

THE “APULCO RAVINE PINE” – ITS MORPHOLOGY, TAXONOMY, AND RELATIONSHIPS

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The morphology, nomenclatural history, and some aspects of relationships of the “Apulco Ravine Pine”, mainly occurring in the ravine system near Apulco, Hidalgo state, Mexico, are discussed. This article is based on a treatment in the recently published “Conifers around the World” (by Debreczy and RÁCZ), with modified text and illustrations to accommodate the format of this journal. As concluded, former typifications of specimens assumed to be vouchers of *Pinus apulcensis* Lindl. should be rejected (and a neotype should be selected) in light of pine population studies by the authors and their associates in the ravines near Apulco, and herbarium studies of various relevant collections. An alternative solution to establish the proper nomenclature of the Apulco Ravine Pine is also considered.

Key words: Apulco Ravine, Hartweg, Hidalgo, *Pinus*

INTRODUCTION

Some 45 km due north of Tulancingo, Hidalgo, Mexico, near the Veracruz border, there is a deep system of ravines, one of which, with an intermittent stream, crosses the centre of the small township of Apulco (Figs 1, 2). Like an emerald necklace – thanks to the humid microclimate – the ravine is covered for kilometres by green stripes of lush pine forests draped with long beards of Spanish Moss (Fig. 3). This forest clearly has a single dominant pine (Figs 17, 18), conspicuous with its long needles (< 28 cm) and fairly large (< 16.5 cm) flat-scaled cones (DEBRECZY and RÁCZ 2011).

The discovery and description

The pine was first collected for science in the Apulco ravine by Carl Theodor Hartweg (1812–1871) (Fig. 4) during his late 1838 to early 1839 stay at Real del Monte, a mining town 40 km southwest of Apulco. Departing Apulco, Hartweg made one last trip in early 1839 via Angangueo, Michoacán, before heading southward through Oaxaca for Guatemala (Fig. 5). He had earlier sent 10 boxes to the London Horticultural Society (LHS), one of which may have contained the pine cones and branchlets he collected in the Apulco ravine. Hartweg's instructions from the LHS had been to focus on a wide range of ornamental plants, so he did not collect many pine taxa and only a few of these were new for science (MCVAUGH 1970). Little did he know the convoluted taxonomic twists and turns the pine he collected in the Apulco ravine would later take.

In 1839 John Lindley (1799–1865) (Fig. 6) published six new pines that had been collected in Mexico by Hartweg, including *Pinus apulcensis*, for which a Latin diagnosis was given with a brief description (Fig. 7):

PINUS apulcensis; pentaphylla, foliis tenuibus abbreviatis ramisque glaucis, strobilis pendulis verticillatis ovatis acutis: squamis rhomboideis pyramidalis rectis nunc elongatis medio constrictis, seminibus ovalibus alâ lineari quadruplò brevioribus. [rough translation: *Pinus apulcensis*; five-needled, leaves thin, rather short, shoots glaucous, cones in whorls, pendulous, pointed-oval with scales rhomboid-pyramidal, upright to elongate, medially constricted, seeds oval with narrow wings, about one-fourth of the wing's length].

“The short leaves and very glaucous shoots distinguish this, independently of the ovate cones, covered closely with pyramidal elevations, which are sometimes prolonged and contracted in the middle, especially those near the points of the cones. The leaves are not more than six inches long, the cones are about four inches long, and very regularly ovate. Mr Hartweg found it in ravines near Apulco growing fifty feet high.” (LINDLEY 1839).

No type was designated, nor has any ever been found.

In 1842 John Loudon published “An encyclopaedia of trees and shrubs (being the arboretum or fruticetum abridged)”, in which he illustrates “*P. apulcensis* Lindl. The Apulco Pine” with the following description: “the backs of the scales are sometimes prolonged into a hook, particularly those nearest the base and the point” (LOUDON 1842) (Fig. 8, cf. Fig. 9).

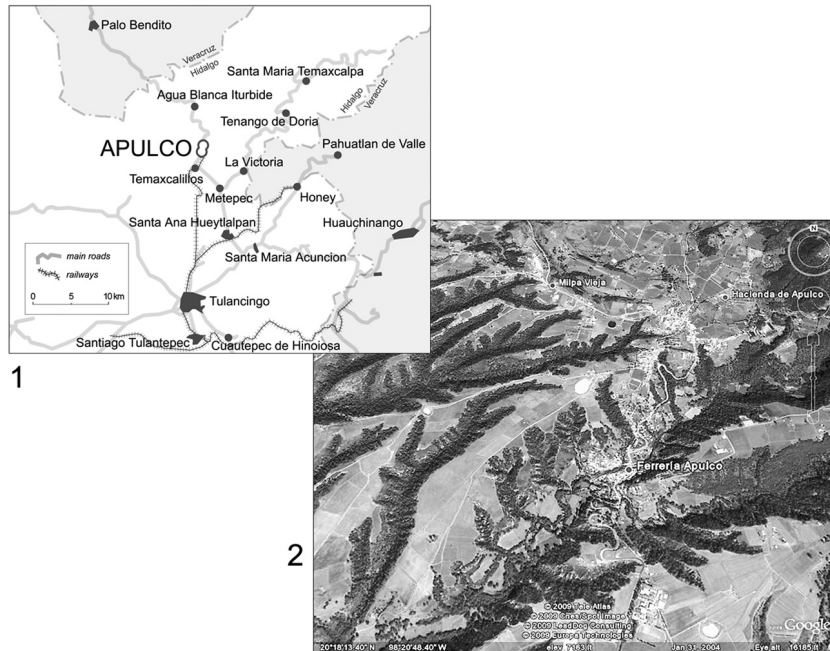


Fig. 1. The environs of Apulco, Hidalgo (near the border with Veracruz); map based on www.maps-of-mexico.com. **Fig. 2.** The intricate ravine system around Apulco, Hidalgo, clothed with emerald green vegetation, as shown by a Google Earth satellite photograph



Fig. 3. View of the ravine section (here, 20–25 m deep) adjacent to the eastern part of Apulco township (April 3, 1994)



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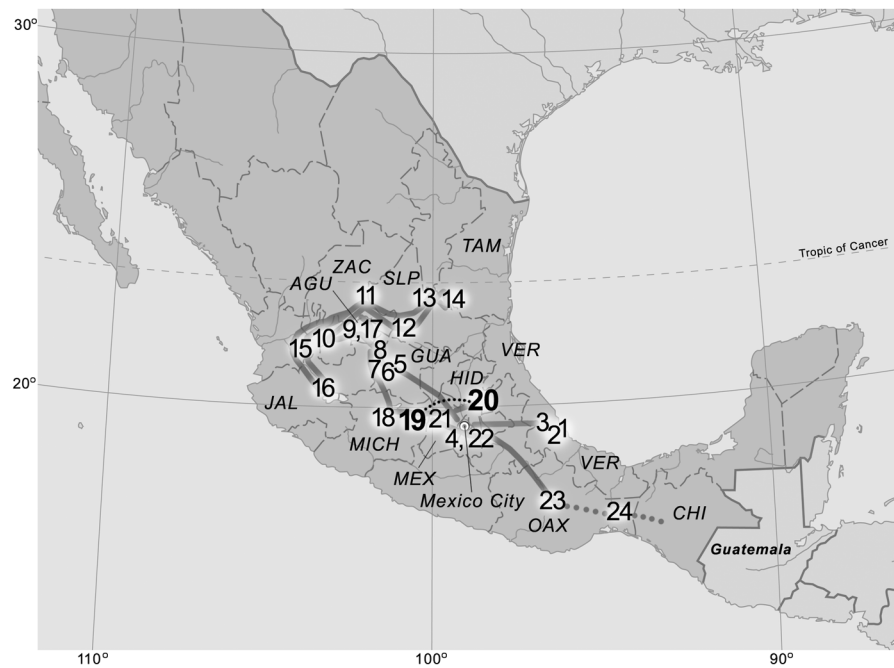


Fig. 4. The only known portrait photo of Carl Theodor Hartweg (1812–1871) (courtesy of Familienarchiv Hartweg, Haigerloch, Germany)

Fig. 5. C. T. Hartweg's travels in Mexico between 1836 and 1839 (based upon McVaugh, 1970) (with present state borders). **1** = Veracruz (VER); arrives Dec. 3 and stays until Dec. 6, 1836. **2** = Zacuapan (VER); stays until Dec. 27. **3** = Jalapa (VER); stops on the way to México City. **4** = México City (MEX); arrives Jan. 2, stays until Jan. 9, 1837. **5** = Guanajuato (GUA); arrives Jan. 13, departs Jan. 14. **6** = Silao (GUA); ~Jan. 15–22; returns to Guanajuato and explores the region until mid-April. **7** = León (GUA); works in the region April 13 to June 17. **8** = Lagos (JAL); works in the region until July 13. **9** = Aguascalientes (AGU); works in the region until Sept. 22. **10** = Bolaños (JAL) and Huichol country; works in the region until mid-Jan. 1838. **11** = Zacatecas (ZAC); arrives mid-Jan., stays until Feb. 26. **12** = San Luis Potosí (SLP); early March, on the way to Tula. **13** = Tula (TAM); early March. **14** = Santa Bárbara (now Ocampo) and Rancho de los Gallitos (TAM); arrives mid-March, stays in the region until early April; returns to Tula ~April 11 and San Luis Potosí April 19. **15** = Bolaños (JAL); arrives about mid-May via Zacatecas. **16** = Guadalajara (JAL); back to Bolaños and Zacatecas ~June 14. **17** = Aguascalientes (AGU); arrives about mid-June for a few days. **18** = Morelia (MICH); arrives ~June 22; works in the region for ~2 months. **19** = Angangueo (MICH); arrives Aug. 24; field work until Sep. 27. Collection of the pine later named *P. pseudostrobus* Lindl.; see #21 as well. **20** = Real (Mineral) del Monte (HID); arrives late October, works in the region for about 4 months until Feb. 2, 1839; excursions to many places including Apulco, collecting the pine later named *P. apulcensis* Lindl. **21** = (dotted line:) Back to Angangueo (MICH) to collect pine seeds; stays until Feb. 17. These are apparently Hartweg's last pine collections in Mexico. **22** = Mexico City (MEX); arrives Feb. 20, stays until March 2. **23** = Oaxaca (OAX); arrives March 18; stays in the region for about 5 months; explores areas such as the Valley of Oaxaca, lowlands of the Chinantla region, over the mountains toward Villa Alta. Returns for final time to Oaxaca (city) probably late July/early Aug., leaving Oaxaca on Aug. 13. **24** = Tehuantepec (OAX); arrives Aug. 22; prepares his trip to Guatemala overland via Chiapas



Fig. 6. John Lindley (1799–1865), prolific botanical and horticultural authority who described many plants from the C. T. Hartweg collections, including the taxon he named *Pinus apulcensis*. Photo from http://lmo.wikipedia.org/wiki/John_Lindley

99. *PINUS pseudostrobus*; pentaphylla, foliis tenuissimis glaucescentibus, strobilus ovalibus verticillatis horizontalibus; squamis apice rhomboideis pyramidatis erectis rectiusculis lineâ elevatâ transversâ, seminibus ovalibus alâ nigrescente quadruplò v. quintuplò brevioribus.

Mr. Hartweg describes this as allied to *Pinus Devoniana*, but quite distinct and resembling *P. Strobis* in habit; he found it very common at Anganguco, about 8000 feet above the sea. The leaves are fine and glaucous, like those of the Weymouth Pine. The cones are about four inches long, by an inch and half in breadth over the middle.

100. *PINUS apulcensis*; pentaphylla, foliis tenuibus abbreviatis ramisque glaucis, strobilis pendulis verticillatis ovatis acutis: squamis rhomboideis pyramidatis rectis nunc elongatis medio constrictis, seminibus ovalibus alâ lineari quadruplò brevioribus.

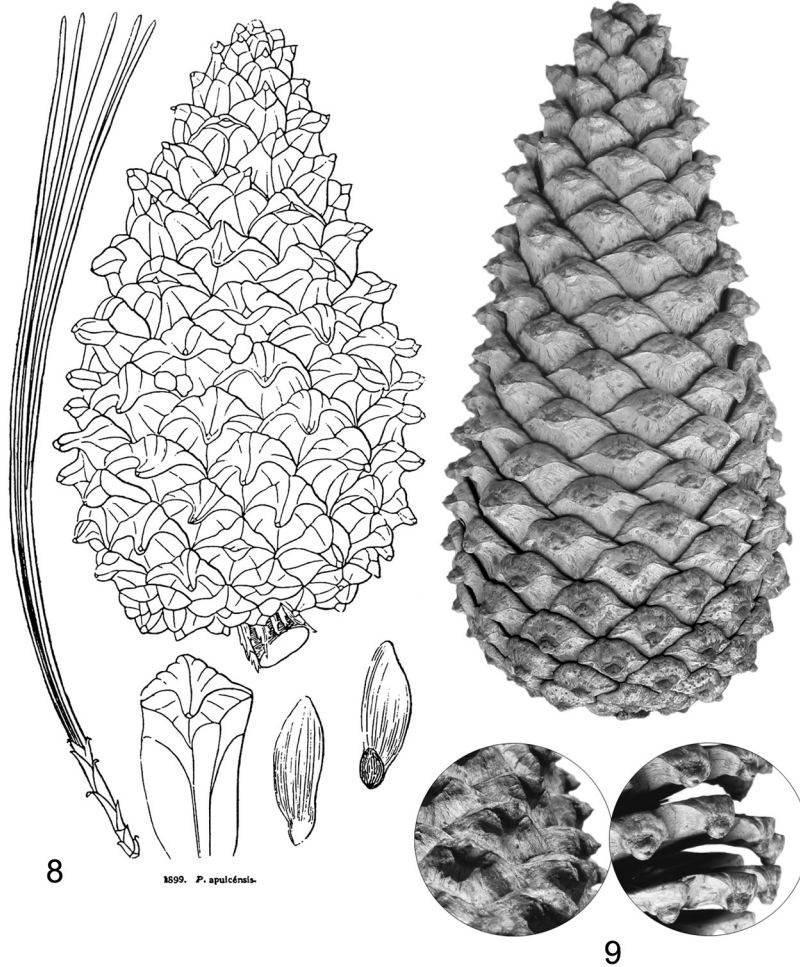
The short leaves and very glaucous shoots distinguish this, independently of the ovate cones, covered closely with pyramidal elevations, which are sometimes prolonged and contracted in the middle, especially those near the points of the cones. The leaves are not more than six inches long, the cones are about four inches long, and very regularly ovate. Mr. Hartweg found it in ravines near Apulco growing fifty feet high.

Fig. 7. The original descriptions of *P. pseudostrobus* and *P. apulcensis* as appeared in Lindley 1839, pages 63 and 64

1014 ARBORETUM ET FRUTICETUM BRITANNICUM.

† 48. *P. APULCENSIS* Lindl. The Apulco Pine.

Identification. Lindl. in Bot. Reg. M. Chron., 1839, No. 100.
Synonymy. *P. acapulcensis* G. Don in *Sweet's Hort. Brit.* ed. 3, p. 769.
Engravings. Our figs. 1899, 1900, from specimens sent home by Hartweg.



Figs 8–9. The illustration of *Pinus apulcensis* Lindl. as figured in Loudon, 1842 (Fig. 8), and a closed cone of the “Apulco Ravine Pine” (Fig. 9, DAP #69865a, collected in the ravine on April 3, 1994) and details of the same cone closed (wet, on left) and open (dry, on right) in comparison with Loudon’s drawing

DISCUSSION

The interpretation of Shaw, Martínez, and Stead and Styles

George Russell Shaw, in his 1909 work “The pines of Mexico”, made a new combination for Lindley’s Apulco Pine: *Pinus pseudostrobus* var. *apulcensis*. Though Shaw based his new combination on Lindley’s taxon (presumably the brief description and Loudon’s interpretation and drawing), he described and illustrated the cone variation of the taxon with two specimens from Oaxaca and one from México (state), which are quite unlike any pine that occurs in the Apulco ravine (SHAW 1909). Considering his intention to present extreme variability (in his interpretation) of this pine one can logically conclude that Shaw had never seen the real “Apulco Pine”, otherwise he certainly would have illustrated that one and not represented it by the Oaxaca and México specimens, which are very unlike the most common and typical cone types – conical to ovoid with mostly more or less flat scales – of the pine occurring in the Apulco ravine.

Maximino Martínez, in his 1948 work “Los Pinos Mexicanos”, realised the contradiction of the morphology of the “Apulco Ravine Pine” and the cones figured in Shaw’s work and rejected Shaw’s interpretation. Martínez thus described a new taxon, “*Pinus pseudostrobus oaxacana* Martínez (*comb. nova*) = *P. pseudostrobus* var. *apulcensis* Shaw. (Pines of Mex. 19.1909.)”, pointing out that Shaw’s description and cited specimens were very different from the pine that corresponds to Lindley’s description and that indeed grows in the ravine (MARTÍNEZ 1948). Unfortunately, Martínez failed to provide a Latin diagnosis for *P. p.* (var.) *oaxacana*, an oversight remedied in 1958 by Nicholas Mirov, who added the Latin description and designated Nelson’s specimen No. 985 from La Parada, Oaxaca (illustrated by Shaw under “8”) (Fig. 10) (MIROV 1958), as the type while elevating the taxon to species rank (*P. oaxacana* Mirov). As so circumscribed, this taxon occurs in México (state), Puebla, Veracruz, Guerrero, Oaxaca, and Chiapas to Honduras and El Salvador (Fig. 19). Martínez interpreted Lindley’s taxon as the one growing in the Apulco ravine (thus the “Apulco Ravine Pine”) and reclassified it as a variety, “*Pinus pseudostrobus apulcensis* Martínez (*non Shaw*) *comb. nova* = *Pinus apulcensis* Lindley”. Although Martínez’s *Pinus pseudostrobus* (var.) *apulcensis* was based on Lindley’s *P. apulcensis* it is a later homonym of Shaw’s name and is thus treated under the International Code of Botanical Nomenclature as a second publication of the same name, and is illegitimate.

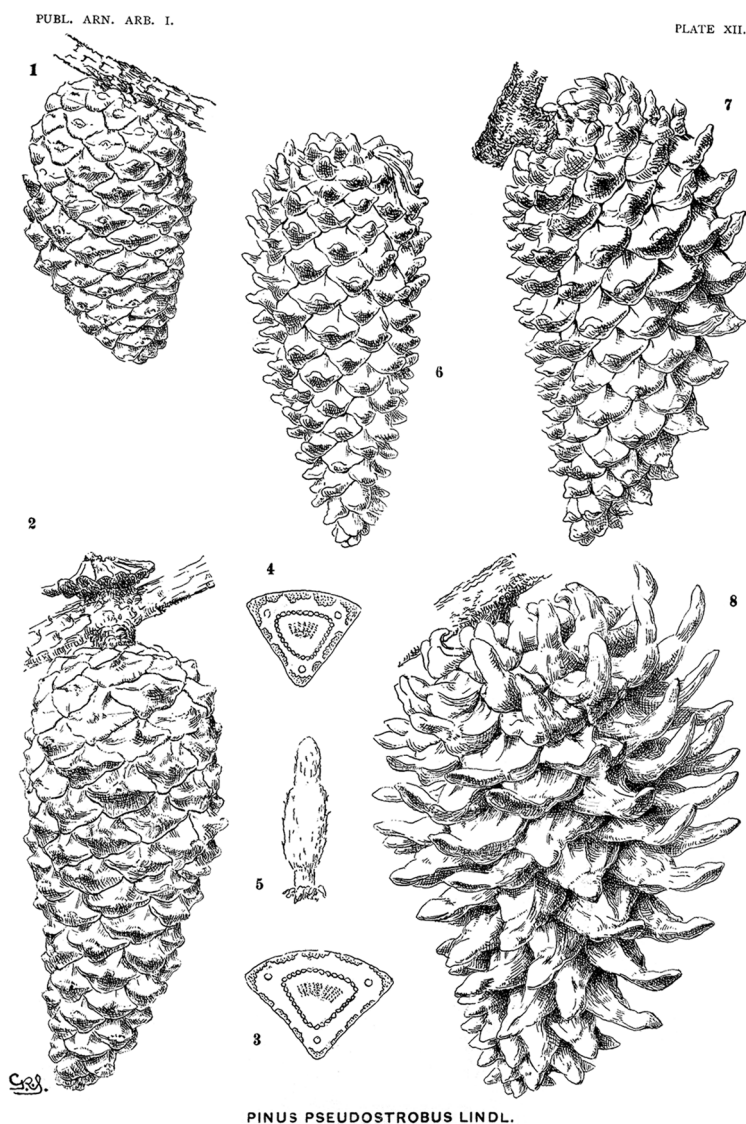


Fig. 10. The illustration of *Pinus pseudostrobus* in G. R. Shaw's "The Pines of Mexico", 1909, with the type variety *P. p.* var. *pseudostrobus* (1, 2) and *P. p.* var. *apulcensis* (6, 7, 8). Number 6 is the same as the type variety (a protuberant form, "f. *protuberans*" in Martínez) while #7 and #8 correspond to the taxon later named as *P. oaxacana* (see text). Cone collection data: 1) Shaw, Tres Marias Morelos; 2) Shaw, Contreras, México (state); 6) Pringle 8788, Eslava, México (Distrito Federal); 7) Nelson 2539, Miahuatlan, Oaxaca; 8) Nelson 985, La Parada, Oaxaca (the latter serving as the type of *P. oaxacana* Mirov)

Shaw had a broad-sense concept for several North American pines, a view that sometimes does not correspond to current practice. Thus, in his description of "*Pinus pseudostrobus oaxacana*" Martínez commented: "However, it should be noted that the variety described by Shaw is very different from *P. apulcensis* Lindl. It is also interesting to observe that no specimens from Apulco were mentioned, when the *apulcensis* variety was established, only ones from Oaxaca and Eslava, D. F. Finally, the variety described by Shaw does not exist in Eslava, only the form *protuberans* of *P. pseudostrobus* Lindl. Neither is it found in Apulco, only much farther south, especially in Oaxaca and contrarily, it is the abundance of the pine that Lindley called *Pinus apulcensis* that is notably different from the *oaxacana* variety. Consequently, as the variety *apulcensis* of Shaw does not exist in Apulco and it is different from *apulcensis* of Lindley, this cannot subsist and to correct this mix-up, *P. pseudostrobus* var. *oaxacana* is admissible." (Translation by Boone Hallberg, Rancho Teja, Ixtlán de Juárez, Oaxaca).

Though Martínez correctly considered the "Apulco Ravine Pine" to be a distinct taxon from Shaw's broad-sense application of Lindley's name (without the inclusion of the pine native to the Apulco ravine) the application of the epithet "*apulcensis*" has been confused ever since Shaw's 1909 publication. Martínez's circumscription of this taxon, however, has for decades been crystal clear for contemporary and succeeding botanists, including present authors; the pine in the Apulco ravine system is very common and distinctive (Figs 17, 18) and is neither *P. p.* var. *pseudostrobus* nor *P. (p.* var.) *oaxacana*, the latter of which is only native 120–140 km farther south, on the other side of the Sierra Volcánica Transversal. The only other pines in the vicinity of Apulco are the very different *P. patula* and *P. teocote*, which appear sporadically on the slopes above the ravine.

Although the pine growing in the ravine is in many aspects very similar to *P. (p.* var.) *oaxacana*, individuals with the less-typical "protuberant" cone types – that is, with scales that are "sometimes prolonged and contracted in the middle" (i.e. with raised apophyses; see type description above) – always occur among those with cones having flat apophyses. Cones of "Apulco Ravine Pine" with maximally "prolonged and contracted" apophyses are, however, comparable to the least protuberant cones of *P. oaxacana* (Fig. 16 C3 or F) and even then only in rare cases and randomly occurring, without geographical or other ecological consistency (interestingly, relatively most frequently

in Chiapas between Comitán de Domínguez and San Cristóbal de las Casas). *P. oaxacana* has hard cones typically with not only prolonged apophyses but umbos tapering to long claws (Figs 15, 16), thus the cones appear just like a smaller size ("tropical") *P. coulteri* as noted by Mirov in his 1958 description, also commenting that *P. oaxacana* has a biochemical (turpentine) composition very distinct from *P. pseudostrobus*. He also found that pines of Shaw's section *Macrocarpae* (including *P. coulteri*) are in this aspect closer to *P. oaxacana* than to *P. pseudostrobus*.

In their 1984 revision of the *Pseudostrobus* pines of Central America, J. W. Stead and Brian T. Styles considered the differences between the "Apulco Ravine Pine" and *Pinus oaxacana* Mirov significant enough to keep the taxa separately (though at different ranks), reaching a conclusion consistent with Martínez' classification (STEAD and STYLES 1984). As evidenced by the list of synonyms, Stead and Styles concluded that Shaw had an erroneous concept of Lindley's species in his "*P. pseudostrobus* var. *apulcensis*". They separated the "Apulco Ravine Pine" from Shaw's circumscription (which in fact referred to *P. oaxacana* and only indirectly – through Lindley's designation of the type location "in ravines near Apulco" – to the pine that is still there, thus the "Apulco Ravine Pine") and Stead classified it at subspecific rather than variety rank, as *P. p.* subsp. *apulcensis* (Lindl.) Stead.

Farjon's concept and its interpretation

In 1995 two cones labelled "*P. apulcensis* Lindl." of uncertain origin and date, reputedly representing Hartweg's collection, were found in the Natural History Museum of Vienna and designated by Aljos Farjon as lectotype of *Pinus apulcensis* Lindl. (Fig. 11a–c) (FARJON 1995, FARJON and STYLES 1997). Another cone with a small branch with needles labelled "*Pinus apulcensis*" and annotated as "Herb. George Gordon. Presented by Sir J. D. Hooker, Dec. 1878." (held at the Gray Herbarium, Harvard University) (Fig. 12) was designated by Farjon as isoelectotype. However, the isoelectotype specimen and the two lectotype cones have been examined by present authors and are a poor match in morphology to the pine of the Apulco ravine area and thus seem not to represent Hartweg's collection (DEBRECZY and RÁCZ 2011).

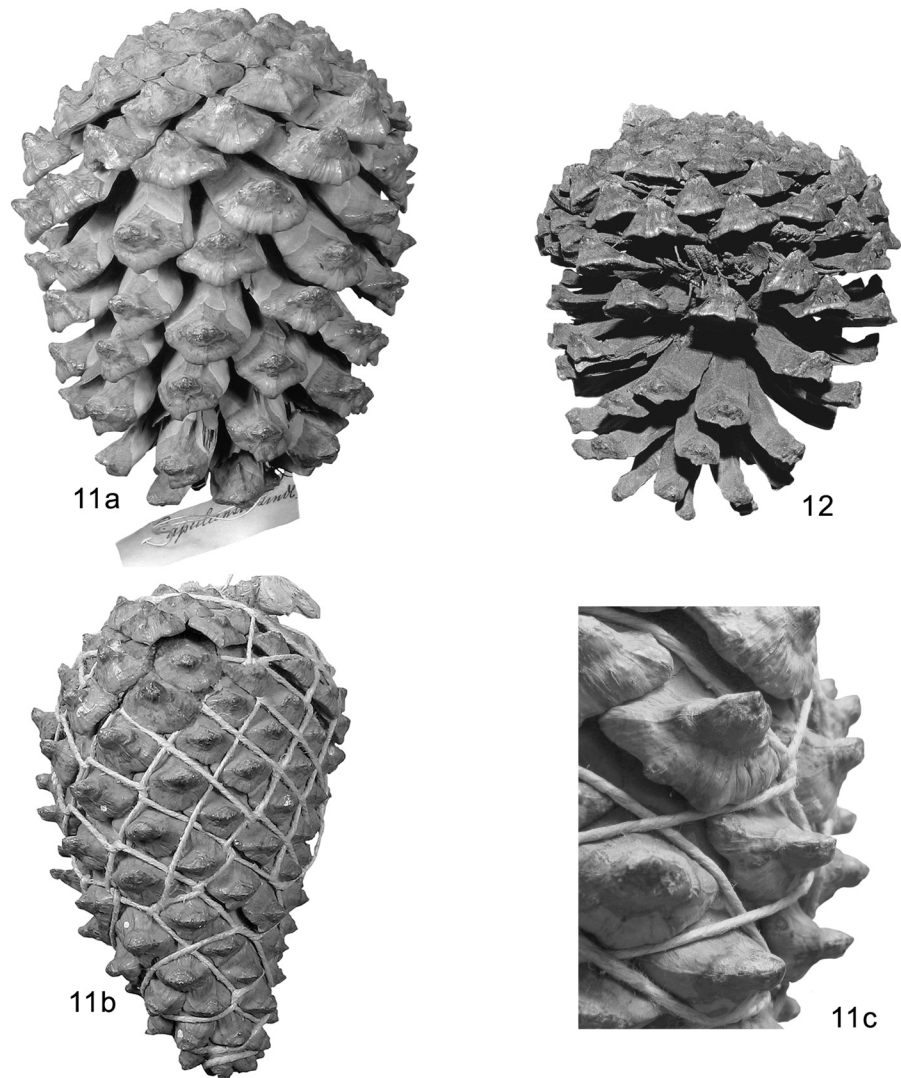


Fig. 11. The lectotype cones labelled *Pinus apulcensis* Lindl. (no collector, place, or date) in the herbarium of the Natural History Museum, Vienna, Austria. (On the cone photo labelled 11b part of the twine keeping the cone in closed state has been digitally removed for better visibility of the cone scales; 11c is a close-up of the cone in 11b). **Fig. 12.** Cone preserved at the Gray Herbarium of Harvard University, Cambridge, Massachusetts, US, designated as islectotype of *P. apulcensis* (no collector, place, or date); however, this cone is certainly from a different tree than that of the cones shown in 11a and 11b, well seen in its flatter basal part (vs. rounded in the Vienna cones), narrower cone-scales more triangular and pointed in facial view (vs. wider cone-scales with umbos protruding from flatter apophyses)

The resulting synonymy (= *P. oaxacana* Mirov) and circumscription of the taxon represented by these two cones, however, conflict with the field experiences of many (including present authors), who, despite thorough searches have been unable to locate a pine represented by the "lectotype" and "isolectotype" in the Apulco region and adjacent areas, even though the ravines around Apulco were historically densely forested and well preserved by the local people. Despite a 1947 report by E. E. M. Loock that the area was "heavily exploited some years ago with the result that no large trees remain today" (LOOCK 1950), there is no indication of prior overall clearing nor is there any evidence that a pine with cones matching the (lectotypified) Vienna cones ever occurred in the region. These ravines are quite steep and heavily forested, and, according to the local people the forest in the village area has evidently for centuries only been partly cut, and kept mainly to prevent soil erosion – necessary for a village that is built along the sides of a deep ravine exposed to rain runoff and landslides. The ravine and immediate surrounding area are thickly forested with a *Pseudostrobus* pine (the "Apulco Ravine Pine") having cones quite different from the *P. apulcensis* lectotype cones. In 2007, an associate of present authors in Mexico showed cones of *P. oaxacana* (sensu Mirov) from Oaxaca to foresters around Apulco, who said that they never saw trees with such cones in the area, adding that they still distinguish the local pine as *P. pseudostrobus* var. *apulcensis* (Lindl.) Martínez (B. Hallberg, pers. comm.).

Stead and Styles work was undone by this 1995 lectotypification and accompanying synonymy, which followed Shaw's circumscription, thus treating *P. oaxacana* as synonymous with *P. pseudostrobus* var. *apulcensis* (Lindl.) Shaw, and also had the effect that *P. p.* subsp. *apulcensis* (Lindl.) Stead became synonymous with Shaw's variety. Thus Stead's name, which was meant to more strongly separate the "Apulco Ravine Pine" from *P. oaxacana*, with the 1995 lectotypification retroactively happened to support just the opposite.

Hartweg and *Pinus apulcensis*

Discoveries of conifers (as well as other groups of plants) are typically the result of adventurous explorations, in which botany is blended with cultural and political history. Hartweg's field work not only takes us back to an interesting era of Mexican plant exploration, but also puts his collecting

trips and his shipments of seeds, plants, and herbarium specimens to England (his last shipment containing the pines for Lindley's 1839 descriptions) into a clearer geographical and temporal context.

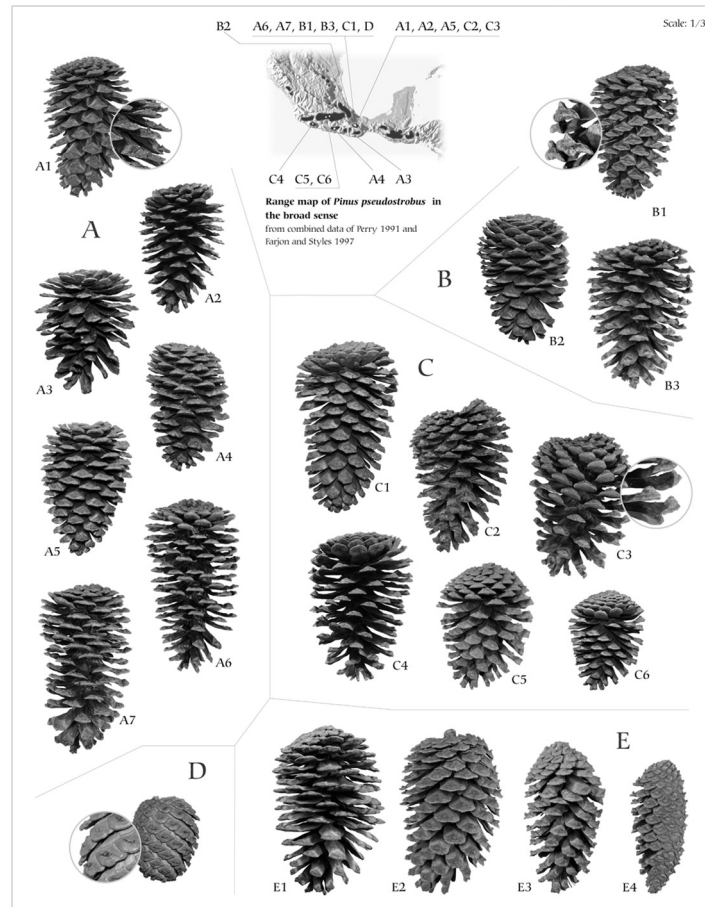
The Apulco pine story started with Carl Theodor Hartweg, a well-educated botanist born into a German horticultural dynasty, who was sent to Mexico by the London Horticultural Society (later the Royal Horticultural Society) to collect plants mainly for cultivation for ornamental use and for herbaria for scientific documentation. Arriving in Mexico in December 1836, Hartweg travelled for nine years in North and Central America, the northern Andes, and Jamaica and sent over 2,200 plant species and hundreds of boxes of living plants and herbarium specimens to London. His first trips led him to explore the northern part of central Mexico (Fig. 5) until he eventually reached the mining town of Angangueo, Michoacán, on August 24, 1838 and found the area rich enough to spend time there collecting. From there he made a long trip to Hidalgo to stay at the invitation of Karl August Ehrenberg (1801–1849), a German mining employee and naturalist living in Real del Monte (today known as Mineral del Monte). After almost a month of travel, he arrived there at the end of September, 1838, and also finding this area to be very rich, started collecting trips in the region to many places including Apulco, about 40 km northeast of Real del Monte. As his contract was about to expire, and the political situation in Mexico was very unstable, Hartweg wrote to the LHS for advice as to whether he should stay in Mexico any longer. He thus remained in Hidalgo until he finally received instructions from the LHS to leave Mexico for the then more peaceful Guatemala, sending 10 boxes of living plants to England before leaving Real del Monte on February 2, 1839. He went back to Angangueo, Michoacán to collect seeds of pines – at the very location, where he first found the pine later described as *Pinus pseudostrobus* by Lindley – since these were not yet mature when he had left that area in late September, 1838 (MCVAUGH 1970).

Hartweg arrived in Mexico City on February 20, 1839, and left for Guatemala through Puebla and Oaxaca on March 2, 1839, arriving in Oaxaca (city) on the 18th. As overland travel was still dangerous, he spent five months exploring the region while waiting for an opportunity to travel by sea to Guatemala. No pines were collected or sent to England from this section of the trip as he focused on orchids and other ornamental plants as per to the wishes of the Society.



Fig. 13. Details of external morphology in *Pinus pseudostrobus* (habit, foliage, closed and open cones, bark) with individuals considered closest to the type variety of the species

APPENDIX

THE "APULCO RAVINE PINE" XII
Pinus pseudostrobus: Cone Variability

APPENDIX

1031

Fig. 14. Cone morphological variability with a corresponding range map of *Pinus pseudostrobus* Lindl. as illustrated in DEBRECZY and RÁCZ (2011), page 1031. A) "Flat-scaled" forms from Guerrero, Michoacán, and Oaxaca; B) "protuberant" forms (also known as *P. p.* var. *pseudostrobus* f. *protuberans*) from Oaxaca; C) forms with raised apophyses and protruding umbos from Guerrero, Michoacán, and Oaxaca; D) form with small subglobose cone from Oaxaca (morphologically similar to what was described as *P. p.* var. *coatepecensis*); E) examples of "historical collections" to demonstrate variability of *P. pseudostrobus* originally collected and distributed under different names but now considered as *P. pseudostrobus* (E1: *P. rinzii* Roehl #80; E2: *P. protuberans* Roehl #36; E3: *P. heteromorpha* Roehl #71; E4: *P. pseudostrobus* var. *apulcensis* Pringle #13262, "Esclava, Valley of Mexico, 7800 ft.", Sept. 2. 1904)

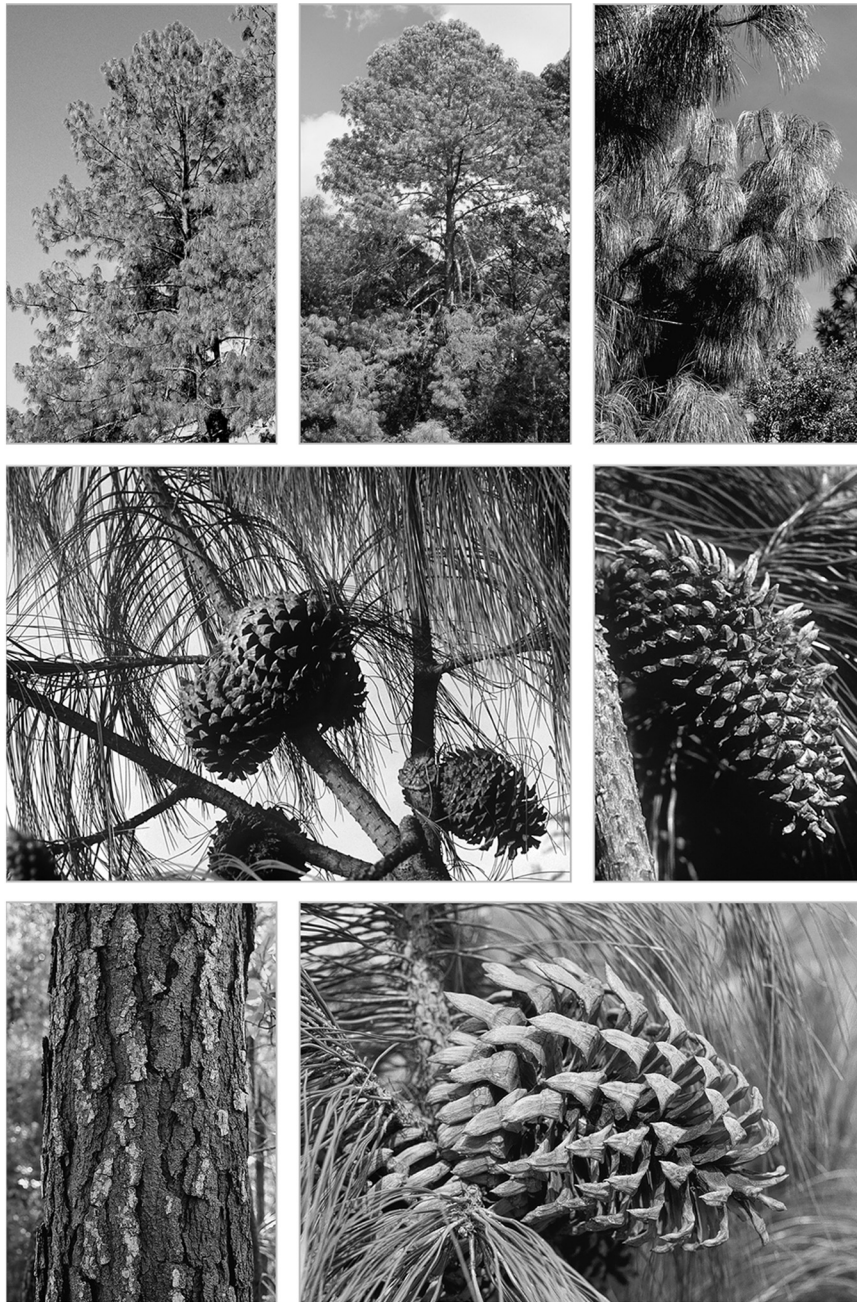
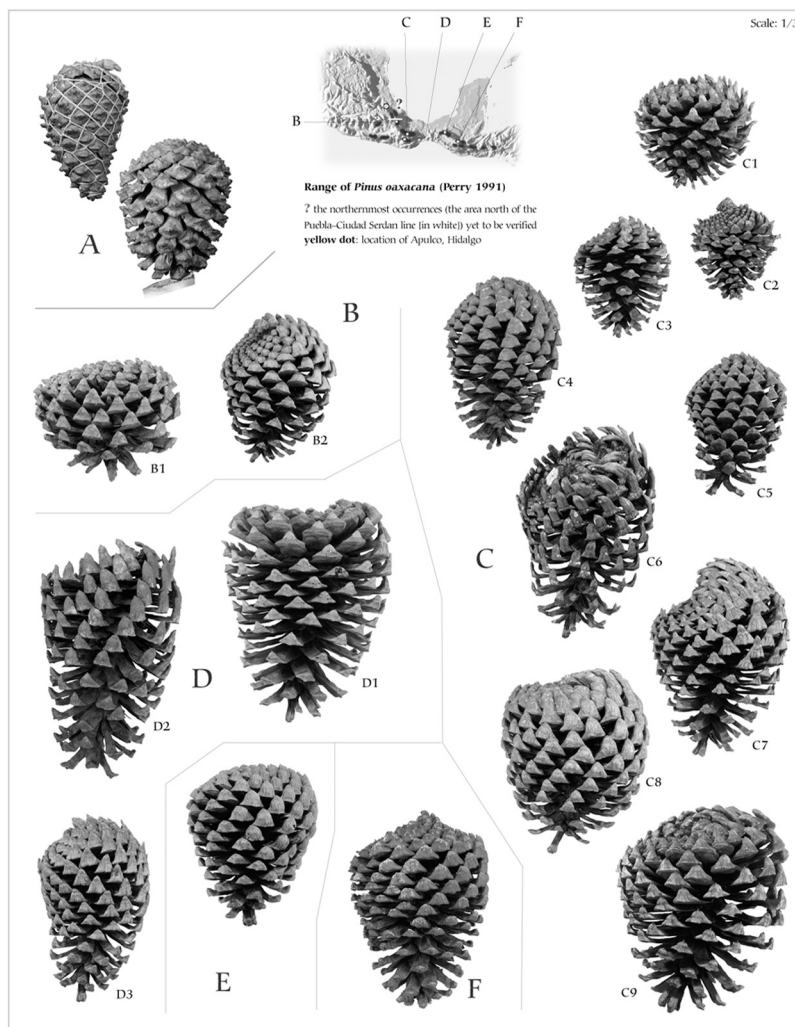


Fig. 15. Details of external morphology in *Pinus oaxacana* (habit, foliage, closed and open cones, bark)

APPENDIX

THE "APULCO RAVINE PINE" X
Pinus oaxacana: Cone Variability

APPENDIX

1029

Fig. 16. Cone morphological variability with a corresponding range map of *Pinus oaxacana* Mirov as illustrated in DEBRECZY and RÁCZ (2011), page 1029, and under "A", in comparison with the two cones designated by A. Farjon as lectotype material of *P. apulcensis* Lindl. Cones of *P. oaxacana* from B) Puebla, C and D) Oaxaca (C, Sierra de Juárez; D, Sierra Madre del Sur), E) Chiapas, and F) Guatemala

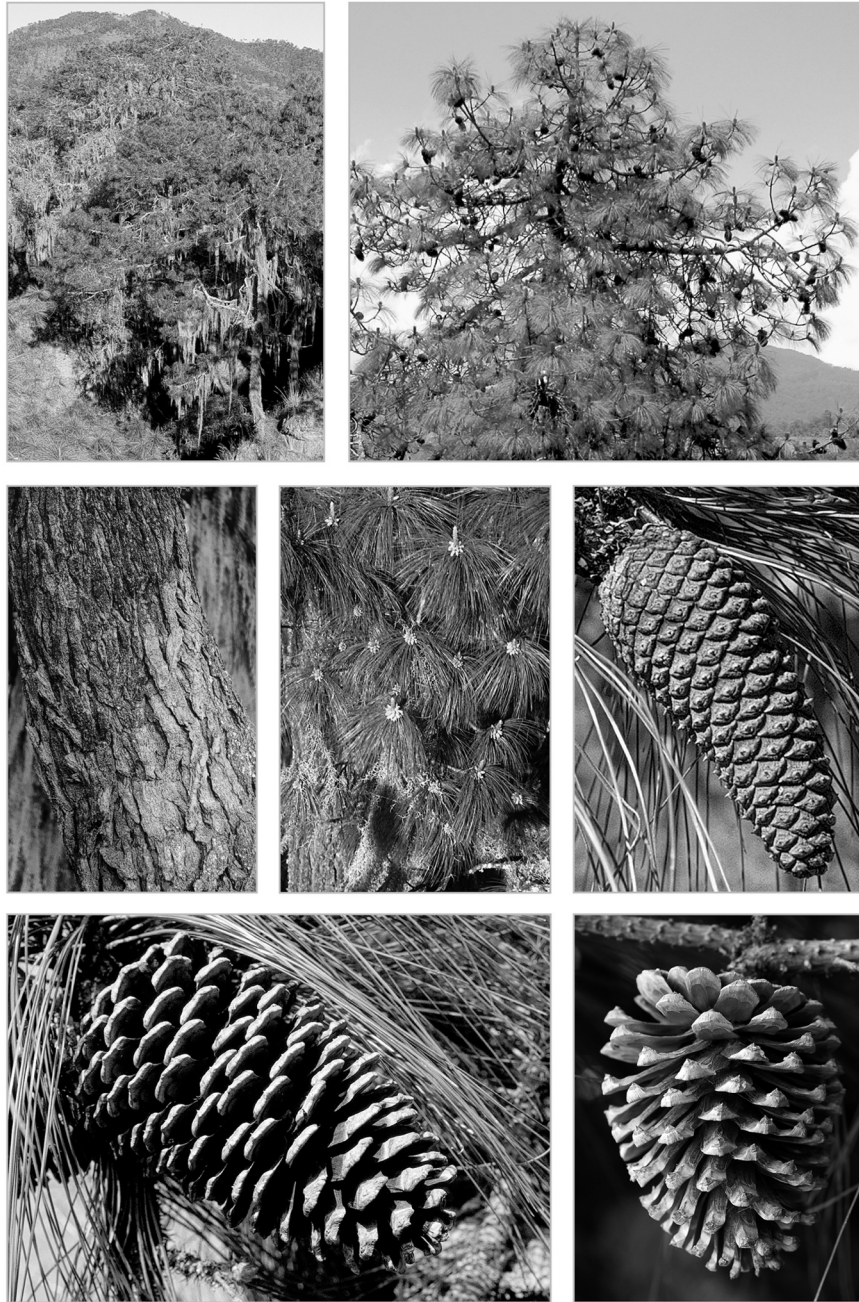


Fig. 17. Details of external morphology in the "Apulco Ravine Pine" (habit, foliage, closed and open cones, bark)

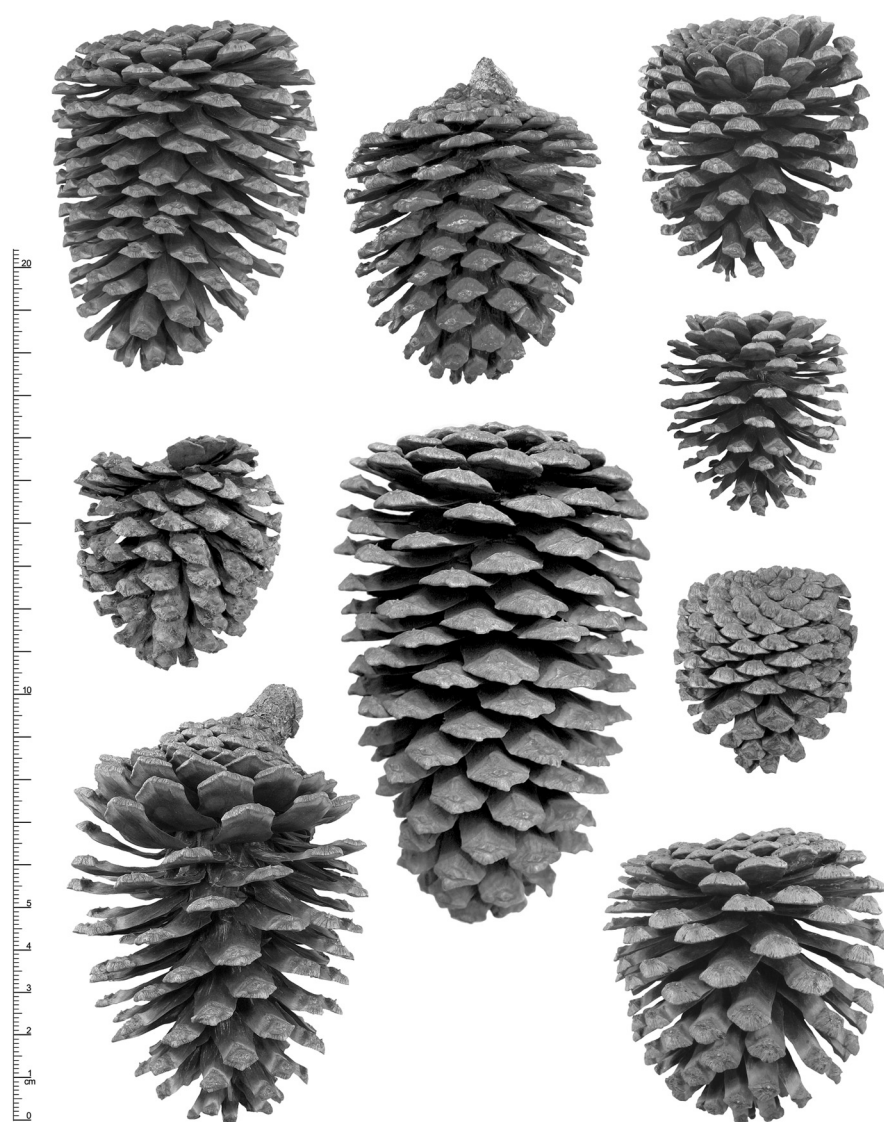


Fig. 18. Cone variability of the “Apulco Ravine Pine” as documented during a single collecting day in the ravine on April 3, 1994. Scale in centimetres (0–20 cm). The cones fall without stalks and basal scales but open cones remain on the tree for up to 3 years; the cones are either large (< 16.5 cm) or small to medium (< 10 cm); cone-scales can be flat or elevated/raised, both with barely or strongly protruding umbos

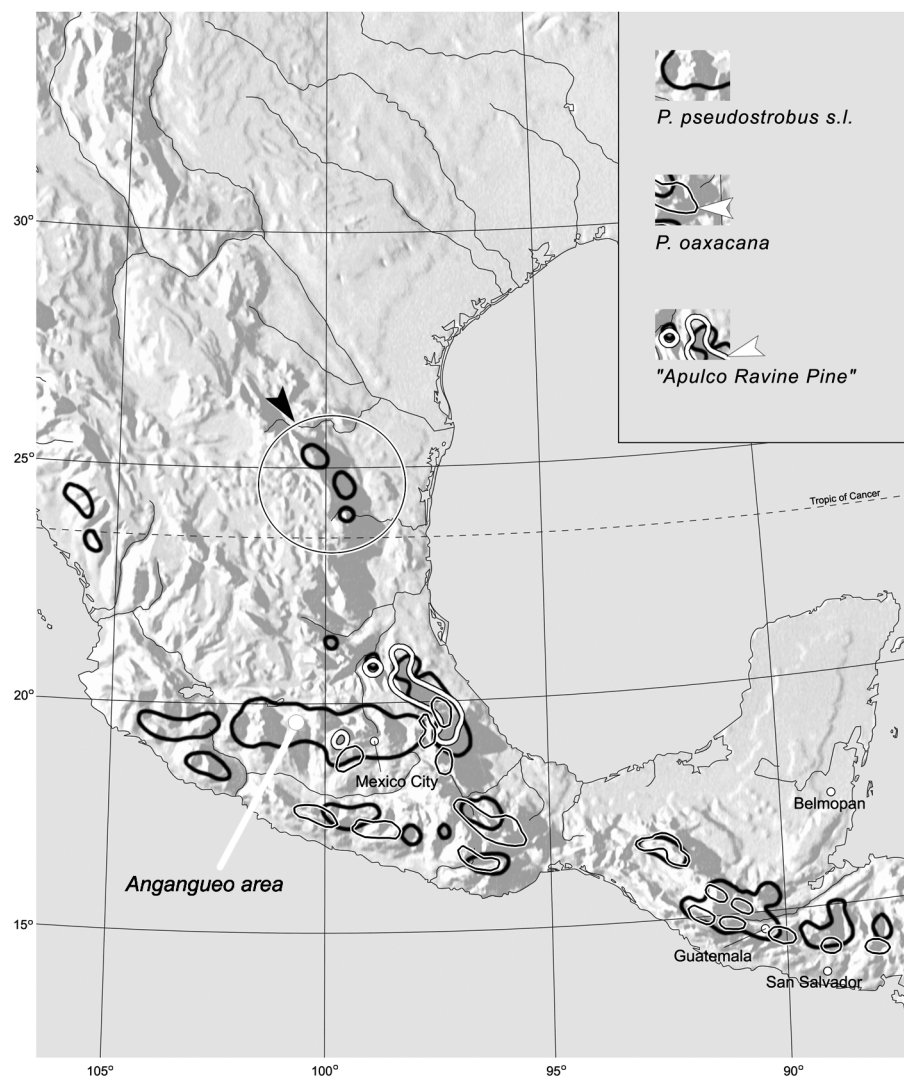


Fig. 19. Distribution of pine taxa discussed in the article. For *Pinus pseudostrobus* the range is combined after PERRY (1991) and FARJON and STYLES (1997), with the westernmost occurrences only given by the latter, while the northernmost ones are treated as *P. estevezii* by PERRY (1991) (as well as in DEBRECZY and RÁCZ 2011). The ranges of *P. oaxacana*, and that of the "Apulco Ravine Pine", are given after PERRY (1991)

The critical part of his trip in relation to the Apulco Ravine pine story was short: October 1938 to February 1939. Seeing the contradiction of the pine that grew in the Apulco ravines and the one that was later named *P. oaxacana*, there are several interesting questions to be raised (and solved).

A) Hartweg's return to Angangueo and his collection there was recorded as February 17, 1839. Afterward, he left the Mexico City area on March 2 via Puebla and Tehuacán and arrived in Oaxaca City on March 18 with the intention to continue to Guatemala by sea. Viewing these travels from the aspect of *P. apulcensis*, his short detour to Angangueo for seeds of *P. pseudostrobus* – still not mature when he left the area – clearly indicates that he did not consider the “Apulco Ravine Pine” to be the same as the taxon that he collected in Angangueo and which soon became known as *P. pseudostrobus* (var. *pseudostrobus*) (Figs 13, 14, 19); otherwise why would he make a long, risky trip from Hidalgo to Michoacán when the same pine was relatively near his accommodations in Real del Monte?

B) Supposing that in the densely forested Apulco ravine there were individuals that were later named by Lindley as *P. apulcensis* (thus, in the sense of Farjon 1995, “*P. oaxacana* Mirov”), then Hartweg either would have considered the flat-scaled specimens within the variability of the taxon with elevated apophyses and claw-like umbos (which would later be described as *P. oaxacana*) and then surely would have enclosed both flat-scaled and long-protuberant specimens as well or at least commented on them, or had he considered the pines of the ravine to be identical with the Angangueo pine (soon named *P. pseudostrobus* as noted above) his February 1939 trip to Angangueo was barely understandable. One should believe that the cone he picked up from the Apulco forest floor was a rather protuberant type of the pine of the ravine; that is, he did not select one that is the least interesting, yet was just protuberant enough to mislead Shaw when he interpreted it as a natural variation of a more southern pine which – a half century later – became widely known as *P. oaxacana*.

C) Had Hartweg found a pine equivalent to what later became *P. oaxacana* in the Apulco ravine, he would surely not be satisfied with the least-protuberant cones of that pine taxon, but would explore it further as a distinct and unique pine among other trees, which he (then) might have considered identical with the (then unnamed) *P. pseudostrobus*.

D) If he would have found (the pine that was later known as) *P. oaxacana* in the ravine, he would have certainly noticed that there is another large-coned pine with similar foliage but flat cone-scales and would have collected some and sent it for comparison, or would have noted that some cone-scales were flat and others protuberant.

If someone today travels along the route Hartweg took from Mexico City toward Oaxaca (his aim being Guatemala), they would see – during long climbs either through the mountains in central Puebla or above the dry valley of Tehuacán – that the extensive “encinar y pinar” zone is dominated by a pine long known as *P. oaxacana* Mirov (Figs 15, 16) (DEBRECZY and RÁCZ 2000, 2011, MIROV 1967, PERRY 1991). In the commonly seen forms the cones are strongly asymmetrical (not ovate as stated by Lindley for the Apulco pine), the apophyses always raised/protuberant and at the umbo’s distal end, particularly on the cone’s dorsal (outer) side, the claw-like umbos are almost a straight continuation of the apophyses (rather than “medially constricted” as Lindley characterised his *P. apulcensis*, referring to short umbos in the middle of the apophyses). These cones are almost like smaller *P. coulteri* cones, and with the shiny, smooth, very hard texture so typical for this pine it is almost impossible that someone with even the slightest interest in conifers would not collect or select at least a few of them. Hartweg travelled extensively across the Sierra Norte de Oaxaca to Villa Alta and Veracruz and his route led through the best stands of the pine now known as *P. oaxacana*. One wonders how it is possible that he did not have any interest in this pine with long claw-like apophyses and umbos if he earlier (reputedly) collected it (even if with minor protuberations in Apulco, Hidalgo). Hartweg travelled from March to mid-April and again, travelled through the best *P. oaxacana* areas with cones with the longest apophyses, yet apparently this unique pine was not even mentioned in his letters nor collected.

CONCLUSIONS

Based on present authors’ extensive field research and on the logistics of possible errors in collecting and recording the specimens now serving as the lectotype of *P. apulcensis* Lindl., the confusing cone lectotype and isolecotype of *Pinus apulcensis* Lindl. seem inappropriate and should be rejected.

The concept of *P. oaxacana* Mirov is based on the thorough research of MARTÍNEZ (1948), continued by MIROV (1958), Jesse P. PERRY Jr. (1991), STEAD and STYLES (1984), and others, including present authors, thus the name *P. oaxacana* Mirov, a well-established and still widely applied name for a well-circumscribed taxon, one of Mexico's most distinct pines, is restored.

In the Apulco ravine there are many trees with cones that perfectly match Lindley's description and also Loudon's drawing; however, the cone described by Lindley and drawn by Loudon is not, as illustrated by Shaw, a typical cone of the taxon. Rather, Lindley's description and Loudon's drawing were of a cone with the maximum apophysis protuberance that occurs in the "Apulco Ravine Pine". Despite the present confusion with the name *P. apulcensis*, authors suggest restoring *P. apulcensis* Lindley (non Shaw) and designating a neotype selected from the herbarium of the Instituto Politecnico (where most of Martínez's material is deposited) that was collected in the Apulco ravine area. If later research shows that the "Apulco Ravine Pine" is indeed a variety of *P. pseudostrobus* (which is doubted by present authors) the combination of *P. pseudostrobus* var. *apulcensis* (Lindl.) Shaw should not be used since Shaw's circumscription did not seem to include the pine that Hartweg collected and Lindley named (DEBRECZY and RÁCZ 2011).

The "Apulco Ravine Pine" may be an ecogeographical variety of *P. estevezii* equivalent to *P. pseudostrobus* var. *apulcensis* sensu Martínez (an invalid name), but is in need of further study to show distinctness across its geographical range.

* * *

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