

# WALNUTS FROM THE LATE TERTIARY OF ECUADOR.<sup>1</sup>

ROLAND W. BROWN.

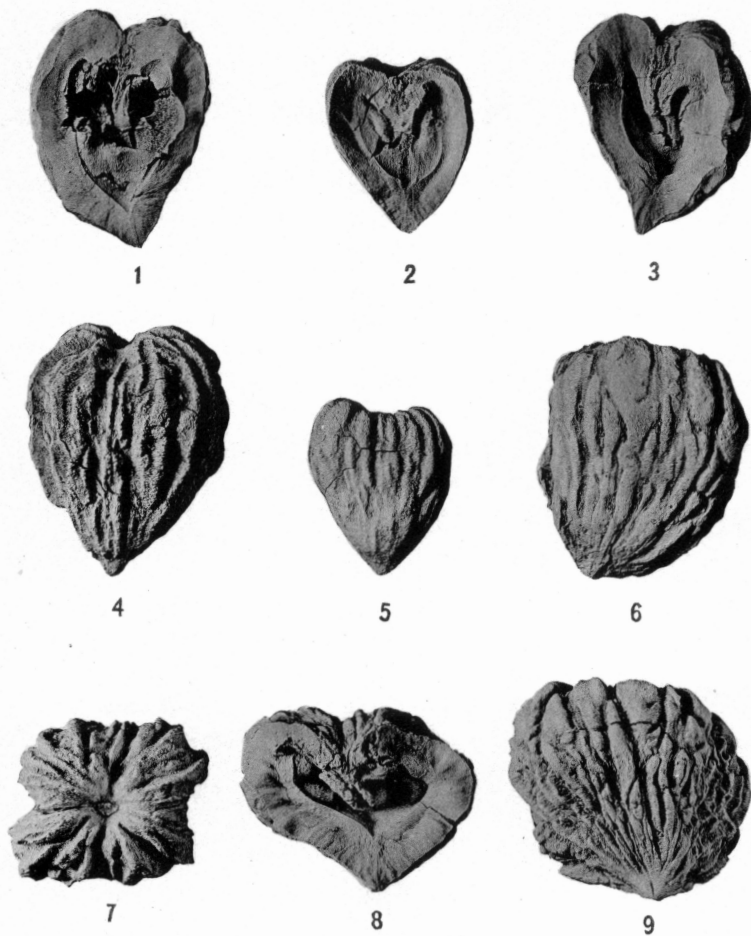
**A**LTHOUGH several living species of walnuts are known from South America, the specimens described here represent the first reported fossil species from that continent. The fossils comprise 27 black, carbonized, brittle, slightly distorted pieces, mostly halves of nuts. They were collected in 1945 by Dr. A. A. Olsson, of the Imperial Oil Company of Canada, from the Punta Gorda formation, which crops out along the coast at Punta Gorda just west of the mouth of Rio Esmeraldas, Province of Esmeraldas, in northwestern Ecuador. Having been received at Johns Hopkins University after the death of Prof. E. W. Berry in September 1945, they were transmitted to me for study and description. Their age is late Miocene or early Pliocene in accord with the currently accepted age of the Punta Gorda formation in which a large, marine molluscan fauna is found. As the fossils are significantly different from any living or fossil species, I designate them as a new species named for Dr. Theodore A. Link, assistant Chief Geologist of the Imperial Oil Company, who assisted Dr. Olsson in collecting the specimens.

## JUGLANS LINKI Brown, n. sp.

Plate 1, Figs. 1-9.

Nuts ovate-pyriform, rounded quadrangular in transverse section, cordate in longitudinal section, rather sharply acute at the apex, averaging 3 cm. in length and 2.5 cm. in diameter. Surface of the better specimens strongly rugose with deep furrows and sharp to rounded ridges. Wall extremely thick and meat cavity relatively small. In life these nuts were undoubtedly larger for there evidently was some shrinkage accompanied by distortion during the process of fossilization. Specimens deposited in the U. S. National Museum.

<sup>1</sup> Published by permission of the Director, Geological Survey, U. S. Dept. of the Interior, Washington, D. C.



Figs. 1-9. Nuts of *Juglans linki* Brown, n.sp., from the late Tertiary of Punta Gorda, Ecuador. Natural size. Photos by Nelson W. Shupe.

The genus *Juglans* is represented today in Asia, Europe, and the Americas by about 20 species, although Dode (1906-1910) claimed 44 species, including varieties. Four native species are known from South America: *Juglans australis* (Argentina black walnut), *J. boliviana* (Bolivia black walnut), *J. columbiensis* (Colombia black walnut), and *J. honorei* (Ecuador black walnut), the common names indicating in general the regions inhabited by the different species. The fossil nuts resemble most closely those of *J. honorei* and its varieties but have acuter apexes and thicker walls. Consequently, their relationship, although suggestive, remains obscure and must probably continue so, inasmuch as no foliage was found with the nuts to aid comparison with living species.

The finding of these fossil walnuts in Ecuador enlarges somewhat the known area over which the genus *Juglans* was distributed in prehistoric times. This area was depicted on several occasions by E. W. Berry, the latest being in connection with the description of nuts called *J. siouxensis* (Barbour) Berry (1926, fig. 7) from the Oligocene of Nebraska. The map shows the known past range as including only the southern, warmer parts of the North Temperate zone and a small spot north of the Arctic Circle in southwestern Greenland. In time this distribution spans the interval from mid-Cretaceous to Pleistocene and Recent. Many of these records are based on identifications of foliage, sometimes very fragmentary, and are, therefore, probably not so reliable as those based on nuts. The earliest fossil nuts, recognizable with certainty as walnuts or at least as being closely related to walnuts, are some as yet undescribed specimens from the Paleocene of Montana, Wyoming, and Colorado. Associated with them are impressions of leaflets definitely attributable to the walnut family. From the Paleocene onward the record of walnuts becomes even more prominent both in America (Berry, 1912-1934) and abroad. After the late Pliocene, however, climatic changes shrank the area of distribution of the genus and localized the present living species. Whether the number of species has, in consequence, decreased, is unknown; but, according to Dode's account of *Juglans*, there seems to be considerable hybridization among living walnuts, presaging the emergence of new species.

Related to *Juglans* are the genera *Carya*, *Engelhardtia*, *Oreomunnea*, *Platycarya*, and *Pterocarya*, the entire group

constituting the walnut family, Juglandaceae. The last four genera have few species and are distinguished by bearing winged fruits. Together with *Carya* they have a much more restricted present distribution than *Juglans*, but all are represented in the fossil record from the Eocene onward.

The Juglandaceae are monoecious, the greenish, inconspicuous staminate and pistillate flowers being separate but on the same tree. The staminate flowers are in aments or catkins, the pistillate solitary or in few-flowered spikes. This simple arrangement reflects an adaptation to wind-pollination, as in most Amentiferae. Do these reproductive and other structures of the walnuts indicate primitiveness or reduction from more highly evolved forms? Botanists today seem to favor the reduction hypothesis, the case for which has been stated by Robertson (1904). To this may now be added the testimony of the fossil record. The presence of recognizable walnuts in the Paleocene presupposes some evolution of *Juglans* during the Cretaceous. However, until better evidence than the indefinite mid-Cretaceous foliage now assigned to *Juglans* is found, there is justification for believing that the genus as we now know it is a late or derived rather than an early phenomenon among dicotyledons.

## REFERENCES.

- Berry, E. W.: 1912. Notes on the geological history of the walnuts and hickories. *The Plant World* 15: 225-240.  
———: 1923. Tree ancestors. Williams and Wilkins Co., Baltimore, Md.  
———: 1926. The fossil seeds from the Titanotherium beds of Nebraska. *Am. Mus. Novitates* 221: 1-8.  
———: 1928. A petrified walnut from the Miocene of Nevada. *Washington Acad. Sci. Jour.* 18: 158-160.  
———: 1929. A walnut in the Pleistocene at Frederick, Oklahoma. *Washington Acad. Sci. Jour.* 19: 84-86.  
———: 1934. A walnut from the Chesapeake Miocene. *Washington Acad. Sci. Jour.* 24: 227-229.  
Dode, L. A.: 1906. Contribution a l'etude du genre *Juglans*. *Bull. de la Soc. dendro. de France*, 67-97; 1909, 22-50; 1910, 165-215.  
Robertson, Charles: 1904. The structure of the flowers and the mode of pollination of the primitive angiosperms. *Bot. Gaz.* 37: 294-298.

U. S. NATIONAL MUSEUM,  
WASHINGTON, D. C.