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A SPECIES OF COPAIFERA FROM THE TEXAS EOCENE

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The determination of the fossil remains of leaflets or even of the pods of a large proportion of the Leguminosae is attended with great difficulty because of their convergent character in so many of the numerous genera. It is therefore all the more important to call attention to unequivocal fossil forms such as the pod of a new species of the genus *Copaifera* described in the present note. This form also happens to be the oldest known representative of this genus as well as the first fossil record from North America, and to that extent suggestive of the place of origin of the genus and something of its geological history.

The genus *Copaifera* belongs to the tribe Cynometreae of the family Caesalpiniaceae and comprises about sixteen existing species of the equatorial region of Africa and America, ranging in the latter region from the West Indies to the valley of the Amazon. Four of the species are African and the balance are American. They are large trees with hard durable wood and yield the gum or balsam known as Copaiba. The latter term was proposed as the generic name for these trees by Miller and it is often substituted for the Linnaean name *Copaifera*, as for example by Taubert in Engler and Prantl's *Natürlichen Pflanzenfamilien*.

The present species may be characterized as follows:

Copaifera yeguana sp. nov.

Pods of relatively small size, short and broadly elliptical in outline, greatly compressed and smooth surfaced, pedunculate, somewhat obliquely mucronate tipped, two valved, tardily if at

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all dehiscent, very coriaceous, 2 cm. in length by 1.3 cm. in maximum width; containing a single, large, elliptical, compressed seed, 1.1 cm. long and 8 mm. in maximum width.

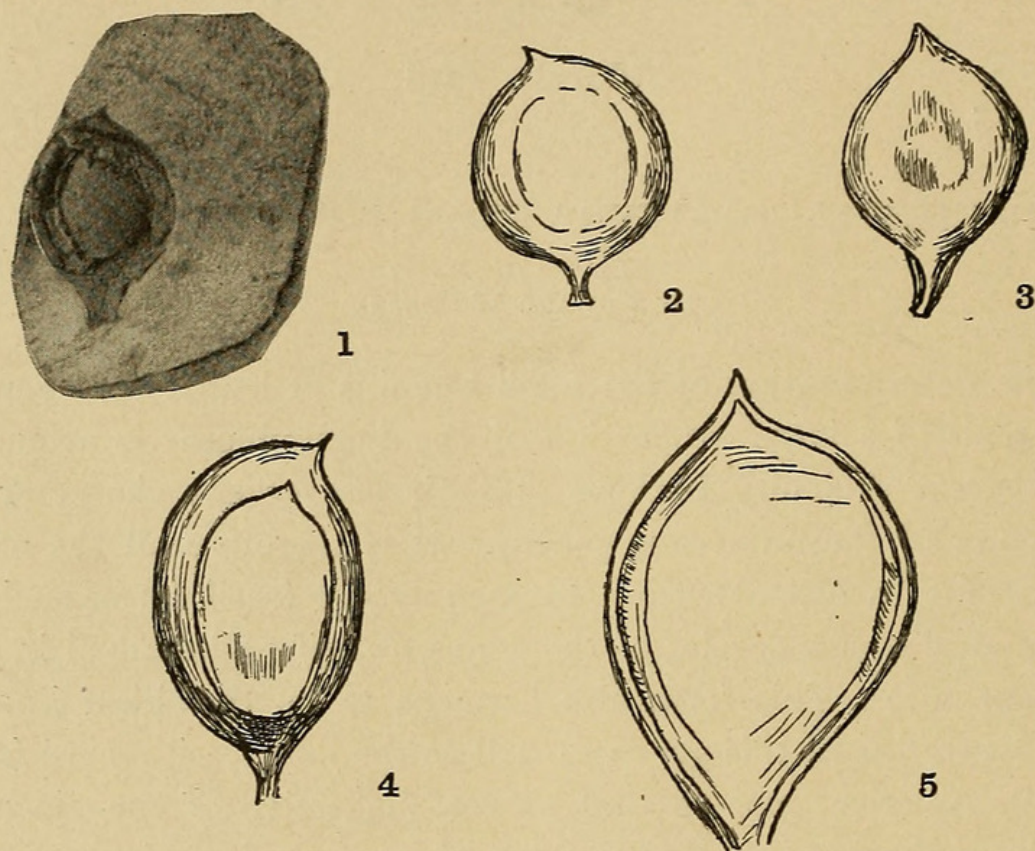


FIG. 1. Fossil and Recent pods of *Copaifera*. 1. *Copaifera yeguana* sp. nov. Middle Eocene of Texas; 2. *Copaifera Langsdorffii* Desf. Brazil; 3. *Copaifera radobojana* Unger, Miocene of Croatia; 4. *Copaifera Kymeana* Unger, Upper Oligocene of Kumi; 5. *Copaifera armissauensis* Saporta, Upper Oligocene of France.

The materials upon which this description is based were collected by C. L. Baker from the hard brown clays of the Yegua formation on Cedar Creek two miles south of the T. S. & E. R. R. bridge and southwest of Lufkin in Angelina County, Texas. The collection was small and the most perfect specimen is that figured. I am indebted to Mr. E. T. Dumble, of the Southern Pacific Company, for the opportunity of studying this and other collections.

The Yegua formation, which consists of several hundred feet of littoral and palustrine deposits of lignitic clays and sands, was differentiated by Dumble* in 1892. It forms the upper division of the Claiborne Group in that state, and is of middle Eocene age, that is to say, about the same age as the Green River beds

* Dumble, E. T., Rept. Geol. Surv. Texas, 1892: 148-154.

of the Rocky Mountain province or the Lutetian stage of the Paris basin.

The genus *Copaifera* has been recognized in the fossil state for over half a century, Unger in 1862 having described in the second part of his Sylloge, a pod of this genus from the Aquitanian of Greece (Kumi)* and a second pod and leaflets from the Miocene of Croatia.† Additional species were subsequently described by Unger,‡ Saporta§ and Engelhardt,|| some based on leaflets and others on pods. Ettingshausen¶ in 1886 described some leaflets from the early Tertiary of Australia as a new species of *Copaifera*, but his material was limited and entirely uncharacteristic, and there is no evidence that the genus was ever present in either Australia or Asia.

The probable origin and geological history of the genus may now be briefly sketched. The Texas form, which is a member of a tropical flora that spread northward from the American tropics along the shores of the middle Eocene Mississippi embayment, is the oldest known form. At about the same time or slightly later the genus is known from Engelhardt's studies (*op. cit.*) to have extended southward into Chili far beyond its modern range. From these facts I would conclude that it had its origin in the equatorial region of America. From America it spread to western Africa, possibly across what is now the south Atlantic. As I have pointed out in another place** there are a considerable number of genera with existing species in the tropics of West Africa and America, old genera that are present in the lower Eocene of the Mississippi embayment. They unite in indicating an equatorial or subequatorial avenue of communication in the early Tertiary, possibly to be correlated with the worldwide emergence of the continents predicated by DeLapparent as occurring during the Oligocene.††

* Unger, F., Sylloge plantarum fossilium, 2: 32. pl. 11. f. 10. 1862.

† Unger, F., Ibidem, f. 4-9, 11.

‡ Unger, F., Foss. Fl. v. Parschlug, 154. pl. 3. f. 13. 1869.

§ Saporta, G. de, Études, 2: 375. pl. 13. f. 14. 1866.

|| Engelhardt, H., Abh. Senck. Naturf. Gesell., 16, pt. 4: 681. pl. 5. f. 8; pl. 7. f. 4. 1891.

¶ Berry, E. W., Proc. Am. Phil. Soc. 53: 129-250. 1914.

** Ettingshausen, C. von, Tertiarfl. Aust. 2: 56. pl. 15. f. 23, 23a. 1886.

†† Traité. 1547. 1906.

All lines of evidence indicate extensive interchanges of terrestrial animal and plant life between Africa and southern Europe during the Oligocene and the oldest known European species of *Copaifera*, in conformity with the above brief outline of migration, are found in the Aquitanian of Kumi on the Island of Euboea and in beds of the same age in southeastern France.

The genus persisted in southern Europe through the greater part of the Miocene and then by reason of climatic and physiographic changes became extinct on that continent.

To facilitate a graphic comparison I have introduced along with the figure of *Copaifera yeguana*, illustrations of the pods of an existing and three other fossil species which were based on the remains of pods.

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AN ABNORMAL SPECIMEN OF CITRULLUS VULGARIS

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A peculiar example of teratology is furnished by a watermelon recently received by the U. S. National Museum from Manteo, North Carolina. Normally the flower of *Citrullus* has a single, tricarpeillary pistil; in this specimen the fruit seems to have arisen from a bipistillate flower with hexacarpeillary pistils. The segments of the two pistils in developing into fruit have grown together from the receptacle up to the point where the fruit diminishes to form the apex. The development of each pistil has been distinct from that of the other, one fruit being several inches longer than its companion. Each presents, however, an abnormal appearance in the carpels, none of which is symmetrical, all being crowded and having the septa more or less distorted. It is unusual for such deformed fruits to mature, but this specimen weighed about forty-four pounds, measured seventeen inches in length of the longer portion, and was of equal width across the widest part. The texture of the pulp was very crisp and the flavor particularly good.



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