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Ocotea heribertoi (LAURACEAE), A NEW SPECIES OF RAIN FOREST CANOPY TREE FROM THE ISTHMUS OF TEHUANTEPEC, MEXICO

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Abstract: *Ocotea heribertoi* is a remarkable new species from very high precipitation rain forests of the Chimalapa-Uxpanapa region of the Isthmus of Tehuantepec in Oaxaca and Veracruz, Mexico. It sports the largest known globose fruit within this large genus, borne in an unusual cupule, while the combination of vegetative and floral features indicate that it is apparently not closely related to any described species.

Resumen: Se describe como nueva para la ciencia la especie *Ocotea heribertoi*, una especie notable de las selvas pluviales de la región de Chimalapa-Uxpanapa del Istmo de Tehuantepec en Oaxaca y Veracruz, México. Se destaca por tener el fruto globoso más grande conocido en el género naciendo de una cúpula extraordinaria, mientras que la combinación de características vegetativas y florales sugiere que la especie nueva no encuentra taxones muy afines entre las especies ya descritas.

Keywords: *Ocotea*, Lauraceae, Chimalapa, Uxpanapa, Flora of Mexico

Recent field work in and around the previously unexplored Sierra de Tres Picos in the Chimalapa region of the Isthmus of Tehuantepec in Oaxaca, Mexico, has yielded a number of new species. One of the most striking comes from the very high precipitation rain forests at the north foot of the range.

Ocotea heribertoi T. Wendt sp. nov. (Figs. 1–3).

TYPE: MEXICO: OAXACA: Mpio. Sta. María Chimalapa: Upper part of valley of Arroyo Garrobo, ca. 5 km straight-line SE of Rancho Alegre, Veracruz, ca. 15 km straight-line SSE of La Laguna, Veracruz, lower N slopes of the Sierra de Tres Picos; 17°08'55"N, 94°28'21"W, elev. 210–260 m, 14 April 1996, *T. Wendt, H. Hernández G., P. Tenorio & E. Torres 6871* (holotype, MEXU; isotypes, CHAPA, HBG, LSU, MO, TEX, XAL).

Arbor usque ad 40 m alta. Folia alterna, laminae oblongo-obovatae 7.0–15.5 cm longae 2.3–5.0 cm latae 2.5–4.5-plo longiores quam latiores, apice rotundatae usque rotundato-acutae, basi anguste acutae usque cuneatae; nervi laterales utroque costae latere 6–11, venatio tertiaria pagina superiore plana indistincta; pagina superior folii glabra; pagina inferior folii juvenalis sparsim strigillosa folii vetustioris glabrata, plerumque domatiis superficiaribus albobarbatis in angulis inter costam et nervos laterales sed non ad axilis locatis (ab costa 1.0–2.5 mm ab nervis lateralibus ca. 1 mm distantibus) praedita; petioli 8–22 mm longi. Inflorescentiae (pedunculo incluso) 2–7 cm longae pauciramosae foliis breviores; axes strigillosi; pedicelli 1.5–4.0 mm longi. Flores bisexuales 2.6–4.5 mm diam. Tepala 6 erecta vel ascendentia 1.5–2.3 mm longa strigillosa (pili aciculares 0.1–0.2 mm longi pro parte maxima, in paginis adaxialibus densius, in paginis adaxialibus tepalorum interiorum densissime), margine apicem versus papilloso. Tubus floris 1.0–1.5 mm longus extra strigillosus intra orem versus dense strigillosus. Stamina 9, 4-locellata; stamina exteriora 6, 1.0–1.5 mm longa, filamentis strigillosis, antheris ovato-oblongis filamenta aequantibus vel superantibus, thecarum paribus inferioribus sub paribus superioribus oblique dispositis; stamina interiora 3, 1.5–1.8 mm longa, filamentis strigillosis antheras plus minusve aequantibus, glandibus sessilibus ca. 0.5 mm diam.; staminodia 3, 0.7–1.0 longa strigillosa linearia vel a medio ad apicem incrassata et acuta; ovarium glabrum. Fructus globosus 3.5–4.5 cm diam., carne usque ad 1.2 cm crassa; cupula 3.5–4.5 cm diam. valde tuberculata; pedicellus

FIG. 1. Buttresses and lower trunk of *Ocotea heribertoi*, with Heriberto Hernández González.

apicem versus non inspissatus; semen 1.7–2.3 cm diam., carne cotyledonum laete rosea.

TREES to 40 m, diam. above buttresses to 90 cm; buttresses medium-sized but well developed; unweathered bark cream (bronze in smaller trees) with abundant spaced darker warts often more or less in vertical rows, in parts with darker exfoliating thick scales a few inches across; slash of bark aromatic, ca. 1 cm thick, in large trees pale to medium cinnamon-colored with fine vertical orange short lines (these not prominent), quickly oxidizing through a medium orange-brown to a medium chocolate-brown; sapwood yellowish-cream. YOUNG TWIGS smooth, sparsely to densely strigillose with distally-directed hairs to 0.1 mm long, usually soon glabrate, 1.5–3 mm thick, lightly ridged below petiole insertions; apical bud 3–5 mm long, lanceolate, densely minutely pale golden-silver sericeous; axillary buds of vigorous shoots with similar vestiture, lanceolate, laterally flattened, minute to 2.5 mm; older twigs grey, smooth to irregular, shiny where

FIG. 2. Section of fruit and cupule of *Ocotea heribertoi* (from the type collection).

smooth. LEAVES alternate, more or less crowded at branchlet tips; blades of canopy leaves oblong to obovate or narrowly so, mostly 7.0–15.5 cm long, 2.3–5.0 cm wide, some leaves smaller, mostly 2.5–4.5 times as long as wide, firmly membranaceous to moderately thick, dark green above, much paler beneath, distally rounded to rounded-acute or a few leaves with a very short broad blunt drip-tip, the base narrowly acute to cuneate and lightly decurrent on petiole as two adaxial ridgelets; midvein prominently raised below, prominent but only slightly raised to slightly sunken above, other venation essentially plane to raised below, mostly slightly sunken and obscure above, laterals 6–11 pairs, opposite to alternate, diverging at 35–60° or a few basal pairs more spreading, roughly evenly spaced or slightly more crowded basally, eucamptodromous or partly subbrochidodromous, tertiary venation more or less transverse between laterals; adaxial surface glabrous, abaxial surface at first sparsely strigillose with distally-directed hairs to 0.2 mm, soon glabrate; some but not all blades with 1–12 adaxial superficial densely white-barbate roughly circular domatia mostly in the basal half, in angles between midvein and lateral but 1.0–2.5 mm from former and generally <1 mm from latter, 1–2/angle, usually more obvious in young leaves; petioles 8–22 mm long, adaxially plane to caniculate, abaxially strigillose like blade and soon glabrate.

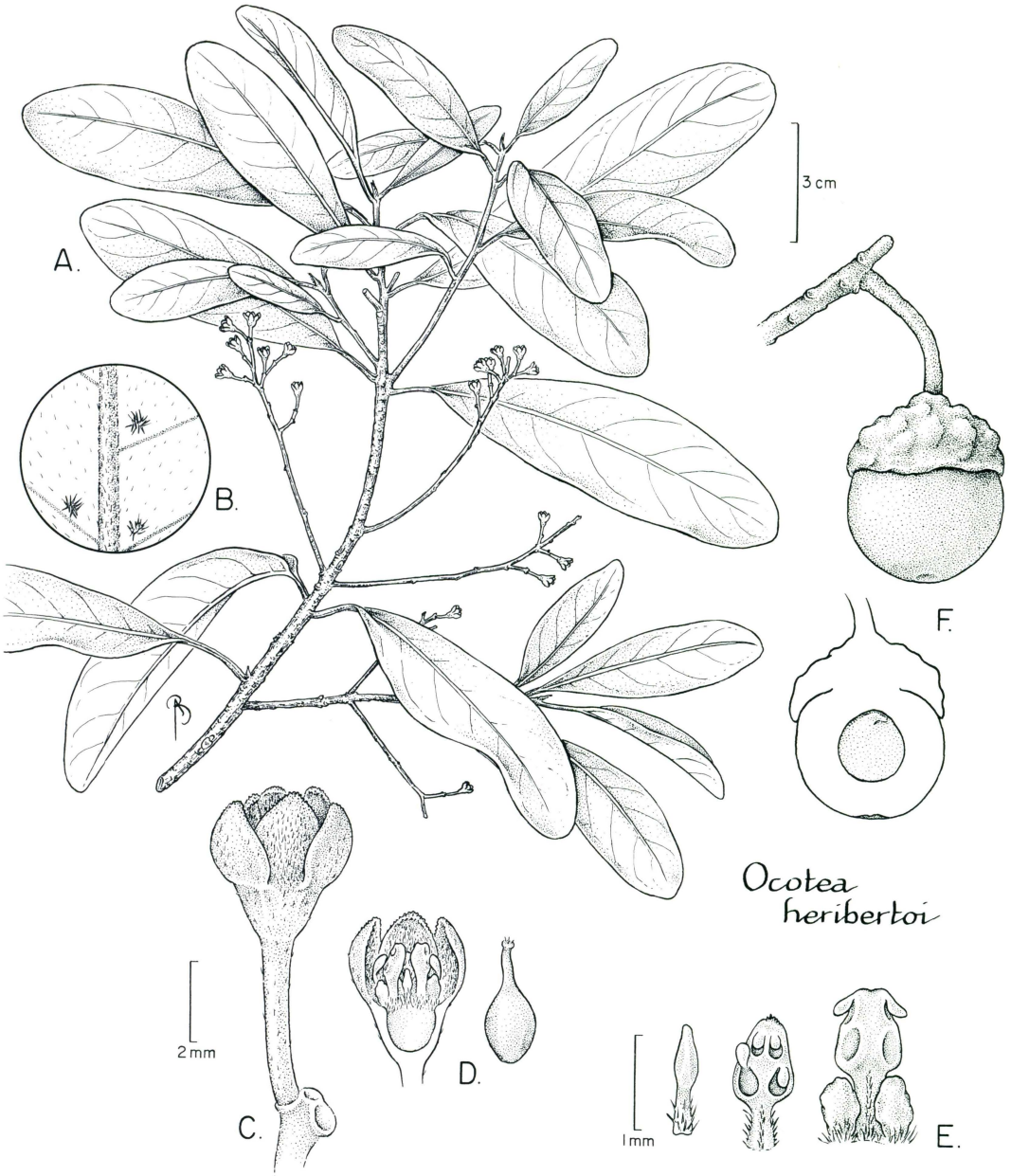

FIG. 3. *Ocotea heribertoi.* A. Branchlet with post-anthetic inflorescences. B. Magnification of lower surface of young leaf, showing barbate domatia. C–E. Post-anthetic flower with details: C, Flower; D, Longitudinal section of flower with already-enlarging ovary removed to right; E, left to right, staminode (abaxial view), first whorl stamen (adaxial view), third whorl stamen with basal glands (abaxial view). F. Fruit and cupule, with schematic section below, at scale of A.

INFLORESCENCE COMPLEX formed by a group of usually 2–6 lateral inflorescences each arising from the axil of a subapical soon-deciduous scale-leaf before leaf flush, becoming a grouped set of lateral inflorescences below present and above previous

flush of leaves; individual inflorescence a panicle of irregularly cymose branches, 2–7 cm long including a peduncle one-third or more the length, shorter than leaves, longer than broad, the definite central axis usually with short ascending branches, these 1-few flowered, often once(twice)-rebranched, essentially dichasial but some buds often suppressed and thus the pattern irregular; axes unevenly sparsely strigillose, near the flowers more densely so and with many hairs irregularly ascending; bracts lanceolate, ca. 1 mm, pubescent like pedicels, quickly deciduous; pedicels 1.5–4.0 mm, stout, sparsely to moderately densely strigillose-puberulent. FLOWERS (description based on post-anthetic material) bisexual, 2.6–4.5 mm diam.; tepals erect to ascending, 1.5–2.3 mm long, outer 3 ovate-deltate with broadly acute tip, inner 3 slightly larger and broadly elliptic with rounded to broadly acute tip, all papillose-thickened around the distal margin and strigillose (hairs acicular, mostly 0.1–0.2 mm) more densely adaxially than abaxially, inner tepals more densely strigillose than outer, adaxial surface of inner tepals very densely so; floral tube urceolate, 1.0–1.5 mm long, strigillose externally, within densely so at tepal and filament bases, otherwise sparsely. Outer 6 stamens 1.0–1.5 mm long, filaments equalling or shorter than anthers, broad, strigillose; anthers ovate-oblong, tip broadly rounded-truncate to emarginate, lightly strigillose up center of abaxial surface, generally with a quite obscure and irregular tuft of papillae at tip, lower pair of thecae below and slightly obliquely to sides of upper pair; inner 3 stamens 1.5–1.8 mm long, filaments ca. equal to anthers, strigillose, basal glands sessile, ca. 0.5 mm; staminodes 0.7–1.0 mm, linear or distally thickened and acute, strigillose. OVARY glabrous, style ca. 1 mm. FRUIT borne on a stout peduncle/petiole from naked branchlets, spherical with a small but prominent apical depression, 3.5–4.5 cm diam., smooth, avocado green with abundant fine pale lenticellar dots, shallowly seated in a broad, greenish brown cupule, this 3.5–4.5 cm diam., arising abruptly from the unswollen pedicel, very strongly tuberculate with irregular large warts roughly arranged in 6 rows radiating from base, much broader than long; flesh of fruit to 1.2 cm thick, yellow with dark green near exterior. SEED 1.7–2.3 cm diam.; tissue of cotyledons bright rose within.

OTHER SPECIMENS EXAMINED: **MEXICO. Oaxaca:** Mpio. Sta. María Chimalapa: type locality, 14 April 1996, *T. Wendt et al. 6869* (CHAPA, MEXU, MO, TEX). **Veracruz:** Mpio. Jesús Carranza: Hills S of Poblado 2 (ca. 3 km S of the junction of the La Laguna-Sarabia gravel highway with the road N to Poblado 2), 17°12'N, 94°39'W, 250 m, 4 July 1987, *T. Wendt et al. 5790* (CHAPA).

All flowers were past anthesis when collected except a very few in *Wendt et al. 6869*. These latter are mostly apparently aberrant, varyingly with extra tepals, fertile "staminodia," sterile gynoecia, and larger sizes in general. Post-anthetic material from the same tree fits the species description. *Wendt et al. 5790* has quite immature fruits and no flowers but seems referable to the new species.

The new species honors Heriberto (Beto) Hernández González (Fig. 1), extremely knowledgeable and keen plant collector, *conocedor de plantas*, native of Santa María Chimalapa, whose collections from the Chimalapa region have yielded numerous novelties and a far better knowledge of the plants of the Isthmus of Tehuantepec.

Ocotea heribertoi is apparently restricted to high-precipitation, deep-soil hill rain forest in the Chimalapa-Uxpanapa region of the Isthmus of Tehuantepec, where it is known from two localities each within a few kilometers of the Oaxaca-Veracruz state line: the type locality in Oaxaca, and a locality 20 km to the WNW in Veracruz. The type locality is at 220 m elevation at the northern foot of the abrupt mostly granitic Sierra de Tres Picos (to 1400 m), and here lowland rain forest in small valleys is surrounded by very steep slopes with cloud forest from 1000 m elevation above. The annu-

al precipitation at the site is probably 5000–6000 mm; the soils, derived from lightly metamorphosed lava, are extremely acidic. The new species was discovered during field work on a four-hectare tree diversity plot, which allows better characterization of the forest and of the abundance and microhabitat of *O. heribertoi*. The most common canopy tree species are diverse Lauraceae, *Elaeagia uxpanapensis* Lorence, *Guarea grandifolia* DC., *Eschweilera mexicana* T. Wendt, S. Mori & Prance, and *Virola guatemalensis* (Hemsl.) Warb. Thirteen individuals of *O. heribertoi* ≥ 27.5 cm d.b.h. (of a total of 532 trees) were found in 4 hectares, mostly on the gentle to moderate lowest parts of slopes near the major stream of the area. At the Veracruz locality, the species occurs in deep-soil rain forest dominated by *Dialium guianense* (Aubl.) Sandwith, *Licania hypoleuca* Benth., *Eschweilera mexicana*, and *Terminalia amazonia* (J. Gmel.) Exell. Fruits of the species apparently require a year to mature: mature fruits and post-anthetic flowers were collected in April, young fruits in July.

Ocotea heribertoi is a remarkable and quite distinct new species. The very large globose fruit and its unusual cupule immediately distinguish it from all species for which mature fruits are recorded; I know of no other *Ocotea* species with a globose fruit this large, although several species have elongate fruits that are as long or longer (e.g., *O. megacarpa* van der Werff of Venezuela and *O. lentii* W. Burger of Costa Rica). However, mature fruits are not yet known for many described species of the genus (Rohwer, 1986), and thus any new species of *Ocotea* need be recognizable on other characters. At this level, *O. heribertoi* is easily distinguished by the following combination of leaf and floral characters, without even invoking many further available quantitative features: glabrate leaves oblong to obovate with a rounded apex, the base cuneate but not inrolled nor strongly decurrent on the petiole, the tertiary venation obscure adaxially, superficial circular white-barbate domatia (on at least some leaves, conspicuous when young) found near but definitely separate (1–2.5 mm) from midrib abaxially; bisexual flowers with well developed staminodia, the ascending to erect tepals more densely strigillose adaxially than abaxially with only appressed acicular hairs mostly 0.1–0.2 mm long, and the abaxial surfaces only lightly to moderately strigillose. The location of inflorescences apparently only in the axils of cataphylls rather than axillary to normal leaves is also unusual. I find no species that closely approaches *O. heribertoi* in either flower or fruit, and while barbate superficial domatia are found directly in the axils of lateral veins in many species of Lauraceae, they are rarely restricted to other parts of the leaf as in *O. heribertoi*.

The taxonomy of *Ocotea* remains difficult, despite recent major advances such as Rohwer's (1986) admittedly preliminary synopsis of the genus and Burger and van der Werff's (1990) treatment of the Costa Rican species. The basic trends in character evolution and the infrageneric patterns of relationship are as yet quite unclear for this genus of perhaps 350 species. Given this situation and the distinctiveness of the new species, it is difficult to assess the affinities of *Ocotea heribertoi*. The Mesoamerican group of species related to *O. jorge-escobarii* Nelson discussed by van der Werff (1988), coinciding in large part with the *O. effusa* (Meissn.) Hemsl. group of Rohwer (1986), presents some notable similarities to the new species, including domatia away from the midrib and (in some) tepal strigillosity reminiscent of that of *O. heribertoi*, as well as basic shared traits such as bisexual flowers and presence of staminodes. However, the group differs from *O. heribertoi* in numerous vegetative and floral details, and in the presence of true pit-domatia as opposed to the superficial domatia of the new species. In addition, this group presents a very different cupule structure (as far as known) from *O. heribertoi*, involving a definitely swollen, fleshy, obconical pedicel

which merges into the cupule (see plates in Burger and van der Werff, 1990). Rohwer (1986) notes that general cupule characteristics (where known) tend to be rather uniform within a species complex and are potentially useful in the taxonomy of the genus. Thus, this fruit difference is probably not trivial, and the relationship of *O. heribertoi* to this complex is clearly not close.

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