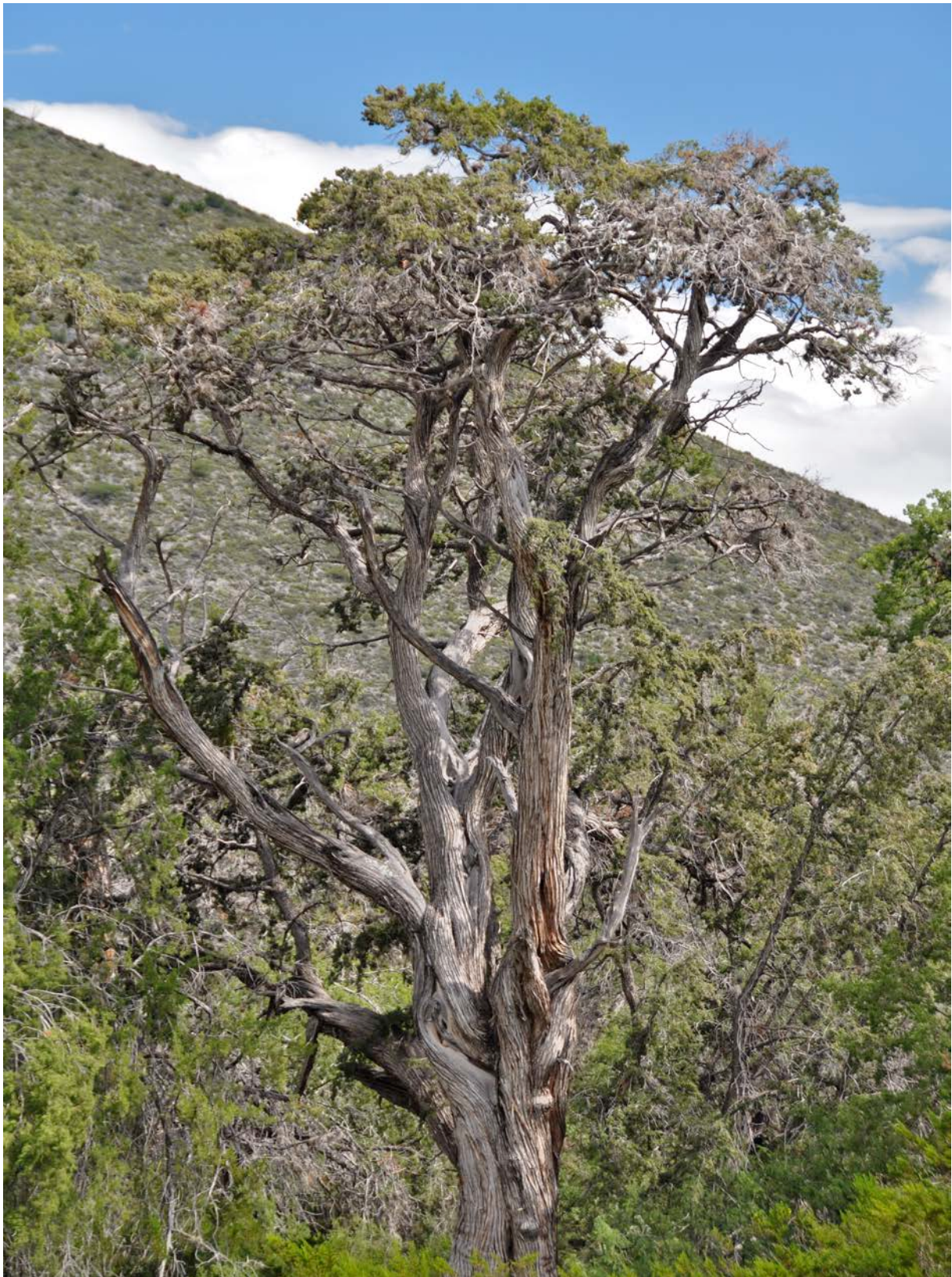




Bulletin of the ***Cupressus*** **Conservation Project**

No 17

Volume 7 No 1 — 10 September 2018

Contents

Volume 7 Number 1

Conifers of the Sierra Madre Oriental, Mexico, trip report 3

J. Bisbee

Abstract : Only a few hours drive south of the Texas border, an amazing variety of conifers can be seen in the Sierra Madre Oriental, a mountain range in the area around Saltillo, Coahuila. Most of these trees are not present in the United States, and many are rare endemics, found only on a few isolated mountain tops. In the fall of 2014 I had the opportunity to visit this area and photograph many of these rare and beautiful trees. The following report is a journal of our adventure..

This Bulletin is edited by the **Cupressus Conservation Project**, a non-profit organisation based in Geneva, Switzerland. It deals mainly with *Cupressus* species, but accepts manuscripts on other species of conifers. Emphasis is given to threatened and endangered taxa. Manuscripts are accepted in the following languages : English, French, German, Spanish, Italian and Russian. The Bulletin is peer reviewed.⁸

Responsible Editors : D. Maerki (Switzerland) & Michael Frankis (England) – Contact by email : bulletin@cupressus.net

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Reference : *Bull. CCP*.

Prices : online pdf version : free access ;

printed version : 30 CHF or 26 Euro per issue. Airmail shipping worldwide included. Publication is irregular.

Payment after delivery. After one's subscription, the next issues will be sent automatically, unless cancellation of the subscription takes place before shipping. www.cupressus.net/subscription.html

Web site : www.cupressus.net – Bulletin web site : www.cupressus.net/bulletin.html

Online PDF Version : ISSN 2235-400X

Bulletin No 17

Cover photo : *Juniperus saltillensis* in Nuevo León, Mexico, 2 October 2014.

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Conifers of the Sierra Madre Oriental, Mexico Trip Report

Introduction

In late September of 2014, I had the opportunity to visit northeastern Mexico to observe and photograph many of its rare and unique conifers. We concentrated our visit in the area around and south of Saltillo, Coahuila (see Maps 1 & 2, p. 40-41). The highest peaks of the Sierra Madre Oriental lie just to the south. This area includes an amazing variety of pinyon pines, more than any other area of North America. There are at least 6 species of pinyon pines, many which are endemic to this region. These include some with very unique characters, such as *Pinus culminicola*¹, a dwarf species growing on a few of the highest peaks. *Pinus pinceana* – which grows in much warmer, drier sites – is unique with its weeping habit, and *Pinus nelsonii*, with its long cylindrical cones. Other pinyon pines include the rare *Pinus johannis* (treated as a synonym of *Pinus discolor*, a related pinyon pine from the Sierra Madre Occidental, by some botanists). Another interesting pinyon pine found at a few low elevation sites is *Pinus remota*, which also occurs at a few locations in west Texas. *Pinus cembroides* is common throughout the region. Besides the pinyon pines, there is at least one white pine, *Pinus stylesii*, or by some accounts, possibly two species. This region of Mexico also has a large variety of hard pines (*Pinus* subgenus *Pinus*) including *Pinus arizonica* var. *stormiae*, *Pinus greggii*, similar in several characters to California's Monterey Pine (*Pinus radiata*), and *Pinus teocote*. *Pinus hartwegii* is common at the higher elevations. *Pinus estevezii*, which is closely related to *Pinus pseudostrobus*, is common in the middle to lower elevations. *Pinus montezumae* is also abundant at many locations. Two species of fir, *Abies coahuilensis*, and *Abies vejarii*, and two species of spruce, *Picea mexicana* and *Picea martinezii*, are found at some of the cooler, wetter locations. More common throughout the region is Interior Douglas-fir *Pseudotsuga menziesii* subsp. *glauca*. The region also has a large variety of junipers, including *Juniperus angosturana*, *Juniperus coahuilensis*, *Juniperus deppeana*, *Juniperus flaccida*, *Juniperus saltillensis* and the recently described *Juniperus zanonii*. *Taxodium mucronatum* can be found growing along rivers at low elevations, and *Taxus globosa* at cool, moist locations in the mountains.

Fig. 1: *Pinus cembroides*, Cañon La Boquilla.



Fig. 2 : *Pinus culminicola* & *Pinus hartwegii*, Cerro Potosí.



Fig. 3 : *Pinus nelsonii*, NE of Doctor Arroyo.



¹ For author's names, see Appendix 1, p. 42.



Fig. 4: *Pinus cembroides* (foreground and right background) and *Pinus pinceana* (centre with drooping branches), Cuauhtemoc, Coahuila.

Fig. 5 : *Pinus teocote*, La Encantada, Nuevo León.

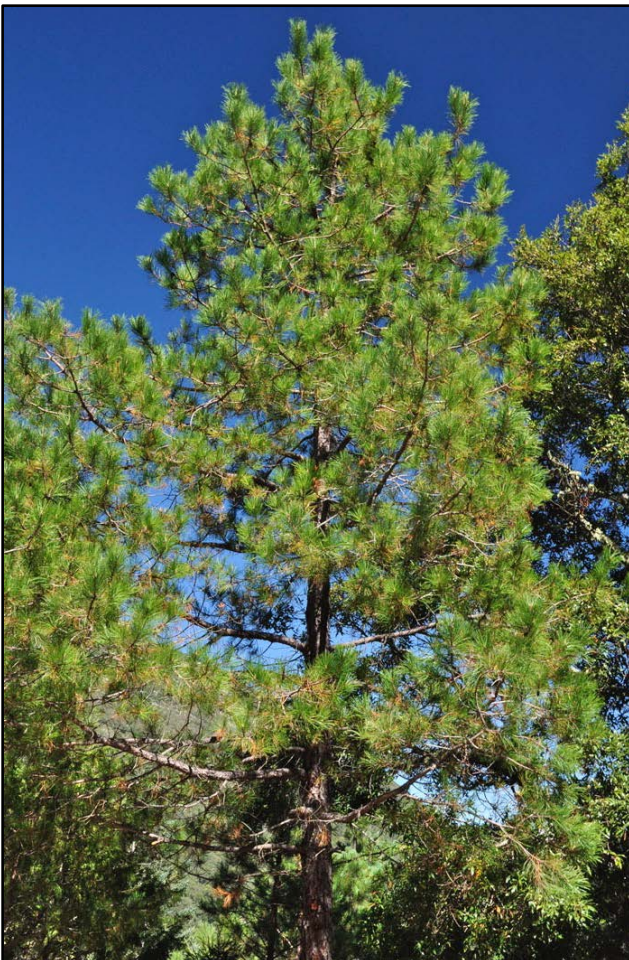


Fig. 6 : *Pinus stylesii*, Cerro Potosí, Nuevo León.



Day 1: 29 SEPTEMBER 2014: Sierra La Marta

Our main goal was to locate and photograph *Picea mexicana*, *Pinus culminicola* and *Juniperus zanonii*, found at the highest altitudes of the Sierra La Marta. This range lies on the border of the states of Coahuila and Nuevo Leon. Permission to drive up the road to the top of Sierra La Marta was denied by the gate keeper. We were told that the road was very wet because of heavy rains the previous week. Also that he was not allowed to give access since the mountain was private property, but I was welcome to walk the 3 hours to the top of the mountain. The road is very narrow and overgrown with plants. Large rocks in the road would have made travel even with a 4 x 4 vehicle very difficult, requiring removal of rocks that had rolled off the banks at many locations. The weather was cool and moist, with low clouds on top of the mountain. The Sierra La Marta is the second highest (after Cerro Potosí) mountain range in the Sierra Madre Oriental. The road begins in Coahuila, but the top of the mountain lies in Nuevo Leon. We arrived just in time for the peak fall colors, the main trees being *Populus tremuloides*, which occur on the north facing slopes. Interestingly the fall colors appear earlier here than in areas far to the north, such as the Atlantic Seaboard and southern New York, due to the high altitude.

The Sierra La Marta is a fairly short drive from the city of Saltillo. You take Highway 57 south to Highway 10, which leads towards the village of San Antonio de las Alazanas, a popular vacation destination. Conifers seen on way to San Antonio de las Alazanas in the order they appear as you climb in elevation along the road: *Juniperus coahuilensis*, *Juniperus deppeana*, *Pinus cembroides*, *Pinus arizonica* var. *stormiae*, *Pseudotsuga menziesii* subsp. *glauca*, *Pinus greggii*, *Pinus stylesii*, *Pinus hartwegii* and *Abies vejarii*.



Fig. 7: Cone of *Pinus stylesii*, Sierra La Marta.

Pinus stylesii

In cone morphology, the white pines of the Sierra Madre Oriental of eastern Mexico are quite distinct from those west of the Chihuahuan Desert in the Sierra Madre Occidental. These have caught the attention of many taxonomists. Debreczy and Rácz (2011) mention: “populations in eastern Mexico have distinct and conspicuous differences from *Pinus strobiformis* in the rest of its range, even considering the wide range of variation seen elsewhere”. Farjon & Styles commented that the cones on Cerro Potosí are “remarkably wide and short” (Farjon & Styles, 1997: 215). Usually included as part of *Pinus strobiformis*, these trees have had many names applied to them including *Pinus strobiformis* var. *potosiensis* Silba, *Pinus reflexa*, and *Pinus flexilis* var. *reflexa*. These are now segregated as *Pinus stylesii* Frankis ex Businský (Businský, 2008; Frankis, 2009). The cones are easily distinguished from those of *Pinus strobiformis*. At the U.C. Santa Cruz Arboretum, in California, are two trees labelled *Pinus ayacahuite* var. *brachyptera* (Shaw, 1909), a name now synonymous for *Pinus strobiformis*, and formerly applied to white pines of both the Sierra Madre Occidental and Sierra Madre Oriental. Recognizing the cones to be those of *Pinus stylesii*, it was inquired about their source. Arboretum records confirmed that the seed was collected in the Sierra Madre Oriental on Cerro Potosí, Nuevo León, trees now recognized as *Pinus stylesii*.

Pinus stylesii is not limited to the vicinity of Cerro Potosí, but can be found throughout the higher peaks of the Sierra Madre Oriental, including areas to the north in Coahuila and south in the Sierra Peña Nevada. At the highest elevations of Cerro Potosí, some trees have small cones that superficially resemble those of *Pinus flexilis* or *Pinus reflexa*. Regarding these trees, Farjon & Styles comment: “Study of more collections from Cerro Potosí reveals that there are possibly two related taxa there: *Pinus flexilis* var. *reflexa* and *Pinus strobiformis*. Accounts of cone variation may be due in part to introgression involving both taxa” (Farjon & Styles, 1997: 215). Martínez and others have even indicated that *Pinus flexilis* was present at the top of Cerro Potosí (Martínez, 1945, 1948; Loock, 1950; Perry, 1991). We collected cones at 3,700 m, just below the summit that resembled those of *Pinus flexilis*, however the seeds from these cones had a short seed-wing, which excludes *Pinus flexilis*. Except for the smaller cones, the trees were otherwise indistinguishable from the pines at lower elevations, and merely represent trees of *Pinus stylesii* stunted by high altitude (Frankis, 2009).

At the time of my visit the green cones of this species had still not begun to open. This was in contrast to the cones of *Pinus reflexa* of the Sangre de Cristo Mountains of New Mexico, which had already opened and all seed was gone. Cones of the soft pines (*Pinus* subgenus *Strobos*) mature slightly later in northern Mexico than those in the United States. This may be due to the dry winters and onset of the monsoon rains in late June which delays the development of cones, and the more gradual onset of winter compared to the north. The cones of the hard pines (subgenus *Pinus*) in northern Mexico mature in early to late winter and gradually open in late winter or early spring. This compares to those of the United States, which generally mature in fall and open in early winter.



Fig. 8: *Pinus stylesii*, with the Sierra La Marta in the background.

Picea mexicana

This spruce, which is often considered a subspecies of *Picea engelmannii* (subsp. *mexicana*), is growing in a moist draw at upper part of a narrow, unburned strip on north side of the mountain. It was much more widespread before fires of 1975 and 1998 burned most of the mountain. The road switchbacks several times through the stand on the way to the summit. The cones had not yet opened at the time of our visit, being still moist, and just beginning to turn brown. Within a few weeks, they would begin to dry and open. Most trees were loaded with a heavy cone crop.

The area we visited consisted of mostly small, young trees, with no large older trees present. Most trees were 9-12 m (30-40 feet) tall. *Picea mexicana* is also found also on Cerro Mohinora, Chihuahua, the highest mountain in the Sierra Madre Occidental.



Fig. 9: *Picea mexicana*, on Sierra La Marta, border of Coahuila and Nuevo Leon.



Fig. 10: Cones of *Picea mexicana*, Sierra La Marta.

Abies vejarii

Taxa in this species include *Abies vejarii* Martínez var. *vejarii*, *Abies vejarii* var. *macrocarpa* Martínez (1948) and *Abies vejarii* var. *mexicana* (Martínez) [T.S. Liu \(1971\)](#). The last has been the subject of some controversy, described as *Abies mexicana* Martínez (1942) and still commonly described as such in Mexico, but reduced to a variety *Abies vejarii* var. *mexicana* by T.S. Liu and most recently assigned to a subspecies by [Farjon \(1990\)](#). *Abies vejarii* is a very distinct fir, distinguishable from all other firs growing in Mexico. In 1943, Johnson described it as follows: “Its numerous crowded short rigid leaves ascend from all sides of the course branchlets in a manner more suggestive of a *Picea* than an *Abies*... Among the species of United States, the present fir most suggests *Abies lasiocarpa*.” Indeed it’s cool climate and habitat, in the high mountains of northeast Mexico give one the feeling of being much farther north, perhaps in the Rockies of New Mexico or Colorado. When I first visited this fir in March of 2005, deep snow blanketed the higher peaks of the Sierra de La Marta in its range in Coahuila.

Although the surrounding lowlands are arid, the higher mountains where this species grows are cool and moist. Some have suggested that *Abies vejarii* may be related to *Abies religiosa*, and some of the southern populations are difficult to distinguish from this species. Its seedlings develop much more slowly in the first few years than those of *Abies religiosa*, or any other Mexican firs. Others have suggested similarities with *Abies magnifica* and *Abies procera* of the Pacific Northwest.



Fig. 11: Cone of *Abies vejarii*, Sierra La Marta.

Figs 12 & 13: *Abies vejarii*, Sierra la Marta.

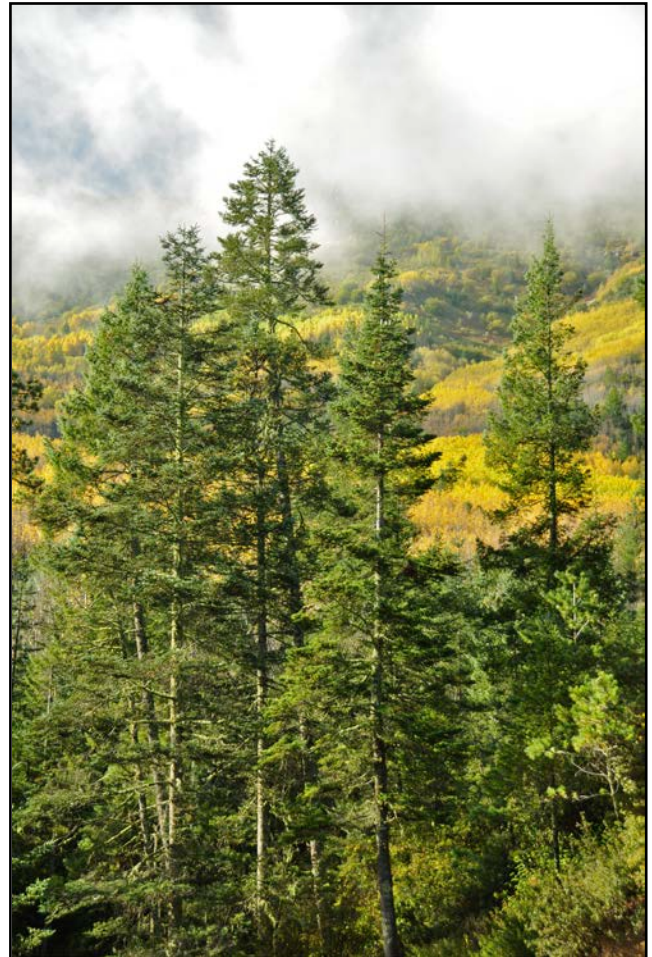




Fig. 14: *Abies vejarii* on the slopes of Sierra La Marta with autumn colors of *Populus trembloides* (see figs 12 & 13 too).

This species is quite variable, ranging in color from bright glaucous blue to deep forest green. Its cones are also variable in size and cone-scale bracts. The trees in the area of Tabla de Las Mesas in Coahuila have larger cones (10-15 cm) and were referred to by Martinez as var. *macrocarpa*. These trees also have shorter cone-scale bracts, some just barely protruding beyond the cone-scales, and bluer foliage. *Abies vejarii* is mainly found in the Sierra Madre Oriental of Nuevo Leon and Coahuila and some of the higher peaks of Tamaulipas. Recently it was discovered much farther south on some of the higher mountains of northern Veracruz and Queretaro. These are also said to be of the variety *macrocarpa*.

At the time of our visit, there was a medium cone crop in the Sierra La Marta. The cones were intact and full grown. Cone bracts were exerted to various degrees, some having only tips slightly exerted beyond the cone scales. This is the area where *Abies vejarii* var. *macrocarpa* was described by Martinez. The cones in this region were said to be larger than those on the trees near Cerro Potosí. Most cones that we observed however were similar in size to those on Cerro Potosí, or only slightly larger. *Abies mexicana* was also described from this region, being described as similar to *Abies vejarii*, however with cones having included bracts. On our previous visit we did find trees west of Jáme with cones having bracts that were only slightly protruding from the cone scales. Other than the length of the cone bract, however, no obvious differences were noted that would distinguish these trees from *Abies vejarii*. Throughout the entire range of *Abies vejarii* the length of the cone scale bracts was variable.

Pinus culminicola

A few plants of *Pinus culminicola* can be found along the road near the base of the mountain, just beyond the gate on road to El Cedral at a relatively low elevation of 2910 m. These are accessible by walking just a few minutes beyond the gate. Farther up, they become more common. Most fresh cones had been torn apart by jays, nearly all good seed having been removed. A few cones could be found hidden among the foliage which contained mostly empty seeds, though some good seed could still be found. Empty seeds are usually lighter in color, and feel noticeably lighter in weight. Sierra La Marta is one of only four locations where *Pinus culminicola* occurs. The other locations are Sierra San Antonio and the Sierra de Santa María, in Coahuila, and Cerro Potosí, in Nuevo Leon. These are all among the highest peaks in the region where the climate is very cool and moist year round, with frequent snow and freezing temperatures in winter. *Juniperus zanonii* occurs at the top of the Sierra La Marta, but was not observed on this trip since I did not climb to the summit. At the time of my visit, the top of the mountain was shrouded in clouds.

Our plan was to continue east, by way of Highway 20 to Allende, and the next day travel to El Butano, near La Trinidad, to see *Picea martinezii*, but due to mechanical problems with our truck, decided to head back to Saltillo. Next day we spent the morning repairing the truck.

We took a different route to return to Saltillo. Instead of heading north on Highway 57, we headed south to a highway that connects Highway 57 to Highway 54. We turned west on this highway near the village of Huachichil.



Fig. 15: Cones of *Pinus culminicola*, Sierra La Marta, Coahuila.

Fig. 16: Cone of *Pinus pinceana*, Cuauhtemoc, Coahuila.

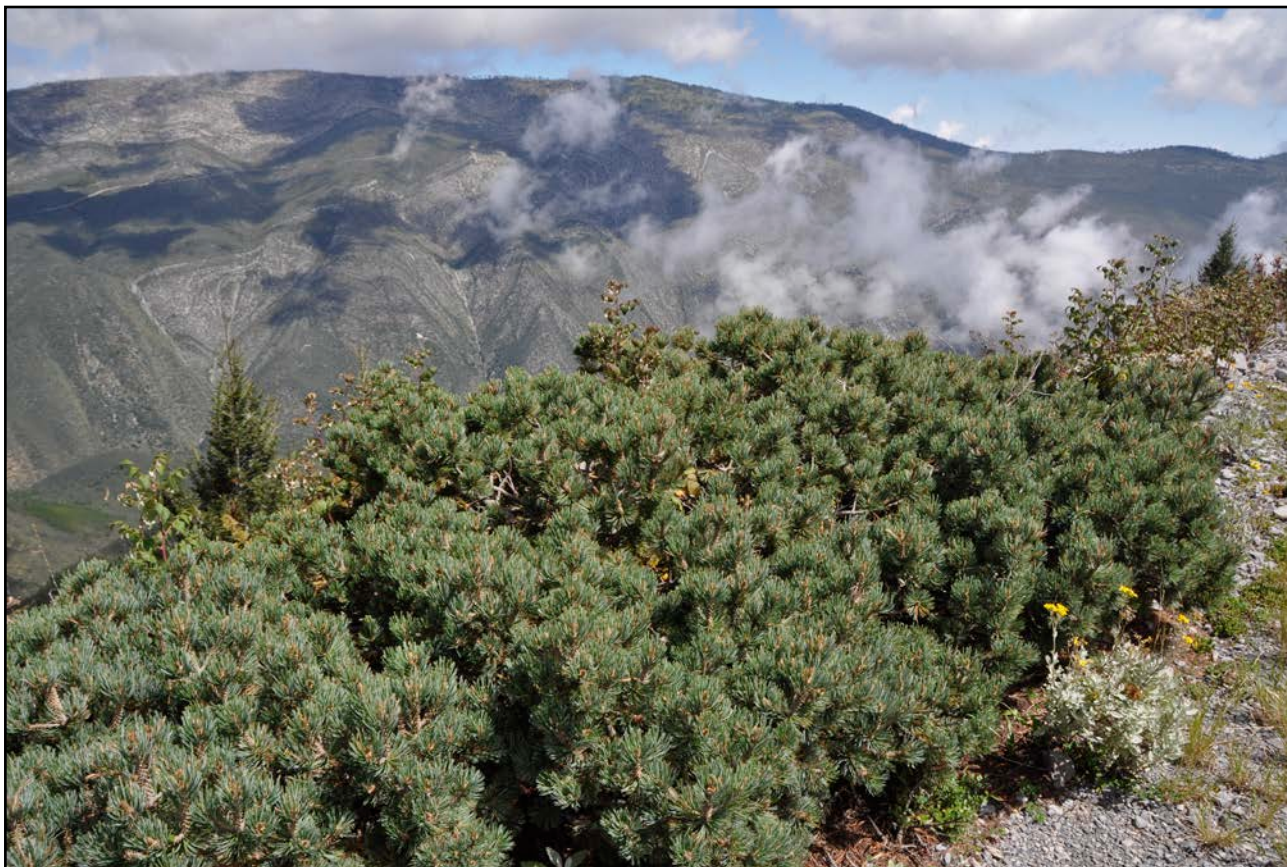
There is a small population of *Cupressus arizonica* just east of summit growing on the south side of the highway with *Pinus greggii*. Also at this location is a stand of pines of uncertain name related to *Pinus montezumae*. These trees are much bluer than either *Pinus montezumae*, or *Pinus hartwegii* found at higher elevations and have (3-)5 needles per fascicle. Also the cones are larger than *P. hartwegii* (see discussion below under Los Lirios).

Pinus cembroides is common in this area. Many trees at the lower elevations near Cuauhtemoc, west of the summit, have predominantly two needles per fascicle. These trees seemed to have a somewhat greener appearance than trees with 3 needles per fascicle that are mixed among them. The two-needled trees have been identified by some botanist as *Pinus remota*, a two-needled, low elevation tree, with thin, green needles and thin-shelled seeds. *Pinus cembroides* however may have 2-3 needles per fascicle in some areas, such as to the east of Los Lirios. Other than by needle count, these trees are difficult to distinguish from the trees that are mixed among them with predominantly 3 needles per fascicle.

Along the dirt road to Cuauhtemoc, 1 km north of highway 57, is a large population of *Pinus pinceana* on the hills just east of road. This is another very unique pinyon pine of northeastern Mexico, with pendent branches. The pale, grey-green color contrasts with the scattered bright green trees of *Pinus cembroides*, which



occur mainly around the perimeters of the large population of *Pinus pinceana*, which extends over hills in the distance. Many of the *Pinus cembroides* at this location had 2 needles per fascicle, while other trees close by had 3 needles per fascicle. Most of the cones of *Pinus pinceana* had recently opened with the seed still inside; however most of the remaining seeds were empty, the good seeds having been dispersed by birds. Only one small green cone found which had not yet opened. Collection of seed should be done earlier, in late August or early September.



Figs 17 & 18: *Pinus culminicola*, Sierra La Marta, Coahuila.





Fig. 19: Foliage of *Pinus pinceana*, Cuauhtemoc, Coahuila.



Fig. 20: Drooping branches of *Pinus pinceana*, Cuauhtemoc, Coahuila

Fig. 21: *Pinus pinceana*, Cuauhtemoc, Coahuila.



Day 2 : 30 SEPTEMBER 2014: Los Lirios

Along the road from Highway 57 to the town of Los Lirios are many junipers that are hard to identify. These trees have mostly red fruit; however, some plants have smaller blue fruit. The habit and foliage color is somewhat variable.



This is a transitional area between the two closely related species of one-seeded junipers with soft fleshy cones. According Adams, hybrid swarms between *Juniperus coahuilensis*, which has larger, red or pink colored fruit, and *Juniperus angosturana*, which has smaller, blue colored fruit occurs in the area south of Saltillo. In addition to this swarm are scattered plants of *Juniperus flaccida* and farther to the east, near Los Lirios, very fine specimens of *Juniperus deppeana* border the cultivated fields.

Just east of Los Lirios are trees that we first identified as *Pinus rudis*. This name is however problematic as its original description is very scanty, and from an unknown locality; it is not now recognized by most taxonomists as being separate from *Pinus hartwegii*. The main difference claimed is the needle count, *Pinus rudis*, having needles in fascicles of 4-5, while *Pinus hartwegii*, which generally occurs at somewhat higher elevation, has needles mostly in 3-4 per fascicle. Near the summit east of Los Lirios are a few scattered trees with stiff, blue-green needles, which could easily be mistaken for *Pinus arizonica* var. *stormiae*. The cones on these trees however, quickly distinguish it from that tree, being 2-3 times larger, dark green in color, with somewhat raised, rounded apophysis. The needles, which are in fascicles of 4-5, are stiff, thick, and relatively short. The blue-green foliage contrasts with the typical green foliage of *Pinus hartwegii* and *Pinus montezumae*. The cones are considerably larger than those of *Pinus hartwegii* seen at the higher elevations on the nearby Sierra La Marta. Those trees have cones that are typical for *Pinus hartwegii*, with thinner apophyses, and dark purple in color. If one rejects *Pinus rudis* as an ambiguous name, then the trees in the Los Lirios area are un-named; probably best treated as a new subspecies of *Pinus montezumae*, adapted to cooler, drier condition. The cones of these trees are very similar to those of *Pinus montezumae*, though typical needles of that species are much longer, thinner, and green, not glaucous. *Pinus montezumae* is widespread in the northern parts of the Sierra Madre Oriental, though some of these collections may be based on misidentified *Pinus estevezii*, which has thicker, somewhat scaly branches compared to *Pinus pseudostrobus*. Parry describes *Pinus estevezii* as intermediate between *Pinus pseudostrobus* and *Pinus montezumae* in many characters such as branch thickness and scales. (See also pp. 22-23).



Pinus cembroides is the most common tree around Los Lirios and to the east. As you go over the summit east of Los Lirios and begin to descend towards the east side of the Sierra Madre Oriental, *Pinus cembroides* occurs in a somewhat wetter environment than typically observed. Many trees in this area have predominantly two needles per fascicle, while other nearby trees have needles in groups of three. The trees with two needles however, are not *Pinus remota*, a pine of the lower elevations common along the highway from Saltillo to Monterrey. These trees have bright green needles, with a shrubby, low growing habit. On the contrary, the two-needled trees west of Los Lirios are very large, single-trunked trees, indistinguishable from the three-needled trees growing among them. We concluded that they all were *Pinus cembroides*.

There is a large population of *Cupressus arizonica* beginning near the summit just east of Los Lirios and continuing for some distance down the grade to the east. These trees have large cones, nearly as large as those of *Cupressus macrocarpa*, and are completely serotinous, unlike the small, non-serotinous cones of *Cupressus lindleyi* growing farther to the south in Mexico. Other conifers growing in association with *C. arizonica* are *Pinus greggii*, *Pinus arizonica* var. *stormiae*, *Pinus montezumae*, and *Pinus cembroides*. There are a few *Abies vejarii* growing near the summit. *Pinus stylesii* was not seen at this location. Farther down the grade growing in the Canyon de la Boquilla, *Pinus estevezii* begins to appear and becomes more common as you continue towards the warmer, eastern side of the Sierra Madre Oriental. This is a spectacular area that rivals any national park in the United States, with steep canyon walls and enormous vertical granite spires reaching to the clouds framed by the long, drooping needles of *Pinus estevezii*. This area has a mix of interior, dry weather species, like *Pinus cembroides*, and species found on the wet eastern side of the mountains facing the Atlantic. *Juniperus flaccida* becomes more common in this warmer climate.



Fig. 22 (p. 12, top): *Pinus montezumae*, blue-foliage form, just east of Los Lirios near the summit.

Fig. 23 (p. 12, bottom): Cone of *Pinus montezumae*, , east of Los Lirios, Coahuila.



Fig. 24 (top): *Cupressus arizonica*, Los Lirios, Coahuila.

Fig. 25 (bottom): Cones of *Cupressus arizonica*, Los Lirios, Coahuila.



Fig. 26: *Cupressus arizonica*, near the summit east of Cuauhtemoc, Coahuila.

Fig. 27: *Pinus cembroides* and *Juniperus flaccida*, Cañon de la Boquilla, east of Los Lirios, Coahuila.



Fig. 28: *Pinus cembroides*, Cañon de la Boquilla, east of Los Lirios, Coahuila.

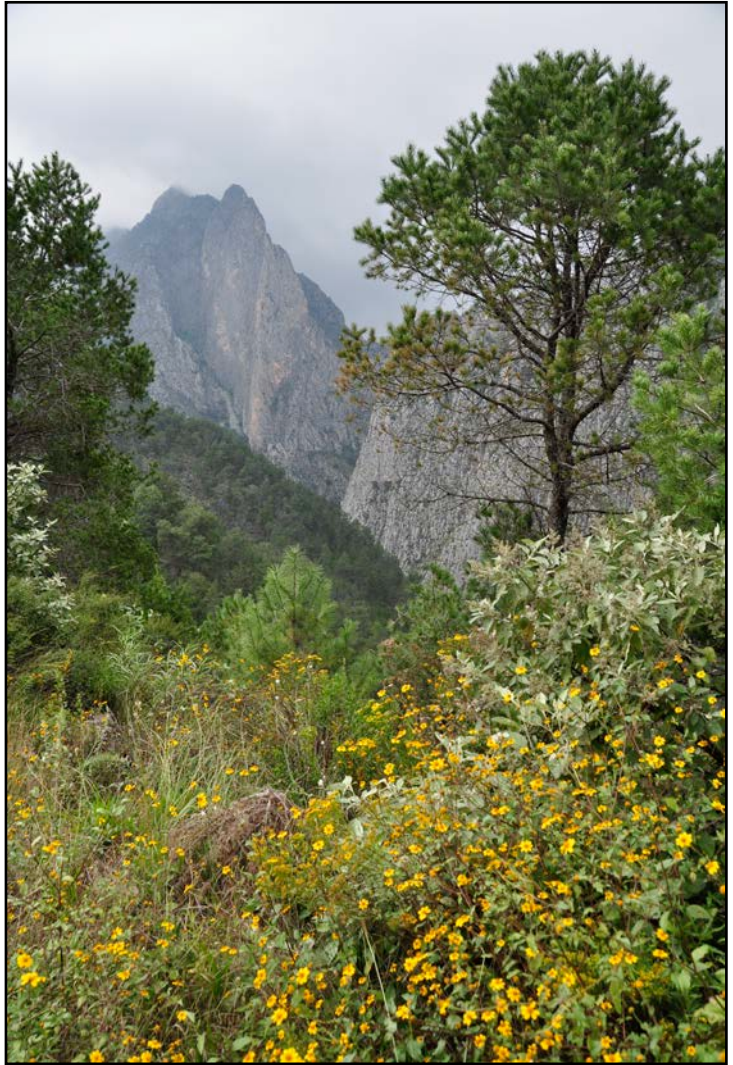
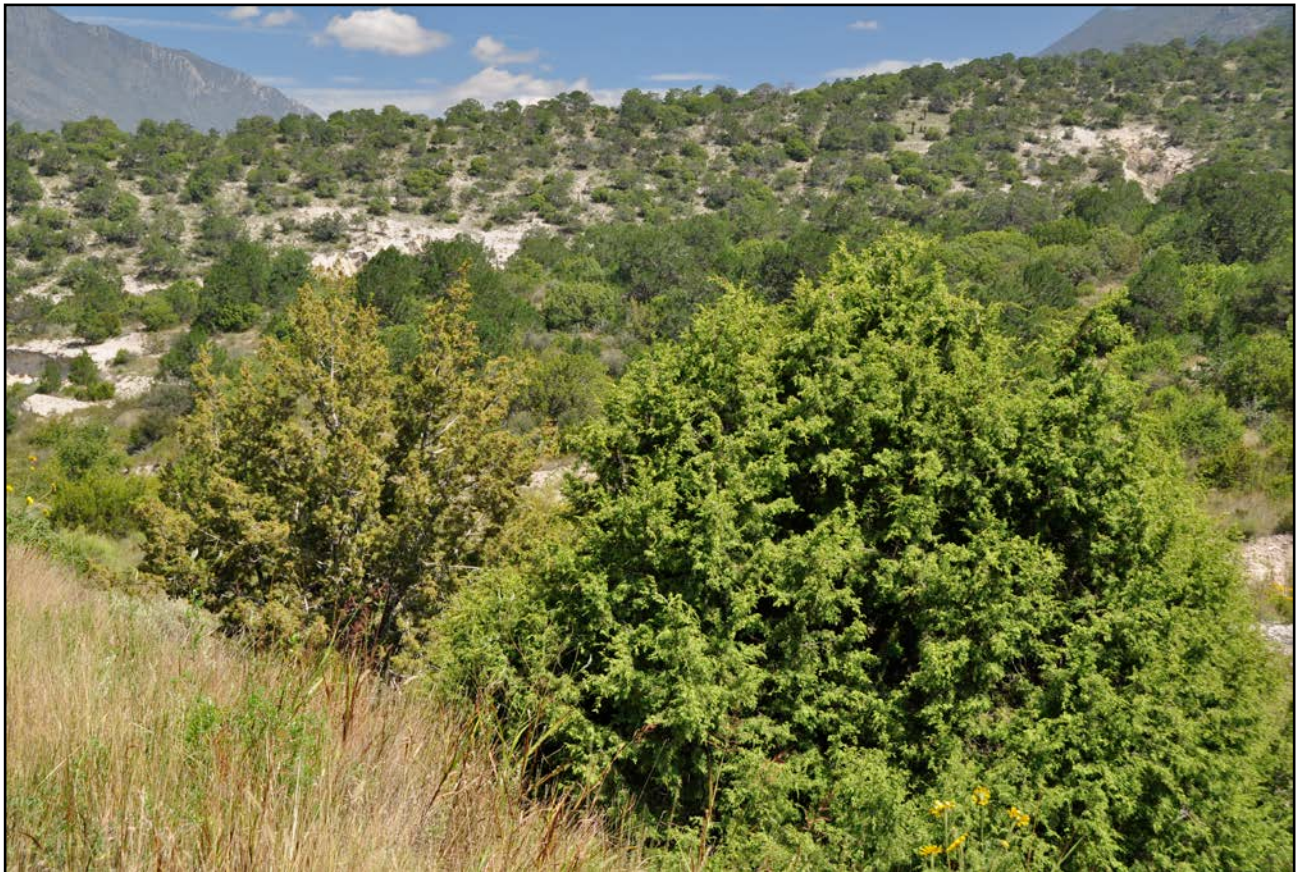
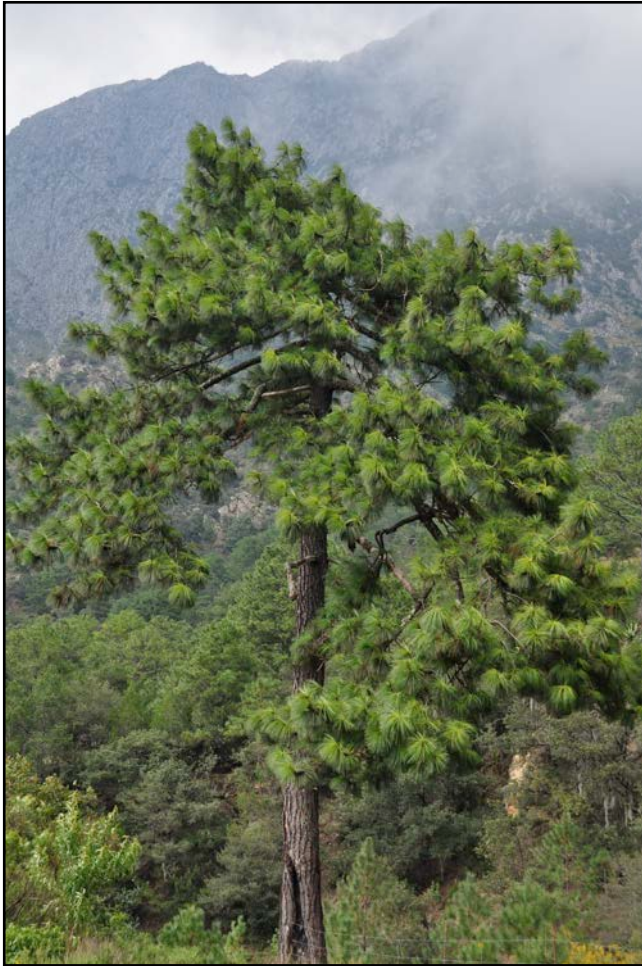


Fig. 29: Variable population of junipers west of Los Lirios, near Highway 57, which may represent a hybrid swarm between *Juniperus angosturana* and *Juniperus coahuilensis*.





Figs 30 (top left) & 33 (below): *Pinus estevezii*, Cañon de la Boquilla, east of Los Lirios, Coahuila.

Fig. 31 (above): Foliage of *Pinus estevezii*, Cañon de la Boquilla, east of Los Lirios, Coahuila.

Fig. 32 (left): Cone of *Pinus estevezii*.





Fig. 34: *Pinus estevezii*, Cañon de la Boquilla, east of Los Lirios, Coahuila.

Day 3: 1st OCTOBER 2014: Saltillo to Galeana: Las Placetas

Just west of San Antonio de las Alazanes, there is a road that leads to Galeana, to the south. The village of 18 de Marzo is where we will turn off to climb to the summit of Cerro Potosí. Before that village, there is another village called Las Placetas. The elevation is about 2250 m. This is well below the elevation where *Abies vejarii* occurs. Here, within sight of Cerro Potosí is a population of *Abies coahuilensis* (see discussion below). At the time of our visit, the trees were loaded with a heavy cone crop. The cones of this species are green with included bracts, which easily distinguish it from *Abies vejarii*. The following are notes on this interesting species which is sometimes included under *Abies durangensis*.

Abies coahuilensis

In 1942 M. Johnston sent samples of a newly discovered fir from the Sierra Madera, an isolated mountain range in the middle of the Coahuilan desert to Máximo Martínez. Martínez thought that it was the same as a recently discovered fir, *Abies durangensis*, from the Sierra Madre Occidental near El Salto, Durango. Johnston did not agree and described it as a new species, *Abies coahuilensis*. Upon further examination, Martínez noticed some differences and later classified it as a variety of *Abies durangensis*. Since then, this fir has continued to be the source of debate and confusion. In the book *Monograph of the Genus Abies* by Liu, p. 390, photo 7, he shows a mounted specimen from the New York Botanical Garden labelled *Abies coahuilensis* “NW of Fraile on top of mountain...” This specimen has short, crowded, spiralling needles. Both the location and the character of the needles indicate that this is *Abies vejarii*, not *Abies coahuilensis*. (*Abies vejarii* was first reported by Johnston from Cameros Pass, NW of Fraile, Coahuila, in the Sierra Madre Oriental.). Johnston described *Abies coahuilensis* as a fir that shows a close relationship with *Abies concolor* and *Abies grandis* of the western United States. Its lower shade needles have the same flat, pectinately arranged character as *Abies grandis* and *Abies lowiana*, very distinct from *Abies vejarii*. In the book *Conifers* by Keith Rushforth, he wrote about another fir in the region, *Abies mexicana*: “It is found to the east across the Coahuilan desert from Coahuila Fir to which it is allied. It has erroneously been treated as *Abies vejarii* var. *mexicana* which also occurs in the same area but differs in foliage arrangement, cones, bark and ecology.” This does not conform to Martínez original description of *Abies mexicana*, which he describes as very similar to *Abies vejarii* with spirally arranged, crowded needles, spreading forward in different directions,



with the main difference being the cones having enclosed bracts. It seems that Rushforth may have come across the stand of *Abies coahuilensis* in the Sierra Madre Oriental near 18 de Marzo, and mistakenly concluded that they were the trees that Martínez referred to as *Abies mexicana*. He therefore placed *Abies mexicana* (*Abies vejarii* var. *mexicana*) in the subsection *Grandis*. According to Martínez's description however, *Abies mexicana* clearly belongs with *Abies vejarii*. He was referring to trees in the area that are nearly identical to *Abies vejarii*, but have cones with included bracts. These trees are now usually considered to be the same species as *Abies vejarii*. Martínez was not aware of the tree in the area of 18 de Marzo that clearly conform to the description of *Abies coahuilensis*, previously only known from the Sierra Madera of Coahuila. Recently it has been discovered in several locations in the Sierra Madre Oriental of Nuevo Leon. Besides the population northwest of Cerro Potosí near the Village of 18 de Marzo, it is growing below the cliffs of El Butano, south of La Trinidad at 2100 m with *Picea martinezii* and *Taxus globosa*. At 18 de Marzo it is growing with *Pinus greggii*, *Pseudotsuga menziesii*, and *Juniperus flaccida*. It has also been reported near Carpinteros, west of Santiago at 1600 m. One of Johnston's arguments to support *Abies coahuilensis* as an independent species from *Abies durangensis* is its location far across the Coahuilan desert from the Sierra Madre Occidental. The Sierra Madera, where *Abies coahuilensis* was first described, is composed largely of species that have migrated along the Sierra Madre Oriental or have extended south from the United States. Very little floristic connections exist between the Sierra Madera and the Sierra Madre Occidental. In seedling tests, *Abies coahuilensis* has shown very rapid growth compared to other firs. The following are some differences between *Abies coahuilensis* and *Abies durangensis*:

Abies coahuilensis

Foliage: Dark shiny green

Stomata few or none on upper surface

Needles on upper fertile branches erect, round blunt tips

Branchlets: Thin, dull brown

Cones: Bract about $\frac{1}{3}$ as long as scale

Bark: Grey well-defined vertical ridges

Abies durangensis

Dull blue or grey-green

Stomata on both surfaces

Needles on upper branches curved downward like *Abies religiosa*

Thicker, yellow or green-brown

Bract less than $\frac{1}{2}$ as long as scale

Grey-brown scaly, not well-defined pattern

Fig. 35 (p. 18, top): *Abies coahuilensis* with cones, Las Placetas, Nuevo León, with Cerro Potosí in the background.

Fig. 36 (p. 18, bottom): Cone of *Abies coahuilensis*, Las Placetas, Nuevo León.

Fig. 37: *Abies coahuilensis* with cones, Las Placetas, Nuevo León.





Saltillo to Galeana: 18 de Marzo

In the area just north of 18 de Marzo we encountered some pines with long, stiff needles, in fascicles of 5. The branches were very thick, with scaly bark, like those of *Pinus montezumae*, that grow farther to the south. The cones were long and narrow, not like the wide cones, with very stiff scales of *Pinus estevezii*. They appeared to match those of *Pinus montezumae*. After doing some research it was noted that some botanist have identified these trees as *Pinus engelmannii*. (Near Galeana, 1 km N of 18 de Marzo, 29 Oct. 1984, *Rushforth* 495 (E) while others have suggested *Pinus montezumae*. In my opinion, the pines at 18 de Marzo appear to be *Pinus montezumae*. They occur at this location with *Pinus greggii* and *Juniperus flaccida*.





Fig 38, 39 & 40 (p. 20 & 21 [above]): Pines in the vicinity of 18 de Marzo that match the description of *Pinus montezumae* with thick branches, and long, stiff needles

Fig 41: Trunk of the pine at the same location.



Fig 42: Cone from same location.



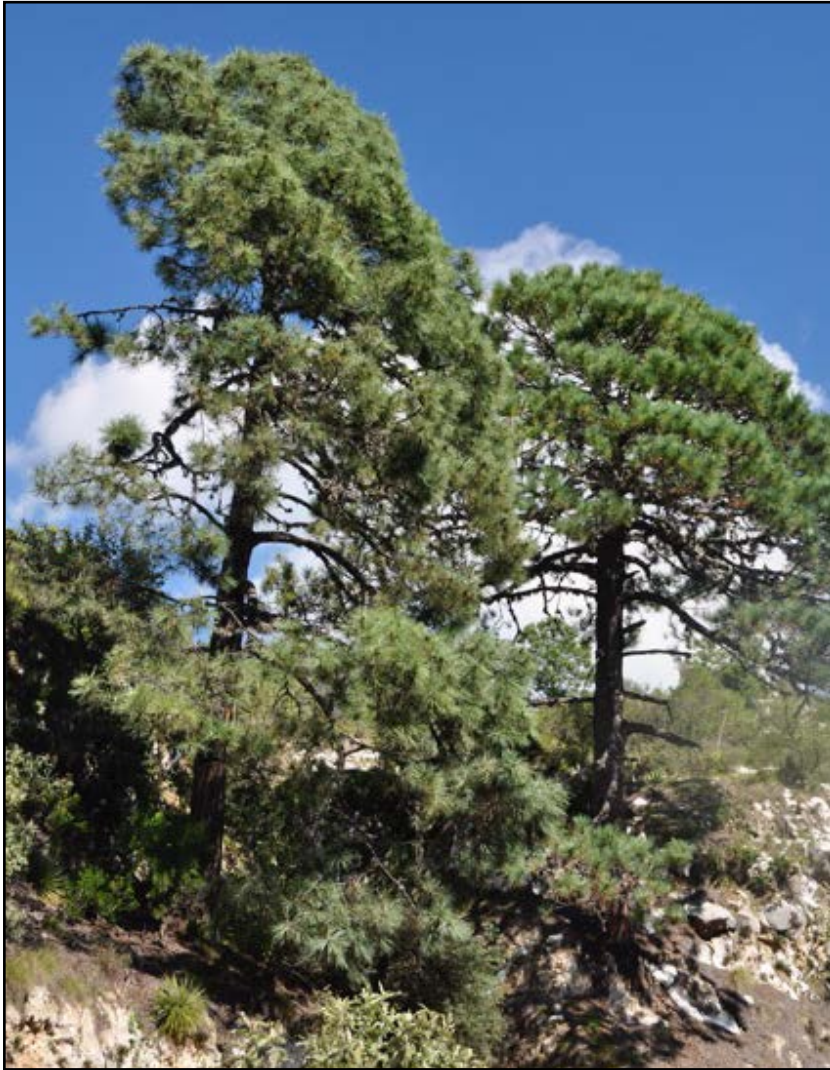


Fig. 43 (left): *Pinus arizonica* var. *stormiae*, on the lower slopes of Cerro Potosí, Nuevo León.

Fig. 45 (p. 23, top): Cones and foliage of *Juniperus angosturana*, lower slopes of Cerro Potosí, Nuevo León.

Fig. 46 (p. 23, bottom): Cone of *Pinus cembroides*, lower slopes of Cerro Potosí, Nuevo León.

Fig. 44 (bottom): Cones of *Pinus arizonica* var. *stormiae*, lower slopes of Cerro Potosí, Nuevo León.





Saltillo to Galeana: Cerro Potosí

The trip to the top of Cerro Potosí requires a four wheel drive and takes most of a day. You begin at the village of 18 de Marzo, at an elevation of 2025 m. and very slowly climb your way up the dirt and cobble stone road by way of endless switchbacks to over 3700 m.

Juniperus angosturana

On the lower slopes of Cerro Potosí, the road is lined with Agave and *Juniperus angosturana*. These can be distinguished from *Juniperus coahuilensis* by the small blue colored fruit.

Pinus arizonica* var. *stormiae

The first large pines seen on the ascent of Cerro Potosí are *Pinus arizonica* var. *stormiae*. These can be easily distinguished from *Pinus estevezii* which occur near Galeana by their thick, scaly branches, stiff, grey-green needles, in fascicles of 3-5, and smaller cones.

Pinus cembroides

Common on the lower slopes mixed with *Juniperus angosturana* and *Pinus arizonica*.

Pinus nelsonii*, *Pinus pseudostrobus

A few miles after leaving 18 de Marzo on the way to the summit of Cerro Potosí, there is a plantation of several pine species including *Pinus pseudostrobus* and *Pinus nelsonii*. These trees are still fairly young and small, however the *Pinus nelsonii* are already producing cones and seem to be doing very well. The location is very similar in climate and soil to where the native stands of *Pinus nelsonii* occur in the Peña Nevada area, and shares many of the associated species. *Pinus nelsonii* has been reported to grow on Cerro Potosí, however we are not able to confirm if these reports are based on native populations.

Pseudotsuga menziesii

Scattered on the lower and middle slopes of Cerro Potosí.

Abies vejarii

Common at middle and upper elevations of Cerro Potosí growing with *Pinus hartwegii*, *Pinus stylesii* and *Pinus culminicola* at higher elevations and *Pinus arizonica* var. *stormiae*, *Pinus cembroides*, *Pinus greggii*, *Pseudotsuga menziesii*, and *Juniperus angosturana* at the lower elevations (see fig. 62, p. 31 & fig. 76, p. 43).

Pinus stylesii

(See description above under Sierra La Marta.) Common white pine at the middle to upper elevations of Cerro Potosí growing with *Abies vejarii*, *Pinus hartwegii* and *Pinus culminicola*.



Pinus greggii

Uncommon on the lower slopes. Seen at several points along the road.

Pinus hartwegii

According to some sources, both *Pinus rudis* and *Pinus hartwegii* occur on Cerro Potosí. The pines at the lower elevations tend to have a higher needle count, generally having 4-5 needles per fascicle, and gradually transition to 3-4 needles per fascicle near the summit. Other than needle count, the trees were not distinguishable and most likely represent a single taxon. Near the summit, trees become twisted, some nearly sprawling from the severe winds and blowing snow that occur in winter. The top of the mountain is mostly bald, forming somewhat of a timberline just below the summit.



Fig. 47 (p. 24, top): *Pinus nelsonii* with several cones, Cerro Potosí, Nuevo León.

Fig. 48 (p. 24, bottom): Cone of *Pseudotsuga menziesii*, Cerro Potosí, Nuevo León.

Fig. 49 (top right): Cones of *Pinus greggii*, Cerro Potosí, Nuevo León.

Fig. 50: *Pinus hartwegii*, close to the summit of the Cerro Potosí, Nuevo León.



Juniperus zanonii

In the limestone rocks shortly before reaching the summit, are small, low growing junipers which are also present at the top of Sierra La Marta, Peña Nevada and a few of the other highest mountains in the Sierra Madre Oriental of northeastern Mexico. These plants were originally identified as *Juniperus monticola* f.



compacta, a juniper found on some of the high volcanoes of the trans-volcanic belt of central Mexico, and are very similar to that species. However, after noticing several morphological differences, and conducting tests on DNA and oils, Robert Adams described these plants as a new species, naming it *Juniperus zanonii* in 2010. He noticed that the branches of *Juniperus zanonii* are rough with persistent dead leaves, while those of *Juniperus monticola* f. *compacta* are smooth. There are also differences in the leaf scales and leaf glands. The cones of *Juniperus zanonii* have 2-5 seeds, while those of *Juniperus monticola* f. *compacta* have 3-7 or as many as 9. *Juniperus zanonii* grows in limestone, while *Juniperus monticola* f. *compacta* grows in volcanic soil. Not all agree that these plants are sufficiently different from *Juniperus monticola* to warrant their distinction.



Fig. 51 (above):
Juniperus zanonii, near
the top of Cerro Potosí,
Nuevo León.

Fig. 52 (left): Cone and
foliage of *Juniperus*
zanonii, near the top of
Cerro Potosí, Nuevo
León.

Fig. 53 (p. 25, top):
Cone and foliage of
Juniperus zanonii near
the top of Cerro Potosí,
Nuevo León.



Pinus culminicola

Whereas the cones on Sierra La Marta had mostly been stripped of seed by birds, with few good seeds remaining, on Cerro Potosí most cones were still green and closed, with the seed still remaining. The trees are mostly found near the top of the mountain; however, some trees occur mixed with *Pinus hartwegii* and *Pinus stylesii* well before reaching the summit. *Pinus culminicola* does not grow in the typical hot, semi-arid conditions that most pinyon pines prefer. The climate at the summit is cool and moist, with clouds often brushing over the top of the mountain, enveloping it in a thick fog. In winter, the weather is drier; however, occasional storms from the north bring snow to the mountain. Last time we were at the summit in early March 2005, we encountered old frozen snow patches near the top. Shortly after we arrived at the summit, thick clouds began to roll in and soon snow began to fall accompanied with lightning. In the days that



Fig. 54: *Pinus culminicola*, Cerro Potosí, Nuevo León.



Fig. 55: *Pinus culminicola*, Cerro Potosí, Nuevo León.

followed, a considerable amount of snow fell on the mountain, with temperatures well below freezing both by day and night. Because of the high altitude, the temperatures even in summer are cool. At the summit, the climate can be almost be described as subalpine.

Fig. 56: *Pinus culminicola*, at edge of burned area near top of Cerro Potosí, Nuevo León.





Fig. 57: *Pinus culminicola* and *Pinus hartwegii*, near top of Cerro Potosí, Nuevo León.

Fig. 58: Cone of *Abies vejarii*, Cerro Potosí, Nuevo León.



Fig. 59: *Pinus stylesii*, Cerro Potosí, Nuevo León.





Fig. 60: Cones and foliage of *Pinus stylesii*, Cerro Potosí, Nuevo León.

Fig. 61: *Pinus johannis*, Siberia, Nuevo León.



Day 4: 2 OCTOBER 2014: Galeana to Aramberri, Zaragoza, San Antonio Peña Nevada, Saltillo

On our way south from Galeana, heading towards Aramberri, we encountered some odd junipers near a creek among the *Pinus cembroides* forest. These had unusual drooping, whip-like foliage. They were located about 1 km north of Las Crucitas, along Hwy 61. Their appearance was similar to that of *Juniperus monticola*, however, they did not have its bead-like foliage. They had small blue cones, with mostly one seed per cone, which would identify it most likely as *Juniperus angosturana*. However the drooping foliage was very distinct from all other populations of *Juniperus angosturana* that we have observed.



Fig. 62: *Juniperus angosturana*, Las Crucitas, Nuevo León.

Zaragoza

We were advised by the forest service not to go to the saw mill where *Picea martinezii* are located as the



Fig. 63: Cone of *Taxus globosa* North of La Encantada, Nuevo León.

road was very muddy and impassable since it was the end of the monsoon season, and heavy rains had occurred the previous week. The steep climb to the south on the Zaragoza to La Encantada road was dominated by very large *Juniperus flaccida* trees. *Pinus estevezii* was found at the upper margins of the *Juniperus flaccida* forest. At the top of the grade the road became increasingly muddy to the point that we wondered if we were going to be able to continue to Peña Nevada.

In a wet area near the top of the slope we encountered *Taxus globosa* growing along a creek with a stand of *Cupressus arizonica/lindleyi*. This area represents the boundary between these two species, and identification becomes difficult, since trees are intermediate in many characters between the two. Just beyond this location we encountered *Pinus teocote*. *Pinus stylesii* is also seen in this area and has larger cones than those farther to the north in the area of Cerro Potosí and Sierra La Marta. The road levels off around Zaragoza, and in this area are a few scattered *Pinus hartwegii*, being at the lower elevational limits for this species. As we head down the road towards Siberia, we encountered a beautiful stand of *Pinus johannis*. This species is thought by some to be the same species, or a variety of *Pinus discolor*, which

occurs far to the northwest in the Sierra Madre Occidental. Both trees have bi-colored needles, a character also shared by *Pinus culminicola*. *Pinus johannis* has bright green foliage, compared to the dull, grey-green foliage of *Pinus discolor*. It also has somewhat larger cones, and a more shrubby habit, though many of the trees at this location are much larger than those seen in other areas. These two may be better treated as varieties of one species. *Pinus orizabensis* which grows to the south also has many similarities to *Pinus johannis*. At this location, *Pinus cembroides* is growing side by side with *Pinus johannis*. They can easily be distinguished by the brighter green foliage of *Pinus johannis*, with a very obvious bi-colored needles, and more shrubby habit. Continuing farther down the grade towards San Antonio de Peña Nevada, *Juniperus flaccida* once again becomes common. *Pinus nelsonii*, another rare pinyon pine also makes its appearance, growing in mixed stands with *Pinus cembroides*. This tree is easily distinguished by its much longer, cylindrical cones. Also in this area are fine specimens of *Pinus arizonica* var. *stormiae*, with long, blue-green needles. The white, gypseous soils in this area are home to several rare endemic plant species.

After arriving at San Antonio de Peña Nevada, we turned northward, eventually turning off Hwy 2 onto Hwy 9 en route to Hwy 57 to return to Saltillo. So far, the trip from San Antonio de Peña Nevada has been semi-desert, void of conifers, however, just before reaching San Juan de Aviles on Hwy 9, we were in for a pleasant surprise. Suddenly we are in a magnificent forest of *Juniperus saltillensis*. Having only once seen a few small examples of this species, and having heard that it was similar to *Juniperus angosturana*, I was not prepared for what I was seeing. Enormous trees, looking like large magnificent Monterey Cypress, having stout single trunks with furrowed bark. The trees were growing in a large oasis in the desert at the foot of the Sierra Madre Oriental. At the time of our visit, they were covered with small fruit, maturing into various shades of blue, pink and whitish colors. There was no mistaking this species from the small shrubby *Juniperus angosturana* found at higher elevations that receive more rainfall. We later pass through another population of *Juniperus saltillensis* after joining Hwy 57, about 10 km north of the Junction San Roberto. This population is located in a valley in front of Cerro Potosí. These trees were not as large as those found at San Juan de Aviles. Farther to the north, we encountered *Juniperus coahuilensis* growing at the lower margins of the *Pinus cembroides* forest.

Fig. 64 (top): Cones of *Pinus johannis*, Siberia, Nuevo León.

Fig. 65 (bottom): Cone of *Pinus nelsonii* Cerro Potosí, N.L.





Fig. 66: *Pinus johannis*, Siberia, Nuevo León.

Fig. 67: *Pinus nelsonii* with smaller, dark green *Pinus cembroides*, San Antonio de Peña Nevada, Nuevo León.





Fig. 68: *Juniperus saltillensis*, San Jose de Aviles, Nuevo León.

Figs 69 & 70: *Juniperus saltillensis*, San Jose de Aviles, Nuevo León.





Fig. 71: *Juniperus saltillensis*, Entroque San Roberto, Nuevo León.

Fig. 72: *Juniperus saltillensis*, Entroque San Roberto, Nuevo León.



Day 5: 3 OCTOBER 2014

Before leaving Saltillo for the United States, we made one last side trip to look for *Pinus remota*. We headed east from Saltillo on Hwy 40 towards Monterrey. We soon began to descend towards a thick blanket of haze filling the lower valleys around Monterrey, which has a considerably wetter and warmer climate than the higher interior valleys. We took the new toll road, although it is not always easy to pull over suddenly on these roads when you spot a tree of interest. As we approached the

Nuevo Leon-Coahuila border, we began to see small pines to the south of the highway in the vicinity of Rinconada. At 1200 m above sea level, we are at a considerably lower altitude than where *Pinus cembroides* grows, so found a place to pull over to investigate. Here were many trees of *Pinus remota*, with its thin bright

green needles, two per fascicle. The stomata are evenly distributed, so the needles do not have a contrast between the upper and lower surface which is usually noticeable in *Pinus cembroides* and very obvious in *Pinus johannis*. *Pinus remota* occurs at lower elevations compared to other pinyon pines. This area of Coahuila and Nuevo Leon marks the southern boundary for the species, which continues up through Coahuila to the Edwards Plateau in South Texas. This species has seeds with very thin shells and white endosperm (flesh), compared to the thick, hard shells of *Pinus cembroides* with pink endosperm. This region has the highest concentration of pinyon pines in North America, which includes *Pinus cembroides* var. *cembroides*, *Pinus culminicola*, *Pinus johannis*, *Pinus nelsonii*, *Pinus pinceana*, and *Pinus remota*. Some sources also put *Pinus discolor* in this region, which is in our opinion doubtful.

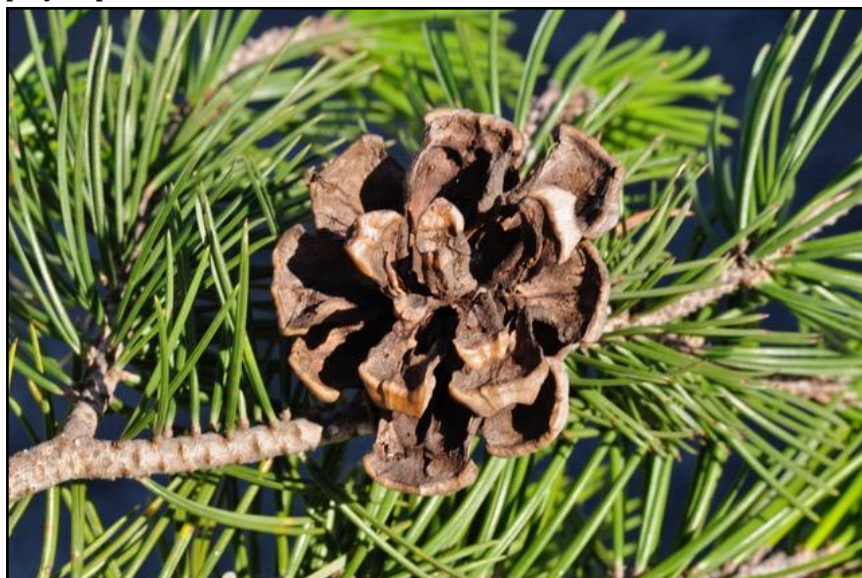
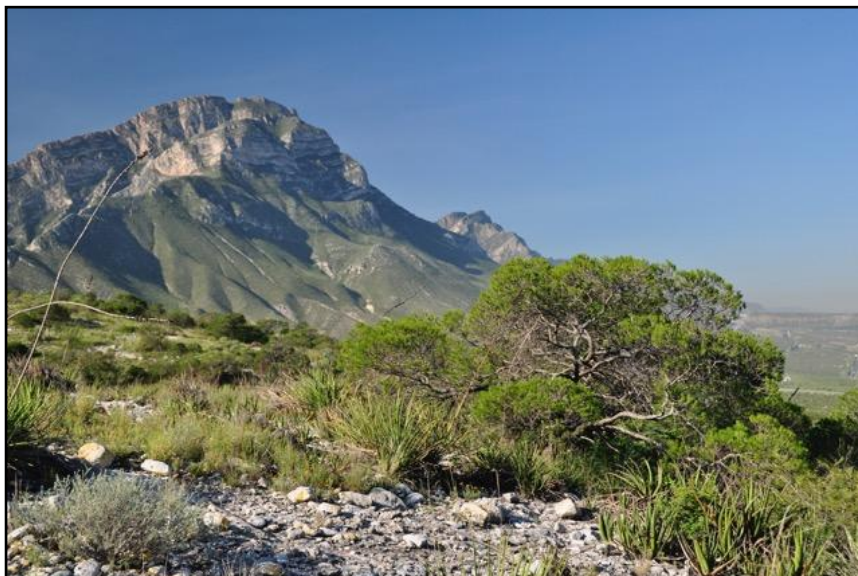


Fig. 73: Landscape with *Pinus remota* and Cerro de la Calle in the background, Rinconada, Nuevo León.

Fig. 74: Needles of *Pinus remota* with two needles per fascicle, Rinconada, Nuevo León.

Fig. 75: Cone of *Pinus remota*, Rinconada, Nuevo León.

Bibliography

- Bisbee, J. (2014). Cone Morphology of the *Pinus ayacahuite-flexilis* Complex of the Southwestern United States and Mexico. *Bull. Cupressus Conservation Proj.* 3: 3-33.
- Businský, R. (2008). The Genus *Pinus* L., Pines: contribution to knowledge. *Acta Pruhoniciana* 88: 1-126.
- Debreczy, Z. & I. Rácz (2011). *Conifers around the world, conifers of the temperate zones and adjacent regions.* 2 Vol. DendroPress, Budapest, Hungary.
- Farjon, A. & B.T. Styles (1997). *Pinus* (Pinaceae). *Fl. Neotrop. Monogr.* 75. The New York Botanical Garden, NY, USA.
- Farjon, A. (1990). *Pinaceae: drawings and descriptions of the genera Abies, Cedrus, Pseudolarix, Keteleeria, Nothotsuga, Tsuga, Cathaya, Pseudotsuga, Larix and Picea.* Koeltz Scientific Books, Königstein, Germany.
- Frankis, M.P. (2008). The high altitude white pines of Mexico and the adjacent SW USA (*Pinus* L. subgenus *Strobus* Lemmon, Pinaceae). *Intern. Dendrology Soc. Yearbook* 2008: 64-72.
- Johnston, I.M. (1943). Plants of Coahuila, Eastern Chihuahua, and adjoining Zacatecas and Durango, I. *J. Arnold Arbor.* 24: 306-339.
- Liu, T.S. (1971). *A monograph of the genus Abies.* Department of Forestry, National Taiwan University, Taipei, Taiwan.
- Loock, E.E.M. (1950). *The pines of Mexico and British Honduras: a report on a reconnaissance of Mexico and British Honduras during 1947.* Bull. n° 35, Department of Forestry, L.S. Gray, Pretoria, South Africa.
- Martínez, M. (1945). *Las Pinaceas mexicanas.* Anales del Instituto de Biología de la Universidad Nacional de México, t. 16 & t. 17-21 (1946-50), Mexico.
- Martínez, M. (1948). *Los pinos mexicanos.* Ediciones Botas, Mexico.
- Perry, J.P. Jr. (1991). *The pines of Mexico and Central America.* Timber Press, Portland, Oregon, USA.
- Rushforth, K. (1987). *Conifers.* Christopher Helm, London.
- Shaw, G.R. (1909). *The pines of Mexico.* Publ. Arnold Arbor. n° 1, Arnold Arboretum, USA.

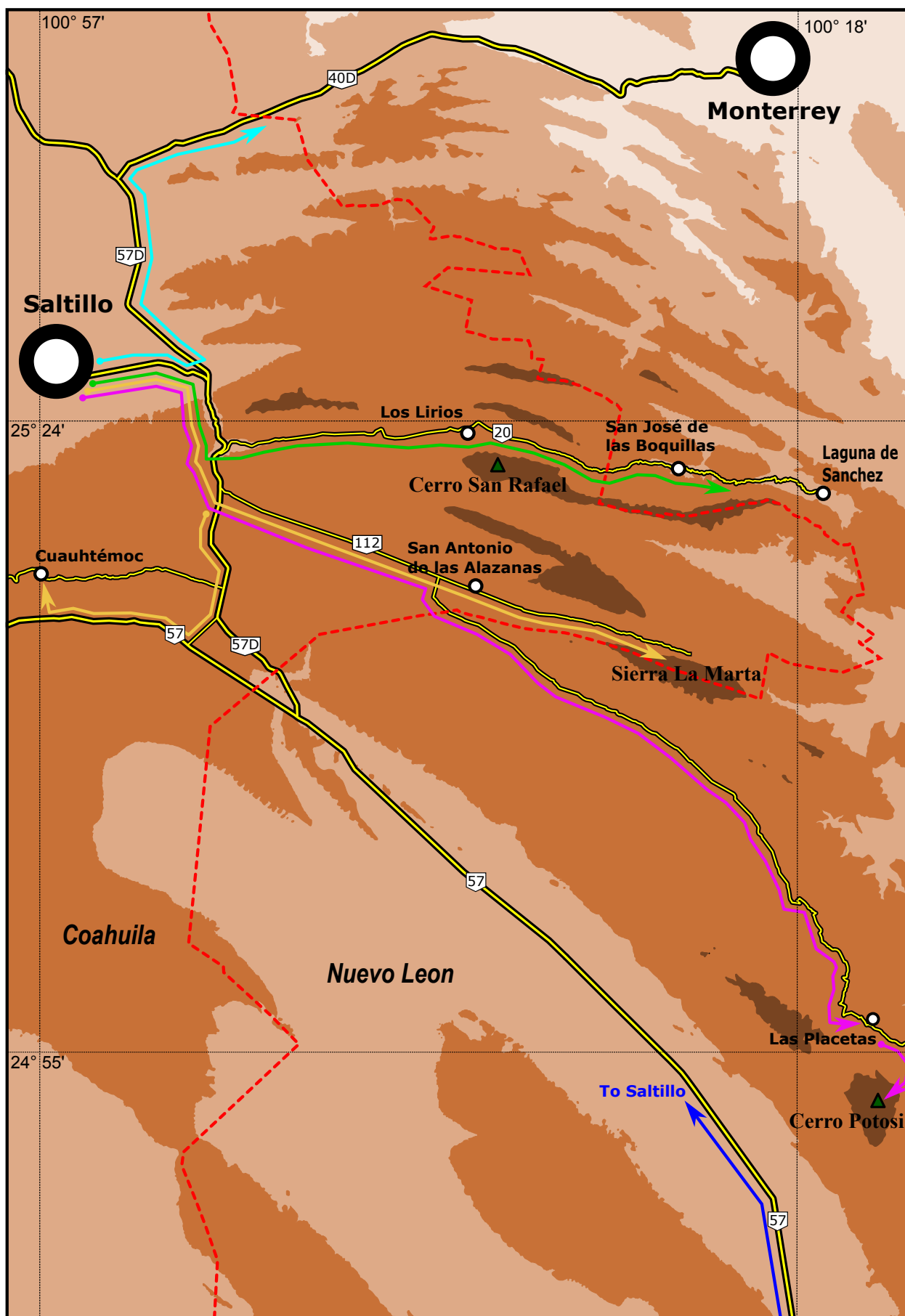
COLLECTIONS

COAHUILA, NUEVO LEON, MEXICO SEPTEMBER 29 - OCTOBER 3, 2014

- 707 *Pinus stylesii*** Bosques de Monterreal, east of San Antonio de las Alazanes, at foot of Sierra La Marta, Coahuila; 25° 13'51.87" N, 100° 25'45.18" W, elev. 2691 m. Jeff Bisbee, Sept. 29, 2014.
- 708 *Pinus hartwegii*** Bosques de Monterreal, east of San Antonio de las Alazanes, at foot of Sierra La Marta, Coahuila; 25° 13'51.87" N, 100° 25'45.18" W, elev. 2691 m. Jeff Bisbee, Sept. 29, 2014.
- 709 *Pseudotsuga menziesii* subsp. *glauca*** Bosques de Monterreal, east of San Antonio de las Alazanes, at foot of Sierra La Marta, Coahuila; 25° 13'51.87" N, 100° 25'45.18 W, elev. 2691 m. Jeff Bisbee, Sept. 29, 2014.
- 710 *Abies viejarii*** Bosques de Monterreal, east of San Antonio de las Alazanes, at foot of Sierra La Marta, Coahuila; 25° 13'38.36" N, 100° 25'26.20"W, elev. 3056 m. Jeff Bisbee, Sept. 29, 2014.
- 711 *Pinus greggii*** Bosques de Monterreal, east of San Antonio de las Alazanes, at foot of Sierra La Marta, Coahuila; 25° 12'38.36" N, 100° 22'53.41 W, elev. 2909 m. Jeff Bisbee, Sept. 29, 2014.
- 712 *Pinus culminicola*** .05 km Southeast of Renacer de la Sierra, at foot of Sierra La Marta, Coahuila; 25°12'33.05 N, 100°21'45.91 W, elev. 2910 m. Jeff Bisbee, Sept. 29, 2014.
- 713 *Pinus culminicola*** North side of Sierra La Marta, Coahuila; 25°12'15.30" N, 100°22'15.91" W, elev. 3316 m. Jeff Bisbee, Sept. 29, 2014.
- 714 *Picea engelmannii* subsp. *mexicana*** North side of Sierra La Marta, Coahuila; 25°12'01.29" N, 100°21'53.29" W elev. 3395 m. Jeff Bisbee, Sept. 29, 2014.
- 715 *Pseudotsuga menziesii* subsp. *glauca*** North side of Sierra La Marta, Coahuila; 25°12'15.30" N, 100°22'15.91" W elev. 3316 m. Jeff Bisbee, Sept. 29, 2014.
- 716 *Juniperus deppeana*** West of Jahuey, near summit of highway 57, south of Saltillo, Coahuila; 25°14'50.36" N 100°54'35.46" W, elev. 2456 m. Jeff Bisbee, Sept. 29, 2014.
- 717 *Cupressus arizonica*** West of Jahuey, near summit of highway 57, south of Saltillo, Coahuila; 25°14'50.36" N 100°54'35.46" W, elev. 2456 m. Growing with *Pinus edulis*, *Pinus rudis*, *Juniperus deppeana*; Jeff Bisbee, Sept. 29, 2014.
- 718 *Pinus montezumae*** West of Jahuey, near summit of highway 57, south of Saltillo, Coahuila; 25°14'50.36" N 100°54'35.46" W, elev. 2456 m. Growing with *Cupressus arizonica*, *Pinus edulis*, *Juniperus deppeana*; Jeff Bisbee, Sept. 29, 2014.

- 719 *Pinus cembroides* West of Jahuey, near summit of highway 57, south of Saltillo, Coahuila; 25°14'50.36" N 100°54'35.46" W, elev. 2456 m. Growing with *Cupressus arizonica*, *Pinus rudis*, *Juniperus deppeana*; Jeff Bisbee, Sept. 29, 2014.
- 720 *Pinus pinceana* 1 km ne of Highway 57 on road to Cuauhtemoc, Coahuila; 25°14'50.36" N, 101°01'36.00" W, elev. 2125 m. Growing with *Pinus edulis*. Jeff Bisbee, Sept. 29, 2014.
- 721 *Pinus edulis* 1 km ne of Highway 57 on road to Cuauhtemoc, Coahuila; 25°14'50.36" N, 101°01'36.00" W, elev. 2125 m. Many trees had needles predominantly in fascicles of 2, others 3. Growing with *Pinus pinceana*. Jeff Bisbee, Sept. 29, 2014.
- 722 *Juniperus chihuahuana* El Chorro, off highway 57D (Carretera Matehuala-Saltillo) en route to Los Lirios, Coahuila; 25°22'59.14" N, 100°47'10.12" W, elev. 1918 m Jeff Bisbee, Sept. 29, 2014.
- 723 *Pinus montezumae* Forested area east of Los Lirios, along road to Laguna Sanchez. Coahuila; 25° 22'45.27" N 100° 31'02.39" W elev. 2468 m. Jeff Bisbee, Sept. 30, 2014.
- 724 *Pinus arizonica* var. *stormiae* Forested area east of Los Lirios, along road to Laguna Sanchez. Coahuila; 25° 22'45.27" N 100° 31'02.39" W elev. 2468 m. Jeff Bisbee, Sept. 30, 2014.
- 725 *Abies vejarii* Forested area east of Los Lirios, along road to Laguna Sanchez. Coahuila; 25° 22'45.27" N 100° 31'02.39" W elev. 2468 m. Jeff Bisbee, Sept. 30, 2014.
- 726 *Cupressus arizonica* Near La Jacinta, on road from Los Lirios to Laguna Sanchez. Coahuila; 25° 22'14.71" N 100° 29'23.62" W elev. 2311 m Jeff Bisbee, Sept. 30, 2014.
- 727 *Pinus greggii* Near La Jacinta, on road from Los Lirios to Laguna Sanchez. Coahuila; 25° 22'14.71" N 100° 29'23.62" W elev. 2311 m Jeff Bisbee, Sept. 30, 2014.
- 728 *Pinus edulis* Near La Jacinta, on road from Los Lirios to Laguna Sanchez. Coahuila; 25° 21'45.13" N 100° 28'12.15" W elev. 2166 m Jeff Bisbee, Sept. 30, 2014.
- 729 *Juniperus angosturana* Near La Jacinta, on road from Los Lirios to Laguna Sanchez. Coahuila; 25° 21'45.13" N 100° 28'12.15" W elev. 2166 m Jeff Bisbee, Sept. 30, 2014.
- 730 *Juniperus flaccida* Canyon de la Boquilla, on road from Los Lirios to Laguna Sanchez, Nuevo Leon; 25° 21'42.16" N 100° 22'43.14" W elev. 1945 m. Jeff Bisbee, Sept. 30, 2014.
- 731 *Pinus estevezii* Canyon de la Boquilla, on road from Los Lirios to Laguna Sanchez, Nuevo Leon; 25° 21'42.16" N 100° 22'43.14" W elev. 1945 m. Jeff Bisbee, Sept. 30, 2014
- 732 *Abies coahuilensis* Las Placetas, 10 km nw of 18 de Marzo, at north base of Cerro Potosí, Nuevo Leon; 24° 55'05.80" N, 100° 12'43.33" W, elev. 2275 m. Jeff Bisbee, Oct. 1, 2014.
- 733 *Pinus montezumae* 1 km nw of 18 de Marzo, Nuevo Leon; Jeff Bisbee, Oct. 1, 2014.
- 734 *Pinus arizonica* var. *stormiae* Lower slopes of Cerro Potosi, along road to summit. Nuevo Leon; 24° 53'00.98" N 100° 11'26.94" W elev. 2175 m. Jeff Bisbee, Oct. 1, 2014.
- 735 *Juniperus angosturana* Lower slopes of Cerro Potosi, along road to summit. Blue berries with soft flesh. 1-2 seeds. Nuevo Leon; 24° 53'05.21" 100° 11'44.40 W elev. 2256 Jeff Bisbee, Oct. 1, 2014.
- 736 *Pinus nelsonii* Cultivated tree in young plantation on lower slopes of Cerro Potosí along road to summit. Nuevo Leon; 24° 53'13.17" 100° 11'54.44" W elev. 2311 m. Jeff Bisbee, Oct. 1, 2014.
- 737 *Pinus greggii* Middle slopes of Cerro Potosí along road to summit. Nuevo Leon; 24° 53'36.80" 100° 12'12.95" W elev. 2382 m. Jeff Bisbee, Oct. 1, 2014.
- 738 *Pseudotsuga menziesii* subsp. *glauca* Middle slopes of Cerro Potosí along road to summit. Nuevo Leon; 24° 53'36.80" 100° 12'12.95" W elev. 2382 m. Jeff Bisbee, Oct. 1, 2014.
- 739 *Pinus stylesii* Upper slopes of Cerro Potosi, along road to summit. Nuevo Leon; 24° 53'24.21" N 100° 12'48.30" W elev. 2807. Jeff Bisbee, Oct. 1, 2014.
- 740 *Abies vejarii* Upper slopes of Cerro Potosi, along road to summit. Nuevo Leon; 24° 53'24.21" N 100° 12'48.30" W elev. 2807. Jeff Bisbee, Oct. 1, 2014.
- 741 *Pinus hartwegii* Upper slopes of Cerro Potosi, along road to summit. Nuevo Leon; 24° 53'24.21" N 100° 12'48.30" W elev. 2807. Jeff Bisbee, Oct. 1, 2014.
- 742 *Juniperus zanonii* Approximately 1 km before reaching top of Cerro Potosi, limestone rocks. Nuevo Leon; 24°51'37.47" N 100° 13'49.15" W elev. 3507 m. Jeff Bisbee, Oct. 1, 2014.
- 743 *Pinus culminicola* Top of Cerro Potosi, Nuevo Leon; 24°52'16.79" N 100° 14'01.02" W elev. 3710 m Jeff Bisbee, Oct. 1, 2014.

- 744 *Juniperus angosturana*** Trees with unusual drooping foliage, small blue berries, 1-2 seeds. 1 km north of Las Crucitas, along hwy 61. Nuevo Leon; 24°30'09.19" N 100° 00'20.28" W elev. 2420 m. Jeff Bisbee, Oct. 2, 2014
- 745 *Pinus estevezii*** Highway 61, north of Arramberi, Nuevo Leon. 24° 26'29.62" 99° 57'16.92" W elev. 2326 Jeff Bisbee, Oct. 2, 2014
- 746 *Juniperus flaccida*** 2 km west of Zaragoza, on road to La Encantada, Nuevo Leon; 23°57'00.64" N 99°47'46.89" W elev. 1815 m. Jeff Bisbee, Oct. 2, 2014.
- 747 *Pinus estevezii*** 2 km west of Zaragoza, on road to La Encantada, Nuevo Leon; 23°57'00.64" N 99°47'46.89" W elev. 1815 m. Jeff Bisbee, Oct. 2, 2014.
- 748 *Taxus globosa*** 3.5 km north of La Encantada, on road to Zaragoza, Nuevo Leon; 23°55'02.27" N 99°48'08.26" W elev. 2584 m. Jeff Bisbee, Oct. 2, 2014
- 749 *Cupressus arizonica*** 3.5 km north of La Encantada, on road to Zaragoza, Nuevo Leon; 23°55'02.27" N 99°48'08.26" W elev. 2584 m. Jeff Bisbee, Oct. 2, 2014
- 750 *Pinus stylesii*** 3.5 km north of La Encantada, on road to Zaragoza, Nuevo Leon; 23°55'02.27" N 99°48'08.26" W elev. 2584 m. Jeff Bisbee, Oct. 2, 2014
- 751 *Abies vejarii*** 2.5 km north of La Encantada, on road to Zaragoza, Nuevo Leon; 23°54'40.57" N 99°47'52.29" W elev. 2705 m. Jeff Bisbee, Oct. 2, 2014
- 752 *Pinus teocote*** 2.5 km north of La Encantada, on road to Zaragoza, Nuevo Leon; 23°54'40.57" N 99°47'52.29" W elev. 2705 m. Jeff Bisbee, Oct. 2, 2014
- 753 *Pinus hartwegii*** 2 km south of La Encantada, Nuevo Leon, on road to San Antonio de Peña Nevada; 23°53'50.00" N 99°47'53.55" W elev. 2725 m. Jeff Bisbee, Oct. 2, 2014
- 754 *Pinus johannis*** 1 km east of Siberia, on road to La Encantada, Nuevo Leon; 23°52'04.68" N 99°48'34.96" W elev. 2677 m. Jeff Bisbee, Oct. 2, 2014.
- 755 *Pinus edulis*** 12 km ne of San Antonio de Peña Nevada on road to La Encantada, Nuevo Leon; 23°48'22.71" N 99°53'53.92 W, elev. 2212 m. Jeff Bisbee, Oct. 2, 2014.
- 556 *Juniperus flaccida*** 12 km ne of San Antonio de Peña Nevada on road to La Encantada, Nuevo Leon; 23°48'22.71" N 99°53'53.92 W, elev. 2212 m. Jeff Bisbee, Oct. 2, 2014.
- 757 *Pinus arizonica* var. *stormiae*** 12 km ne of San Antonio de Peña Nevada on road to La Encantada, Nuevo Leon; 23°48'22.71" N 99°53'53.92 W, elev. 2212 m. Jeff Bisbee, Oct. 2, 2014.
- 758 *Pinus nelsonii*** 12 km ne of San Antonio de Peña Nevada on road to La Encantada, Nuevo Leon; 23°48'22.71" N 99°53'53.92 W, elev. 2212 m. Jeff Bisbee, Oct. 2, 2014.
- 759 *Juniperus saltillensis*** Hwy 9, 1 km south of San Juan de Aviles, Nuevo Leon; 24°09'54.02" N, 100°03'52.48" W, elev. 1591 m. Jeff Bisbee, Oct. 2, 2014.
- 760 *Juniperus saltillensis*** 10 km north of Entronque San Roberto on Highway 57, Coahuila. 24°52'06.03" N, 100°22'35.23 W, elev. 1878 m. Jeff Bisbee, Oct. 2, 2014.
- 761 *Juniperus coahuilensis*** Highway 57, south of Huachichil, Nuevo Leon; 25° 14'41.95" N 100° 47'42.08" W elev. 2129 m. Jeff Bisbee, Oct. 2, 2014.
- 762 *Pinus remota*** Highway 54D Saltillo-Monterrey, at Rinconada, Nuevo Leon-Coahuila border, 25°38'09.06" N 100°45'40.69" W, elev. 1300 m. Jeff Bisbee, Oct. 3, 2014.



Map 1: Northwestern part of trip.

Map 2 (p. 41): Southeastern part of trip.

Legend:

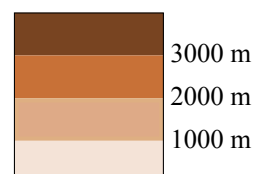
Scale: ~1:465,000

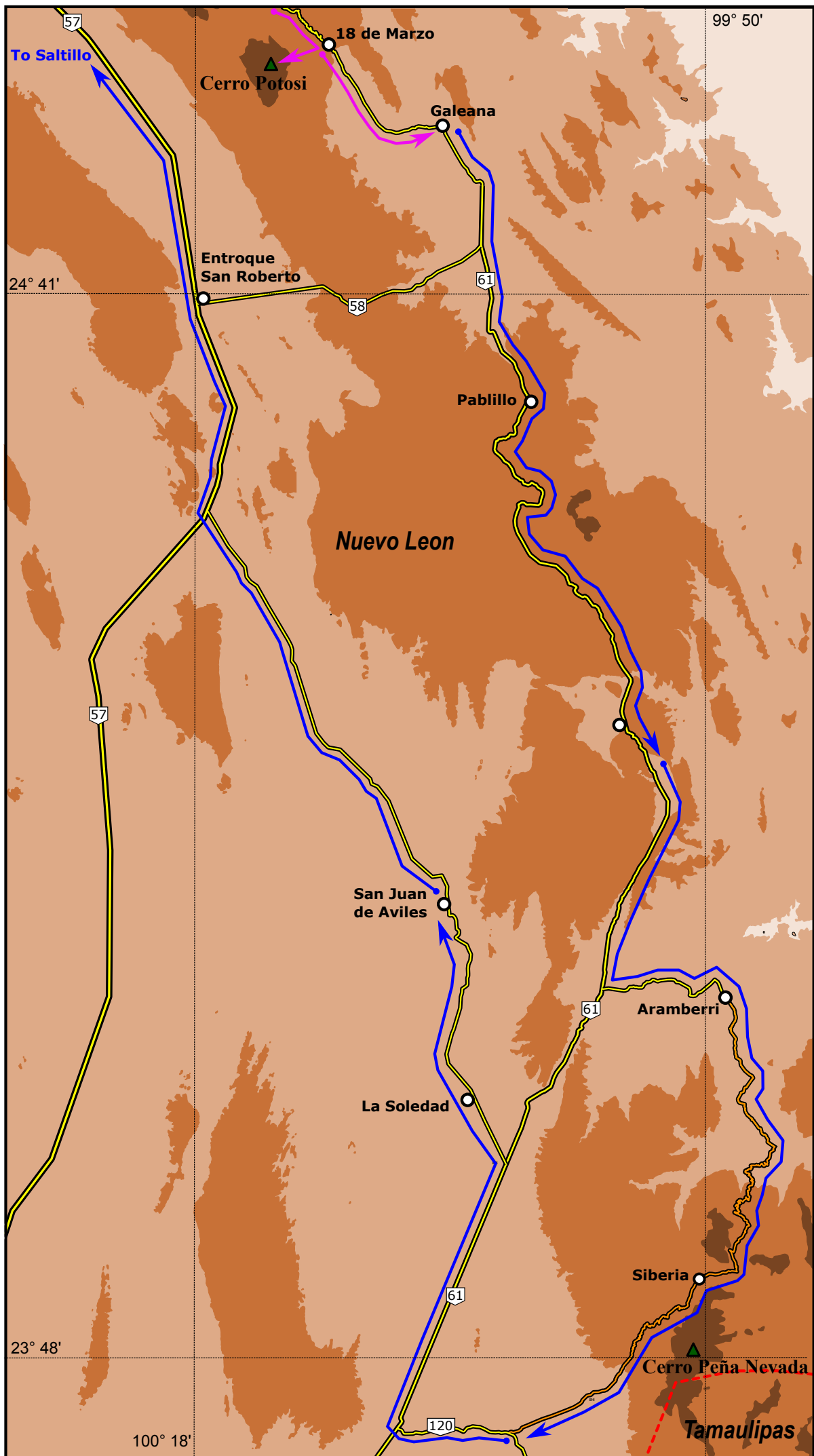
- Town
- ▲ Summit
- - - Province border
- Road
- - - Dirt road
- 57 Highway #

Itinerary

- Day 5
- Day 4
- Day 3
- Day 2
- Day 1

Contour lines





Appendix 1: List of the Latin names mentioned in the article with their author's name.

In bold characters the taxa with photos.

Abies coahuilensis I.M.Johnst. (1943).
Abies concolor (Gordon & Glend.) Lindl. ex Hildebr. (1861).
Abies durangensis Martínez (1942).
Abies grandis (Douglas ex D.Don) Lindl. (1833).
Abies lasiocarpa (Hook.) Nutt. (1849).
Abies lowiana (Gordon) A.Murray bis (1863).
Abies magnifica A.Murray bis (1863).
Abies mexicana Martínez (1942).
Abies procera Rehder (1940).
Abies religiosa (Kunth) Mirb. (1825).
Abies vejarii Martínez (1942).
Abies vejarii var. *macrocarpa* (Mart.) Liu (1971).
Abies vejarii var. *mexicana* Martínez (1949).
Cupressus arizonica Greene (1882).
Cupressus lindleyi Klotzsch ex Endl. (1847).
Cupressus macrocarpa Hartw. (1847).
Juniperus angosturana R.P.Adams (1994).
Juniperus coahuilensis (Martínez) Gaussen ex R.P.Adams (1993).
Juniperus deppeana var. *deppeana* Steud. (1840).
Juniperus flaccida Schltdl. (1838).
Juniperus monticola f. *compacta* Martínez (1946).
Juniperus monticola Martínez (1946).
Juniperus saltilensis M.T.Hall (1971).
Juniperus zanonii P.Adams (2010).
Picea engelmannii Engelm. (1863) subsp. ***mexicana*** (Martínez) P.A.Schmidt (1988).
Picea martinezii T.F.Patt. (1988).
Pinus arizonica Engelm. (1878) var. ***stormiae*** Martínez (1945).
Pinus ayacahuite C.Ehrenb. ex Schltdl. var. *brachyptera* Shaw (1909).
Pinus cembroides Zucc. (1832).
Pinus culminicola Andresen & Beaman (1961).
Pinus discolor D.K.Bailey & Hawksw. (1979).
Pinus estevezii (Martínez) Gaussen (1960).
Pinus flexilis E.James var. *reflexa* Engelm. (1879).
Pinus greggii Engelm. ex Parl. (1868).
Pinus hartwegii Lindl. (1839).
Pinus johannis M.-F.Robert (1978).
Pinus montezumae D.Don in Lamb. (1832).
Pinus nelsonii Shaw (1904).
Pinus orizabensis (D.K.Bailey) D.K.Bailey & Hawksw. (1992).
Pinus pinceana Gordone (1858).
Pinus pseudostrobus Lindl. (1839).
Pinus radiata D.Don (1836).
Pinus reflexa Engelm. (1882).
Pinus remota (Little) D.K.Bailey & Hawksw. (1979).
Pinus rudis Endl. (1847).
Pinus strobiformis Engelm. (1848).
Pinus stylesii Frankis ex Businský (2008).
Pinus teocote Cham. & Schltdl. (1830).
Populus tremuloides Michx. (1803).
Pseudotsuga menziesii (Mirb.) Franco (1950) subsp. ***glauca*** (Beissn.) A.E.Murray (1982).
Taxodium mucronatum Ten. (1854).
Taxus globosa Schltdl. (1838).

Appendix 2: Cone difference between *Juniperus angosturana* and *J. coahuilensis*.

Fig. 76: Cones of *Juniperus angosturana*.



Fig. 77: Cones of *Juniperus coahuilensis*.





Fig. 78: *Juniperus saltillensis*, Nuevo León.