand feet or more above the camp. Many plants were found here that were not seen elsewhere on the entire trip.

In order to reach the summit, the trail had to cross the Río Tirica in its upper reaches. It was at this point that a high magnificent waterfall surrounded by dense forest was discovered by the expedition. The constant stream of foamy water that poured from this falls was heard several miles away. I estimated its height to be twice that of Niagara. So far as known, this waterfall had not been seen previously by anyone, and the Indians named it Steyermark-Meru or Steyermark Falls in my honor.

Two more camps were made after crossing this stream. Beyond the final camp difficulty was encountered in penetrating the upper part of the mountain through a dense jungle of interlacing curving air-roots and branches of dwarf trees, mostly species of the genus *Clusia*, covered with wet moss and liverworts. Instead of the trunks growing straight and upright, they branched horizontally and curved in all directions, forming sinuous aerial obstacles that had to be cut with machetes before any progress could be made through the woody entanglement. In order to follow the trail it was necessary to step from one branch of aerial root to another and to lower oneself to the wet ground and then go back up again onto an aerial branch or root. An hour or more of this gave one the feeling that he was following in Tarzan's footsteps.

Eventually the climb upward led to a more open stretch of a plateau covered with large grotesque sandstone boulders and bluffs that made it necessary to climb and traverse rocky terrain for a few miles. Now, working our way upward, the forest became still more reduced in size to tiny trees and shrubs of motley greens, russets, and purples.

CLEARING A CHANNEL

Indians heaving rocks from rushing stream so that dugout canoe laden with botanical treasures may be pulled safely through the rapids in remote "lost world" wilderness.

After nearly a week of trail-making, the summit of the mountain was sighted and, with the thrill that comes from scaling unknown and previously unclimbed heights, was finally attained. Here one really felt as if he had placed foot on a new part of the earth's surface, for on the summit appeared an entirely new array of vegetation, different from anything hitherto seen. The plants were in weird shapes, with unusual leaves and peculiar flowers, and had assumed an aspect of low herbs and dwarf shrubs. Flowers of many colors were in evidence. Some plants had small thick leaves covered beneath with a dense gray or brown woolly cloak. The leaves of other plants were silky gray and matted to form beautiful rosettes set on top of a naked woody stem, often resembling alpine or andean types of plant growth. Much of the vegetation belonged to the sunflower, melastome, madder, heath, and pitcher-plant families, but members of the xyris family as well as the orchid and fern family were also prominent.

Walking on the summit required a sure foot. We had to walk slowly and step gingerly from one place to another, for progress was frequently interrupted by sudden deep rocky fissures or crevasses, a common occurrence on the summit, making it necessary to lay poles, cut from the largest of the dwarf trees, across these crevasses as bridges. Some of these fissures were fifty feet or more deep. It can easily be imagined what might have happened if one were to slip and fall into one of these rocky surface-cracks.

The summit was studded with weird large boulders and odd, often mushroom-shaped formations of sandstone. Moist cave-like shelters, often dripping with water, were found wherever the large rock formations occurred, and unusual ferns, hitherto unknown, of the genus *Pterozonium* clung to the shadier portions of such boulders.

At one place on top, the expedition encountered a large basin-like, swampy depression filled with water, resembling a tiny alpine lake. Here the landscape took on a weird appearance, resembling one of the Colombian páramos so well depicted in a mural in the Museum's Hall of Plant Life (Martin A. and Carrie Ryerson Hall). At this swamp solitary woody trunks rose five to ten feet high, looking like erect statues scattered over the landscape. Each one was bare in the lower part, but closely enveloped with narrow olive-green leaves, the undersides of which were covered with a dense brown woolly growth. The stem was similarly wool-matted. A single large cluster of orange flowers, about the size of a dandelion, was at the very top of the stem. The appearance of the plant, with the thickly set drooping reflexed leaves, resembled some of the species of *Espletia* of the Colombian Andes, but the genus is unknown outside of the Andes of South America. It also resembled some of the peculiar woody *Senecios* from the Mountains of the Moon in Africa. Only careful study will reveal the true identity of this peculiar member of the sunflower family (Compositae). At this writing it is safe to state that the plant is not one of the Espeletias and it may well prove to be an undescribed genus. Many other peculiar members of the sunflower family also were found on the summit.

UNEXPECTED ADVENTURES

Finding and collecting these weird plants, most of them new to science, was an unforgettable thrill. One week of difficult collecting was spent on the summit, and seven Indians were loaded down with the prize

collections, amounting to thirty packages crammed full of plants laid between sheets of newspaper. Now it was necessary to transport these fresh collections, some of them gathered nearly a week earlier, back to the main camp for drying and packing.

The return to our destination at the main camp, situated at the base of a high bluff, was a two-day trip of hard hiking over

'LOST WORLD' ODDITY

One of the weird plants encountered on the summit of Chimantá-tepuí in Venezuela. It belongs to the same family as thistles, daisies, and asters.

steep slippery trails. We had calculated a supply of just enough food to last us for this return trip. But misfortune struck in heavy rains that played havoc with our plans. During the past two days the streams had risen, and as we approached the upper reaches of the Río Tirica below the newly discovered waterfall we found, much to our dismay, that this rocky stream, which we had succeeded in fording on foot two weeks earlier, was now impassable. It was a raging torrent spouting and pouring past boulders with a tremendous fury at the rate of thirty or forty miles an hour.

Our only hope at this time was to fell the tallest trees bordering the river and make them fall in such a way that they would eventually form a bridge. However, at this particular crossing, two islands separated us from the other side of the river, and even if we were successful in felling a tree in the right direction, it would only land us as far as one island, from where we would have to cut down another tree to fall successfully over the second island, and eventually from the second island cut a tree to land on the other side of the river. At other places up and down the stream from this crossing, the river was too wide for bridging by trees; so the island crossing was our only hope.

TREES CARRIED DOWNSTREAM

Unfortunately, we had left our sturdiest ax back at our main camp, located several miles beyond on the other side of the stream, and the only ax with us was a smaller one with a lighter-weight blade and smaller handle. It was discouraging, after having worked half an hour or more to cut a tree a hundred or more feet tall, to watch hopefully as it fell in the right direction towards the island, only to be swept away in the strong torrent of the stream and quickly carried downstream as if it were a matchstick. One after another of these giant trees was thus swept away until we wondered about our prospects, if any, for getting across.

Later in the day, one of the Indians succeeded in felling a tree so that it became wedged into a large rock on the first island and stayed there securely. However, there were still two more bridges to make before we could cross over to the other side. As the afternoon was now drawing to a close and our ax handles kept splitting, it was too late to try to move on, and camp was made along the river for the night. But it rained again. When we awakened the following morning we found the river just as violent as the day before, and in spite of all our efforts we failed to cross the river that day.

The morning of the third day we were greeted by the welcome sight of a much lower river-level, for several large rocks that were previously covered by swift water were exposed. This enabled the Indians to wedge stout tree trunks between the rocks, and by agile footwork they jumped across from tree trunk to rock and eventually to the other side of the stream. We all watched breathlessly as they cut away at a giant leguminous tree while it began to rain again. Despite what seemed an endless time waiting for this tree to fall, the Indians finally completed the task with their machetes, one hacking away at one side, the other working hard on the other side, until finally the tree gave way and crashed with a mighty roar from the other side of the river onto the second island. Now we had continuous passage from one side of the river to the other.

I took off my shoes and walked barefooted across the slippery tree trunks over the raging river until I finally reached the other side. All the plants and sleeping packs were eventually carried across safely, and we hurried to climb the steep slope beyond. We continued on the trail back to our main camp at the base of a high bluff and reached our destination in the afternoon of the same day. The valuable plant specimens were placed between dry newspapers, numbered, pressed, and dried over the stoves, and saved for posterity. This was a great relief.

We had many unusual and exciting experiences. A number of poisonous fer-de-lance snakes were seen, as were large hairy spiders the size of a large dinner plate. At one point near the summit during the first part of the trip the Indians were so cold, wet and miserable that they planned to desert the expedition. Only quick talking in Spanish saved the day. On another occasion some families of Indians had come upstream to help move the equipment from base camp to a camp higher up in the mountains. They had made camp on an island across from our camp. During the night the river rose fifteen feet. Our Indians awakened in time to shout to them of the impending danger and rushed our canoes across the flood waters to rescue men, women, and children from the other side, and bring them all safely to our side of the stream.

INDIAN COMPANIONS

Throughout the trip Indians belonging to the Arekuna tribe were employed. They were always found to be trustworthy, reliable, helpful, and pleasant companions. Their skills in building shelters thatched with palm or large Philodendron leaves, their intimate knowledge of woodlore, skill in using various native vines for tying and the latex of trees for caulking cracks in canoes, adeptness in fishing and hunting, clever maneuvering in navigation of treacherous rapids, and ability to carry cargo over difficult trails, as well as sense of direction in making trails to various parts of the mountain, all combined to make their services indispensable. As many as fifteen Indians were employed at one time to carry the food and equipment.

Cassabe is the staff of life to the Indians. Made from the root of *Manihot*, and related to the plant from which tapioca is derived, the final baked product is a white substance, at first flabby in texture, eventually stiffer.

REPTILE AS DINNER DELICACY

Indian helper to Dr. Julian A. Steyermark on "lost world" expedition roasts the carcass of a caiman (a member of the crocodile family) to tempt appetite of tired explorer after a hard day of collecting plants.

It usually appears in a compressed large plate-like circular form. A hot pepper sauce, called *kumachi*, made from cooked peppers, salt, and a little water, is the other main item in their diet.

Our expedition, in addition to the cassabe, carried black beans, rice, oatmeal, coffee, native brown-sugar (papelón), spaghetti, canned corned beef, and cocoa. These foods

(*Continued on page 6, column 3*)

ARCHAEOLOGICAL 3-D APPLIED BY SOUTHWEST EXPEDITION

By JAMES T. BARTER
STAFF ASSISTANT, SOUTHWEST ARCHAEOLOGICAL EXPEDITION

TODAY THE RAGE IS 3-D. Hollywood, which for the last few years has been fighting against high production costs as well as public apathy toward much of its product, has now turned to various forms of three-dimensional pictures in a hope that its failing box office will be revived.

To the staff of Chicago Natural History Museum's Southwest Archaeological Expedition digging this summer as in nine previous years near the town of Reserve, in west-central New Mexico, three dimensions are old stuff. Of course we are talking about archaeological 3-D, not optical 3-D.

Archaeological 3-D is a system of looking at prehistoric cultures from more than one viewpoint, that which we used to call the "well-rounded approach." In looking at cultures with this in mind, we utilize the findings of botanists, climatologists, zoologists, physicists, and other scientists in order to round out our fund of knowledge.

Our three archaeological dimensions are time, space, and culture. We are interested in the broad history of a people. We want to know how long they lived in one area, why they moved and where they went, with whom they traded, and how far they traveled on trading expeditions. We are also interested in more homely things, such as the crops they raised, the tools they made, the utensils they used, the animals they hunted, at what age they died. In short we are interested in everything about these ancient people. So you see that if we were to neglect any of the three dimensions we would have a flat picture of the life of the people.

THE FIRST DIMENSION—TIME

Chicago Natural History Museum's Southwest Archaeological Expedition has for ten seasons concentrated on the problem of a rational delineation of the history of one of the ancient Southwestern cultures, that of the Mogollon people of Pine Lawn Valley. The span runs from 2500 B.C. when the Egyptians were building pyramids to A.D. 1100 when the Christians were starting forth on the first Crusade. Excavation of more than fifteen sites has made it possible to trace the rise, growth, and fall of the Mogollon people during these three and one-half millenia.

It is possible to follow the development of agriculture (corn, beans, squash), of pottery, and of tools, utensils, and weapons. The sum of observations and the accumulation of artifacts bore witness to the fact that the Mogollones lived in a changing world, as we do today. Change was evident in everything from corn to pottery. Through the centuries, by breeding and selection, the ear of corn became longer and the rows of kernels decreased from 14 and 16 to 8 and 10. Pit houses, at first roughly circular, became rectangular and eventually gave place to rough masonry surface-dwellings of contiguous rooms. The pottery changed from generation to generation in shape, color, and mode of decoration.

But what happened to the Mogollon culture after A.D. 1100? Did it die out or did it continue to grow and expand until the Spaniards came in 1540? Early work caused us to be fairly sure that this civilization continued to flourish after A.D. 1100 and, in fact, thereafter reached its classical height. This summer in an effort to trace the rise, spread, and decline of the Mogollon culture we are again conducting archaeological excavations. This year the staff consists of Dr. Paul S. Martin, Chief Curator of Anthropology and leader in eighteen previous seasons of Southwest excavations in this and other areas, Dr. John B. Rinaldo, Assistant Curator of Archaeology, E. D. Hester, Allen Lapiner, David Mabon, Joseph Shaw, and the writer.

TOMB INTEGRAL WITH HOME

Adult burial exposed by excavations of Southwest Archaeological Expedition on this summer's "dig" in New Mexico. The skeleton and accompanying mortuary pottery can be seen under earliest floor of ancient habitation of little-known Indians.

THE SECOND DIMENSION—SPACE

The site—"ruin," or "pueblo"—lies on a ridge several hundred feet above and overlooking the San Francisco River valley on land owned by Owen McCarty and Ray Hudson. It is roughly in the northeast section of the Mogollon culture area—an area that covers thousands of square miles in eastern Arizona and western New Mexico. The ruin was easily recognized because the fallen walls formed a mound 10 feet in height covering roughly an acre in extent. Close examination revealed rooms outlined by portions of standing walls, broken pieces of pottery (potsherds), arrowheads, stone mills (metates) for grinding corn, and large rectangular depressions that we have dubbed "plazas."

The mound resembled a rocky Vermont hill, but it should be borne in mind that each rock had been carefully selected and often shaped and once was part of a wall. We selected this site because the scattered bits of pottery on the surface were "late," that is, were typical of a pottery style that was popular during and after the years 1200–1250. Since these pieces of pottery were late, we guessed that the site was also late and was therefore representative of the period we wished to know more about.

For six weeks (at the time of writing) a crew of six men had been sweating it out, picking, shoveling, moving dirt, and throwing rocks, for excavating in such a ruin where the fill is composed largely of collapsed walls is tough work. The walls in some places are seven feet high and it takes staunch effort to toss out 15-pound boulders and tons of damp earth. We estimate that some of the rooms contained 10 to 12 tons of debris and all of this has to be removed carefully by manpower without the benefit of earth-moving machinery. In one morning alone we moved 25 tons of rock by truck a distance of several hundred yards.

So much for the physical labor involved.

THE THIRD DIMENSION—CULTURE

After all this work we find an amazing amount of materials and historical facts. First of all, we have the physical appearances and sizes of the rooms, the types of masonry and of floors, the plaster on the walls; various features such as firepits, storage pits, postholes, and doorways. Then we have the contents of the rooms—that is, the contents left behind by the last occupants and by time and weather—for almost all perishable items tend to disintegrate in an open site (open as opposed to a cave site) such as this which is exposed to the elements. But, surprisingly enough, some perishables remain, preserved partly and paradoxically by fire. That is, corn, beans, squash, sandals, cloth, and bits of matting were charred and thus preserved when the roof timbers burned. And finally we have the so-called "imperishables" such as pottery and tools of stone and bone. We have recovered a few pieces of whole pottery and many crushed pots, but these can be restored to their pristine shape and beauty by the skill of the Museum's ceramicist, John Pletinckx.

How do all these things help us in reconstruction of the life of these ancient people? What sort of story do these material remains tell? To the experienced eye of the archaeologist the stone and bone tools, the type of houses, and the kind of pottery all take on a new significance; being man-made they reflect the life of man.

First of all, we know that these people were primarily farmers. This we can deduce

from much evidence. We find the remains of charred corn, beans, and squash. We find many metates and manos with which they ground their corn meal, and storage baskets for hoarding the winter's supply of food. Arrowheads and other weapons of the chase and of warfare are significantly few. The size of the pueblo tells us that agriculture must have been important because such a large population as lived here

TOUGH BUT DELICATE JOB

The archaeologist must strain his muscles with pick and shovel, and then switch to the most delicate operations in excavating cultural relics. Here are shown final steps in removal from ground of embedded ancient cooking pot. The jar probably was used for storage because its mouth was flush with the floor of prehistoric Indian dwelling, while its body was under the floor.

could not have been supported on hunting, fishing, and gathering of nuts and berries. The flat margins of the San Francisco River probably afforded amply watered rich farmlands.

Any surplus of food or other materials was used in trade, perhaps for the Glycymeris shell from the Gulf of California that was used in making beautiful bracelets. Trade was also carried on with their northern neighbors, the Anasazi, to secure fine pottery vessels. A surplus of food also provided a comfortable buffer against bad years. The diet of vegetables was varied when the hunter brought home rabbits, squirrels, turkeys or an occasional deer or elk. On the floor of the rooms we find the bones of these animals still lying right where they were thrown after some prehistoric pueblo meal.

RAVAGES OF FIRE

Of course, this picture of economic well-being was often blighted by tragedy or near tragedy. Several of the rooms of this pueblo burned. In one of the rooms we found great stores of corn, and one can imagine the hungry winter that the occupants faced with their harvest consumed by the angry flames. There was no protection against fire, no fire-fighting equipment (and no fire insurance). The water of the river was too far away to be of much use, and even though the rooms were built of stone and mud, the wooden roofs and the corn itself must have blazed heartily.

Though fires were a tragic occurrence, they were not as tragic as premature death. Infant mortality was very high in this pueblo and the lifespan of the people was not very great. Buried under the floor of one of the rooms we found skeletons of five infants; in another room, there were three, most of them only a few days old when they died. The poor health conditions and the lack of medical knowledge undoubtedly accounted for the high incidence of infant deaths. Habits in these times were not very sanitary. Refuse apparently was carried just outside the door and dumped. Water for drinking and washing had to be carried several hundred yards, so that except for dips in the river, bathing was infrequent. Several people most likely ate from a common dish, and without doubt flies abounded everywhere.

With two of the infant burials we found grave offerings of whole pottery. This is a very rare occurrence with infants and probably bears testimony to the affection in which these children were held and the great loss that their parents felt. Another mark of affection, and to us perhaps a strange one, was the fact that the infants were buried under the mud floors of the rooms. Perhaps the parents were reluctant to have their dear ones very far from them.

EVIDENCE OF CEREMONIES

Magic and religion played a large part in the lives of these people, just as it does among many peoples throughout the world. Ceremonies were held in a room set aside for this purpose, and in this site we have found such a room. It is the largest room yet uncovered here and there are indications of extensive remodeling. Originally it was two rooms but when the need arose for a larger ceremonial room, a partition was torn out and a new floor put into the room. In this room we found a Corn Goddess symbol, which is a large sandstone block shaped to resemble an ear of corn. In an adjacent room we found a beautifully decorated sandstone slab painted in red, yellow, green, and black. These colors were sometimes used to represent the cardinal directions. Pottery was frequently placed in the graves with deceased adults either as an offering or for use in the spirit world. With the adult burials uncovered this year, we have found several such pieces of pottery.

Thus from the three-dimensional view comes a story of life and death, of plenty and hardship, of symbolism and stark reality.

Change in Visiting Hours

On September 8, the day after Labor Day, autumn visiting hours, 9 A.M. to 5 P.M., go into effect at the Museum, continuing until October 31.

'LOST WORLD'—

(*Continued from page 4*)

were eaten regularly by the Indians and myself. For my own luxuries I also had dried soups, dehydrated vegetables, dried fruits, and dehydrated beverages, powdered milk, malted milk powder, ovaltine, postum, cheese, and sardines. One can each of butter and peanut butter were saved as luxuries for special occasions. We relished feasting upon fresh meat, whenever it became available. Peccary (wild pig), tapir, capybara (*lapa*), caiman (a type of crocodile known as "*baba*"), curassow, wild turkey (*pava*) (different from our wild turkey of the United States), and wild mountain chicken (a species of guan) were frequently on our bill of fare.

The Indians, who normally live at the lower warmer elevations requiring a minimum of clothing, do not enjoy living in the relatively cooler upper levels where the expedition carried on most of its work. They had to be supplied extra blankets.

The expedition carried on its work during the rainy season, which lasts from April through October. The rains added to discomfitures experienced on the trip. Long hikes and steep climbs over difficult slippery trails were taken during heavy rains, and I would return at the end of the day with dirty wet clothing, and wet shoes.

At the end of the trip in July, the expedition left its main base camp on the Río Tirica for its return to the airport at Urimán along the Río Caroni. Four dugout canoes (called *curiares*), filled to capacity with the treasures of the expedition, were needed. During the trip home down the turbulent rushing flooded Río Tirica with its dangerous rapids, the canoes had to be guided very carefully by the Indians who were always alert for submerged rocks or logs. The slightest miscalculation would have foundered the canoes and dashed them against one of these hidden rocks, with loss of valuable specimens and equipment.

Although many botanical species new to science and a large number of genera and species new to the Museum's Herbarium were obtained, it is safe to state that but a small fraction of the total flora of this large mountain was obtained. Years and years of hard work, requiring numerous trails that would have to reach all parts of the summit and many sections of the mountain, are necessary before any real idea of the luxuriant and amazing flora of Chimantá-tepuí can be gained.

Daily Guide-Lectures

Free afternoon guide-lecture tours are offered daily except Sundays under the title "Highlights of the Exhibits." These tours are designed to give a general idea of the entire Museum and its scope of activities. They begin at 2 P.M., Monday through Friday, and at 2:30 P.M. on Saturday.