

Solanaceae

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JALTOMATA STUDIES IN PERU, JANUARY 1998

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The research team included myself, professor Segundo Leiva G. (Universidad Antenor Orrego, Trujillo, Peru) and professor Leon Yacher (Southern Connecticut State University) who was born and raised in Peru. During this expedition at least three new-to-science species of the genus *Jaltomata* were collected. Prior to the trip I studied hundreds of herbarium specimens collected in Peru. Based on the collection locality information on the specimens I knew where to look for species that had been collected but had not yet been described by botanists.

Excursion I, from Lima to the small city of Canta and back, all in the department of Lima: In the vicinity of Canta we collected *J. dentata* (photoslide 609) and *J. bicolor* (purple form, photoslides 612, 617). We were unable to find *J. contorta*, the type specimen of which was collected at the small town of Obrajillo (2,732 m; 76°36'33" W long., 11°26'40" S lat.) near Canta. The latter species was described in the late 1700s; a type specimen exists, but the species has not been collected again since it was described. It was unfortunate that we were unable to find *J. contorta*, as I am interested in knowing if this species is extant, and if so, if people eat the fruits. I had hoped to bring home seeds to grow plants of this species in the greenhouse, so I could study the basics of its reproductive biology and count its chromosomes. The protologue (original description) of *J. contorta* states that this species was described from cultivated plants (Mione, 1999), and given this, I wonder if there could have been a mistake made by the original botanists as to the location at which their seeds were collected.

Excursion II, from Lima up into the Andes toward La Oroya, and back; we remained within the dept. of Lima: We had a very productive few days of collecting specimens in this area, with a fantastic surprise (see next paragraph).

Mione and Coe (1992) treated all of the *Jaltomata* specimens of the Department of Lima, Peru, having one large flower per

inflorescence as *Jaltomata aspera*. During field work I was surprised and excited to find not one but two similar but distinct species where I expected to find *J. aspera*. Although similar, the two species can be distinguished by the following characters. Collection 615 has red nectar in the flowers, lacks gland-tipped hairs on the leaves, and has articulated pedicels. Collections 616, 620 and 622 lack red nectar, have gland-tipped hairs, and lack articulation in the pedicels. The question that immediately arose was, which one of these species is actually *J. aspera*? To answer this I will need to study the type specimen of *J. aspera*. I have tried to borrow a type specimen of *J. aspera* from various herbaria, have not been successful, and will continue to write to European herbaria. One of these species is *J. aspera*, and the other may have as its basionym one of the following binomials: *Saracha ciliata*, *Saracha lacrima-virginis* or *Saracha urbaniana*. These two species may actually be distantly related within the genus, and may have converged on (independently evolved) superficial similarity and occupation of the same dry habitat. The on-going molecular systematics work will shed light on this exciting issue.

Prior to going to Peru I studied the type specimen of *Saracha lobata* and recognized it as a member of the genus *Jaltomata*. At that time I had to decide whether to transfer this species to *Jaltomata* or place this binomial in synonymy with another *Jaltomata* species. Without field work I was unable to choose one of these two courses of action. In Peru, when we visited the type locality of *S. lobata* we were pleased to find plants that match the type specimen of *S. lobata*. After studying these plants I concluded that they represent *Jaltomata dentata*, described decades earlier than *S. lobata*. Thus, this field work has allowed me to conclude that *S. lobata* is a synonym of *J. dentata*. To fix the taxonomy of the genus *Jaltomata* I work with dozens of Latin binomials; it was very satisfying to eliminate one of these (*Saracha lobata*) from further consideration.

Another goal I had was to visit the type locality of *Hebecladus propinquus* var. *parviflorus* at a place called Tambo de Viso, along the Lima to La Oroya highway, in the department of Lima. The type specimen of this variety lacks open flowers, perhaps contributing to

the taxonomic confusion (Macbride 1930 p. 110, 1962 p. 33) surrounding this variety. We visited the type locality of this variety, and found *Jaltomata propinqua* (photoslide 621). With this in mind, when I returned to Connecticut I studied the type specimen of this variety again and concluded that variety *parviflorus* is a synonym of *Jaltomata propinqua*. This taxonomic problem could not have been solved without field work.

Excursion III, north out of Lima along the coast, and then from the coastal city of Patavilca (department of Lima) to Recuay (department of Ancash) up into spectacular mountains: We had no place to stay on our first night of this excursion, but after asking for help in the town of Cajacay, we were put up in a church, in quarters for visiting clergy, by the very kind local people.

New-to-science species having edible fruit: Right near the town of Cajacay professor Leiva showed me a population of *Jaltomata* plants he located at an earlier date. It was and is a new-to-science species!!!!!! One woman said, "we call that *musho* in Quechua, and everyone eats the fruits uncooked. It is a very prolific plant that no one deliberately plants, it just grows in our chacras (mountain farm plots)." An Indian woman about four and a half feet tall and dressed in traditional Indian attire came walking along. She said that people use the leaves and flowers to make tea that is consumed for stomach ache. Her 10 year old son, who looked about 6 or 7 to me because of the size difference between these Indians and North Americans, saw that we were fascinated with one particular species. He then went up the road and pulled from the ground a big shrub of the same species. The beautiful shrub he brought to us will be the type specimen (collection and photoslide 624).

During excursion III we searched for *Jaltomata weberbaueri*, the species of this genus having the largest flowers. The species is poorly known (there are few collections) and I wanted to not only collect it, but also to see its habitat. We found it (department of Ancash, province Bolognesi, collection 626) by continually asking any of the locals we saw if they know of the plant in this area with large purple flowers that has tomato-like berries. Several residents gave us similar

information, and we were able to find the species at 3,400 m of elevation by climbing up a steep wet slope. The flowers are beautiful maroon bells 6 cm in diameter, having red nectar inside the corolla at the base. I have no slides because my camera was not working, but I do have a good color print that professor Leiva sent me. At this collection locality we also found the green-flowered form of the species discussed in the next paragraph.

Jaltomata bicolor has beautiful tubular flowers. In the department of Lima the plants of *J. bicolor* we encountered had dark purple flowers (collections and photoslides 612 and 617) while in the department of Ancash we encountered only green flowers on this species (collections 625 and 627). When I returned from field work I studied the flowers I preserved in alcohol in the field, and noticed that the purple flowers have 5 corolla lobes, but the green flowers have 5 lobes alternating with small corolla lobules. Thus, it is possible that the plants having green flowers represent one species and the plants having purple flowers represent another species. At this time this single morphological difference is not sufficient for me to consider these distinct species. Until I follow up with more study I will consider the green and the purple forms as variants of one species.

New-to-science shrub found in spectacular, "sky high", Huascarán National Park: Among the *Jaltomata* specimens I borrowed before going to Peru I noticed some from Huascarán National Park (Department Ancash) that appeared to either be a shrubby form of *J. dentata* or a new-to-science species. We went to the collection locality I had seen on an herbarium specimen, and found breathtaking scenery in the Cordillera Blanca mountain range. In the Llanganuco sector of the national park we found the shrub (collections 628, 629, and 630) abundantly growing at 3,500 m of elevation along the road through the park! I have two beautiful color prints of this species, taken by Segundo Leiva. We may name this species *Jaltomata yungayensis*, after the nearby city of Yungay.

Excursion IV, A new-to-science shrub found in the unique and interesting Lomas habitat: In 1938 botanists made herbarium specimens of a plant on the side of a small mountain named Cerro Las

Lomas, or Mongon (hereafter Mongon Mountain), in Peru near the ocean in the department of Ancash, province of Casma. I was going through the specimens (loaned to me) identifying each one, when I noticed one specimen from an interesting habitat, a specimen that appeared to represent a different species from all the others with which I had worked. I thought to myself, this specimen could have erroneous locality data on it, from where the botanists were collecting another day, because this single specimen looks like no other species that grows in that habitat. I also knew that it is very rare for a botanical museum specimen to have incorrect label data because collectors are passionate about their work.

The special habitat is called the Lomas. The west coast of South America from Ecuador through Peru and into Chile is desert, but periodically there is a mountain high enough to be bathed in fog (garúa, in Peru). Thus there are widely separated oases of green (on the mountains that stick up into the fog) surrounded by extremely arid desert. The fog comes off the ocean, and is caused by the cool, north-bound Humboldt current. These oases of green are Lomas formations. I did not fully grasp the idea of Lomas formations until I saw one: the mountains are located in the sandy, barren nearly vegetation-free desert, but the higher elevations of them are bathed in fog coming off the ocean and so are green. The plants intercept the fog and water drips down sufficiently to water the plants. I had a special interest in going to the Lomas habitat on Mongon Mountain to see if a species of the genus I study really grows there, and if so, which one?

To get to the base of Mongon Mountain one option was to drive around the mountain on the few available roads, but the map showed a town named La Ponderosa on the other side of the mountain, and as such I suspected that the Lomas vegetation on the other side of the mountain might be destroyed by livestock. We were on the opposite side of the mountain from this town, on the Pan-American highway. Picture this: dry, open sandy desert everywhere all around, and from this vast, flatish, open sand rises Mongon mountain, flaunting its lush green Lomas vegetation. What an inviting, pretty green color of the top two thirds of the mountain, the only green in an otherwise brown

landscape. The mountain looked like it was only 4 km away on the map so, in OK Spanish I said to my fine Peruvian colleague Segundo Leiva, "lets go by foot from here and then climb". Segundo's enthusiasm and optimism know no bounds. He smiled and filled bottles with alcohol for samples and put them in his pocket, and to me this meant "I am absolutely sure that we will not only reach the Lomas vegetation way up there, but we will also find your plant". We filled up large water bottles at lunch at an isolated highway rest stop, and then professor Yacher dropped us off along an uninhabited stretch of the Pan-American highway.

Segundo and I were in incredibly high spirits, having a stretch of desert to cross and then a small mountain to climb to track down our quarry. We hiked across open desert for a few km, relaxing and getting into the groove of hiking. The little red pickup truck got smaller and smaller in the distance behind us. We were surrounded by beautiful crescent dunes in every direction as far as we could see, except for our mountain ahead flaunting its lush green face. I shot a compass bearing to the pickup so we could return no matter what, and double checked the bearing and that we had sufficient water. Down a dune, over a dune, up a dune, and the pickup truck disappeared.

Slowly, Mongon mountain grew larger and larger as we got closer and closer, and we could now feel the air changing, with the smell of the Pacific ocean. Rarely have I been so alive, my senses flooded in the charbroiling sun. In this desert there are areas of stable ground on which walking is easy, and areas of loose sand that drain you. A relative of the pineapple (*Tillandsia*) is the only plant around in the desert; it grows in fairyland clumps a few meters apart, but only on the stable sand, never on the loose sand of a dune. I never noticed how beautiful sand dunes could be, huge curving masses reflecting so much light. When we reached the base of the mountain we had to pick a pass. The mountain seemed to average a 45 degree slope on the parts we saw, and rises up to 1,144 meters of elevation at its summit. We had just been at over 4000 meters the other day so it is not the elevation that was amazing, it was that this green-faced mass near the sea sticks up out of an otherwise desolate expanse of desert. At the beginning of the Lomas vegetation cacti were red flowering all about.

Here if one were a klutz it would be all over, as the mountain is steep. To one side of the ridge we ascended there was an abyss with a sandy bottom. Looking down into the abyss, and looking out all around me, left me with an incredible sense of space. Vast space. To my amazement I couldn't see a person, a domestic animal, a car, a house or even a trail as far as I could see in any direction. I looked and looked but saw no sign of civilization, but I now could see the Pacific ocean.

When we got to the green zone, the Lomas vegetation, it turned out to be a primeval garden. There were no livestock, and so the vegetation was pristine. Not even were there human trails. Everywhere I had been in Peru there were foot trails for people to go switch backing up and down mountains. Here there were none, perhaps because the mountain is surrounded by desert or there is not enough fresh water around even for goats? On the other side our map shows a hamlet named La Ponderosa, near the beach, and we wonder if this is from where the 1938 botanists came. The green zone might best be described as an alpine garden to someone who is not a botanist because there were flowers everywhere among the rocks: tens of thousands of blue and yellow flowers. I have never seen so many blossoms in natural conditions.

Segundo made it up the mountain in front of me, and found our quarry growing in the protection of a few rocks, with *Puya ferruginea* and other plants. The label data on the specimen collected in 1938 was not wrong! I found another shrub of the same species, and these are the only plants we found, even though we searched for about an hour. Perhaps there are more plants of this species on another side of the mountain. When I first saw the *Jaltomata* shrub I sat down and laughed a hearty laugh of joy. It indeed was and is a new-to-science species, unlike any other. We collected material for making herbarium specimens and extracting DNA, Segundo took photos, and we placed flowers in alcohol for morphological studies. We walked back across the desert, with shoes full of sand no matter how often we emptied them. When we looked back the green zone was enshrouded in fog. At last, as the sun dipped low in the sky, we made it back to our trustworthy companion Leon at the truck. This was a day I will

never forget. I cannot thank the National Geographic Society enough for making this rediscovery possible.

Binomials mentioned above and their authorities

Hebecladus propinquus (Miers) Bitter var. *parviflorus* Bitter

Jaltomata aspera (R. & P.) Mione

Jaltomata bicolor (R. & P.) Mione

Jaltomata contorta (R. & P.) Mione

Jaltomata dentata (R. & P.) Benítez

Jaltomata propinqua (Miers) Mione & M. Nee

Saracha ciliata Miers

Saracha lacrima-virginis Bitter

Saracha lobata Bitter

Saracha urbaniana Bitter & Dammer

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