A NEW DIOSPYROS FROM THE MISANTLA REGION IN MEXICO

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THIS PAPER IS A CONTRIBUTION to a critical study of the flora and vegetation of the Misantla region in central Veracruz, México.

The region is bounded on the north by the Nautla river, on the south by the Sierra of Chiconquiaco (also called Sierra of Naolinco), on the east by the Gulf of México, and on the west by the road from Misantla to Martínez de la Torre.

This small region of about 1500 square kilometers ranges in altitude from sea level up to more than 2000 meters, has an annual rainfall of 1400 to 3000 millimeters, a rich superficial geology, and complex topography. These factors provide the ecological conditions for a rich flora and the varied vegetation types of the area. The region is also notable in being located near the northern limit of the warm, humid tropics in America. Many important tree genera of southern México, as, for example, *Terminalia*, *Vochysia*, *Bernoullia*, *Dialium*, and *Vatairea*, do not reach this area, and a few, such as *Aspidosperma*, *Dussia*, *Chione*, and *Pseudolmedia* apparently have their northern limit of distribution here. The ranges of many other genera, among them *Brosimum*, *Achras*, *Carpodiptera*, and *Zuelania*, extend farther north to San Luis Potosí and probably to southern Tamaulipas. On the other hand, some genera widespread in the eastern United States, such as *Liquidambar*, *Fagus*, *Magnolia*, and *Juglans*, are represented in the flora of the temperate, humid montane area in this region.

It is of interest that several outstanding collectors, including Schiede, Deppe, Liebmann, Karwinski, and Purpus have collected in the Misantla region. The type localities of many species and a few genera, among them such well known taxa as *Croton draco* Schlecht., *Quercus oleoides* Cham. & Schlecht., *Aspidosperma megalocarpon* Muell., and *Misanteca capitata* Cham. & Schlecht. (the name of this genus derived indirectly from that of the town of Misantla) are in or near this area.

One of the most interesting vegetation types in the area is a deciduous forest (*bosque caducifolio*) at an altitude of approximately 900 to 2000 meters above sea level, on ferrolithic acid soils rich in organic materials. The humidity is extremely high due to the frequent fogs. The original forest is rather well conserved because of the abrupt topography and the lack of roads. Among the most conspicuous tree species in the upper

* While working on a series of Mexican collections I am using the facilities of the Arnold Arboretum and the Gray Herbarium of Harvard University, as a fellow of the John Simon Guggenheim Memorial Foundation. I want to express my gratitude to these institutions and their officers.

canopy are *Liquidambar styraciflua*, *Quercus affinis*, and *Meliosma alba* reaching heights of more than 40 meters. Other notable tree species in this area are *Befaria glauca*, *Dendropanax arboreus*, *Oreopanax liebmanii*, *Podocarpus matudai*, *Symplocos coccinea*, *Ternstroemia sylvatica*, *Turpinia insignis*, *Magnolia schiedeana*, *Brunellia mexicana*, and *Weinmannia pinnata*. In the course of studying collections made in the Misantla area, I found a new persimmon from this deciduous forest. The description of the new species and a discussion of its relationship to other taxa of the genus are here presented.

Diospyros riojae Gómez Pompa, sp. nov.

Arbor 10–15 m. alta, foliis ellipticis vel oblongo-ellipticis, 4–12 cm. longis, 2–5.5 cm. latis, basi cuneatis breviter attenuatis, apice breviter acuminatis, acumine obtuso, lamina glabra supra et subtus nitida, costa supra impressa, nervis nervulisque numerosis supra et subtus prominentibus, graciliter elevatis. Flores ignoti. Fructus nitidus solitarius, subglobosus, pericarpio coriaceo-ligneo, endocarpio luteo, 4–4.5 cm. longo, 4–5 cm. lato; calyce fructifero 5-lobato, lobis oblongis, 1.5 cm. longis, 0.5–0.7 cm. latis.

Tree 10–15 m. high; branchlets glabrous or the young shoots sparsely tomentose. Leaves elliptic or oblong-elliptic, 4–12 cm. long by 2–5.5 cm. wide, glabrous, shiny on both surfaces, when dry olive-green on the upper surface and brown-green on the lower, subcoriaceous, pellucid-punctate, cuneate at base and slightly attenuate, the apex faintly arcuate, shortly acuminate, the acumen obtusish; midrib impressed above, prominent beneath, with 6–11 pairs of primary veins prominent on both surfaces, the marginal nerves conspicuous; petioles canaliculate above, 6 mm. long. Flowers unknown. Fruit subglobose, about 4–4.5 cm. high and 4–5 cm. broad, glabrous, shiny, green when fresh, light brown when dry (probably immature when collected); the exocarp coriaceous-ligneous, the endocarp fleshy, drying orange-yellow. Calyx deeply 5-lobed, lobes oblong, acutish, glabrous, 0.5–0.7 cm. wide, 1.5 cm. long; style probably 5-parted.

HOLOTYPE: Mexico, State of Veracruz, between Chiconquiaco and Misantla, in *Liquidambar-Quercus* forest, with *Magnolia*, *Meliosma*, *Juglans*, and *Turpinia*, 1350 m. alt., Aug. 13, 1962, *Arturo Gómez Pompa 789* (A). Isotypes, US and MEXU.

This species is named in honor of the late Dr. Enrique Rioja LoBianco, who contributed greatly to the development of biology in México and under whom I studied ecology and biogeography at the Universidad Nacional Autónoma de México.

Although only this single fruiting collection is known, *Diospyros riojae* is distinctive in the shape and size of its leaves, in the glabrous, shining leaf blades, conspicuously reticulate on both sides; and in the large globose fruit. There is variation in the shape of the leaves, some being asymmetrical, others symmetrical, and in the size which may vary on one branch, but

their shape is predominantly elliptic to oblong-elliptic. In Standley's *Trees and Shrubs of Mexico*, which includes the only relatively modern treatment available for the Mexican species of *Diospyros*, this new species will be identified as *D. conzattii* Standl. (*D. pergamentacea* Lundell) [1] but it may be easily distinguished by the following obvious characters:

	DIOSPYROS RIOJAE	DIOSPYROS CONZATTII
LEAF SHAPE	Elliptic or oblong-elliptic.	Lanceolate or ovate-lanceolate.
LATERAL VEINS	Prominent on both surfaces of leaf.	Not prominent on either surface of the leaf.
VENULES	Reticulate on both upper and lower surfaces.	Not reticulate on the upper surface.
LEAF SURFACES	Shiny throughout.	Dull.
FRUIT SHAPE	Subglobose (4–5 cm. broad, 4–4.5 cm. high).	Depressed-globose (4 cm. broad, 2 cm. high).
EXOCARP	Coriaceous-ligneous (not wrinkling on drying).	Coriaceous (wrinkling on drying).
CALYX LOBES	Up to 1.5 cm. long.	Up to 2.7 cm. long.

It seems unlikely that *Diospyros riojae* and *D. conzattii* are at all closely related, in spite of their superficial resemblance. In a search for other possible relationships, all of the materials in the collections of the Arnold Arboretum and Gray Herbarium, including representatives of nearly half of the perhaps 400 species in the genus, were surveyed. It was soon evident that a number of species from widely scattered areas share to varying degrees some of the distinctive vegetative characters of *D. riojae*.

In leaf characters, the combination of shiny, glabrous leaf blades, conspicuously reticulate on both surfaces is especially conspicuous in *Diospyros riojae*. Some 25 additional species show the same combination of characteristics, and about 27 more differ only in that the lower side of the blade was dull instead of shiny.

Even though the taxonomy of many of the species of the genus is in doubt and the identifications of many are not reliable, it seems worth while to enumerate the species which share with *D. riojae* the combination having the leaf blades glabrous, shiny and conspicuously reticulate on both surfaces:

Mexico: *Diospyros cuneata, D. anisandra.*
West Indies: *D. crassinervis, D. tetrasperma, D. caribaea, D. leonis.*
Eastern Asia: *D. metcalfii, D. susarticulata, D. sinensis, D. nitida.*
India: *D. choboënsis, D. crumenata, D. ebenum, D. fleuryana, D. mun.*
Philippines: *D. alata, D. curranii, D. pilosanthera, D. viridifolia.*

[1] Both *Diospyros conzattii*, described from Oaxaca, and *D. pergamentacea*, described from Chiapas, are known only from fruiting specimens. The two seem to be conspecific, the differences between them being minor and mostly in size. They are therefore combined here under the older name.

New Caledonia: *D. olen.*
Polynesia: *D. hillebrandii*, *D. ferrea* var. *subimpressa*, *D. samoënsis.*
Australia: *D. hebecarpa.*
Africa: *D. mespiliformis.*

It should be noted that there is a wide variation in these species in leaf shape, venation, and size (only species with leaves from 2–15 cm. long

FIG. 1. *Diospyros riojae* showing some details of leaf venation and calyx form (approximately 1/2 natural size). Drawn by Eileen K. Carroll.

were considered), but there is a striking resemblance between *Diospyros riojae* and two species from southeastern Asia (Hainan), *D. metcalfii* and *D. susarticulata*. These three species are similar, not only in the characters mentioned above, but in leaf shape, size, and petiole. On the other hand, they differ from each other in fruit and calyx characters.

In a taxonomically difficult genus such as *Diospyros* in which all of the species are dioecious and in which many are known only from fruiting materials, the possibility of utilizing vegetative characters is an intriguing one, and the general similarity of leaf characters of species from both eastern and western hemispheres offers a number of interesting suggestions:

1. The presence of this combination of leaf characters in such a large number of species leads one to think that these may be linked characters that cannot be explained as a random distribution of individual characters.

2. Apparently these characters do not have any significant value for adaptation to the environment, for the species in which they are found occur in a wide variety of ecological situations. The large number of species with this combination in Asia, India, and the Philippines may well be related to the great number of species of *Diospyros* in that area, while the scarcity of these characters in extratropical regions is probably related to the paucity of species. (Only 12 species of *Diospyros* occur in subtropical regions and only 4 are known from truly temperate climates (White, 1956).)

3. According to Hiern in his monograph (1873), the 25 species mentioned above fall into a number of different sections. However, these need to be reevaluated, especially in view of some of the characters used by him in distinguishing some sections, as, for example, "stamens quite glabrous" versus "stamens more or less hairy." One can certainly join White (1956) and Wood and Channell (1960) in saying that revision at the subgeneric level is needed. The data above suggest that leaves can provide some useful characters for this purpose. This suggestion is supported by Bakhuizen van den Brink (1936–1941) who used some leaf characters (prominent venation) as an aid in distinguishing sections in the subgenus Diospyros (subgenus *Eudiospyros*) and by White (1956), who stated that "the leaves should contribute some useful secondary characters" for the revision of the subgeneric classification of the genus. However, so much remains to be learned of the importance of floral and fruiting characters that it is difficult to know just how to evaluate the vegetative characters. It is obvious, however, that these can be useful in the comparison of species (e.g., *D. riojae* vs. *D. conzattii*).

4. In spite of differences in calyx structure, and our lack of knowledge of the flowers, the vegetative resemblance between *Diospyros riojae, D. metcalfii*, and *D. susarticulata*, mentioned above, suggest that these three may furnish yet another example of relationships between the plants of the *Liquidambar* forests in Mexico with those of the eastern United States and eastern Asia (Sharp, 1951, 1959; Dressler, 1954; Li, 1957; Miranda 1959). At present only *D. virginiana* (closely related to *D. lotus*, of

eastern Asia), occurs in the eastern United States, but among the fossil species there is one which matches strikingly the leaves of *Diospyros riojae*.

Some 23 species of *Diospyros* have been described from Cenozoic deposits in North America (LaMotte, 1952), but many of these, described only from leaves, may not represent this genus. MacGinitie (1941) says, "The leaves of *Diospyros* are easily confused with those of *Banisteria*, *Heteropteris*, *Chionanthus*, *Nyssa* and the leaflets of various legumes." To this list can be added several more Sapotaceae, Styracaceae, Moraceae, and Thymelaeaceae which could also be confused with some of the leaves of living and fossil *Diospyros*. Despite this, *Diospyros wilcoxiana* Berry (1916, *pl. 101, fig. 1*), described from the Lower Eocene of Tennessee is remarkably like the leaves of *D. riojae*. This species has also been reported from the Eocene of Texas (Ball, 1931); and it is worth mentioning that Ball also reported as *D. mirafloriana* Berry a deeply 5-parted calyx, similar to that of *D. riojae*. Thus it seems evident that many of the species of *Diospyros* with leaf characters similar to those of *D. riojae*, which today are restricted to tropical or subtropical regions (as are all of the species with a 5-lobed calyx), have come from a stock once much more widely distributed and continuous in the northern hemisphere. It is also remarkable that vegetative parts that at first sight look very variable can remain relatively unchanged through millions of years. The relationships of *Diospyros riojae* with other species of the genus remain obscure, but it is to be hoped that an eventual revision of the genus, including the fossil remains, will one day clarify these.

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