THE BRAZIL NUT[1]

W. J. YOUNG

(WITH PLATE VIII AND ONE FIGURE)

The genus *Bertholletia*, to which is assigned the Brazil nut of commerce, was established in 1808 by HUMBOLDT and BONPLAND, who placed in it a single species, *B. excelsa*. A translation of BONPLAND'S description of the fruit of this species is as follows:[2]

Fruit a spherical, compound nut the size of a child's head and often larger, divided internally into four cells, each of which encloses several nuts; covered on its exterior with a husk of a green color, smooth and shining.

Main nut very solid, rough and marked by branching furrows on its outer surface, 6 lines (1 cm.) thick, divided internally into four cells by as many membranous dissepiments which become obliterated in part or entirely after the maturity of the fruit, but of which there always remain traces.

The tree is described as 33 m. high, with a trunk 9 dm. in diameter. Leaves alternate, oblong, subcoriaceous, 1 dm. broad and 6 dm. long, borne on short petioles. Type locality, Rio Orinoco.

On account of the great height of the trees, these botanists were unable to obtain the flowers, although it is said that they offered in vain an ounce of gold for specimens.[3] On this account, they were uncertain as to the position which the genus *Bertholletia* should occupy. More recent investigations have established it next to *Lecythis* among Lecythidaceae, an arrangement now universally accepted. It is worthy of note, also, that BONPLAND failed to describe either the operculum or the opercular opening of the fruit, although the latter is shown in his drawing as becoming decidedly narrower at the inner edge.

For more than half a century after the publication of BONPLAND'S description of *B. excelsa*, the genus was accepted as monotypic. Evidence was being gradually accumulated, however, which led to the recognition of a second species. Among the

[1] Published by permission of the Secretary of Agriculture.

[2] BONPLAND in HUMBOLDT and BONPLAND, Plantes equinoxiales **1**:110, 111.

[3] SPRUCE, RICHARD, Notes of a botanist on the Amazon and Andes. Edited by A. R. WALLACE. **1**:356. 1908.

later botanists to contribute to this end may be mentioned BERG, who in monographing the Brazilian Lecythidaceae described under *B. excelsa* a species distinct from that of HUMBOLDT and BONPLAND.[4] Although BERG'S description is marred by several errors, it is sufficiently accurate to demonstrate that the species described is not the *B. excelsa* of BONPLAND. BERG'S drawing of the fruit or pyxidium is moreover quite different from that of BONPLAND.

It remained, however, for Mr. J. MIERS to point out clearly the distinction between the two plants and to describe BERG'S species under the name *B. nobilis*.[5]

The more noticeable points of distinction between *B. excelsa* and *B. nobilis* are collected from MIERS'S description in the following summary:

B. excelsa Humb. and Bonp.	*B. nobilis* Miers.
Tree 100 ft. or more high, with trunk 2.5–3 ft. in diameter.	Tree somewhat taller than *B. excelsa*, with trunk 14 ft. in diameter.
Leaves green; petioles 9–18 lines long.	Leaves rufescent; petioles 3–6 lines long.
Floral panicle 8 in. long, with single branch nearly equal in length, and nodes $\frac{1}{6}$ in. apart.	Floral panicle 10 in. long, with about 5 short branches, and nodes 0.25–0.5 in. apart.
Fruit slightly elongated, 0.16 in. in length.	Fruit approximately spherical usually under 5 in. in diameter.
Cortex of fruit smooth, palish, entire, persistent.	Cortex of fruit comparatively thick and rough, darker, cracking as the fruit dries and tending to loosen and drop off as the fruit is handled.
Opercular opening with straight or concave walls, narrowing slightly at its inner edge.	Opercular opening with sharp edge and concave walls, and widening considerably inward.
Operculum cylindrical, with roundish, indented apex.	Operculum oval or radially compressed, conical and pointed at the apex.
Operculum breaks away and falls from the fruit as the columella shrivels.	Operculum remains attached to remnant of columella and, as the latter shrivels, falls into the cavity of the fruit.

[4] BERG in MARTIUS' Flora Braziliensis, I. **14**:478.

[5] MIERS, J., On the Lecythidaceae, *Bertholletia*. Trans. Linn. Soc. II. **30**:195–199.

The differences noted above, as far as they relate to the fruit, are well shown in the copy of MIERS's drawing, reproduced half-size in text fig. 1.

The idea that *B. excelsa* Humb. and Bonp. is the source of commercial Brazil nuts has become so thoroughly grounded in popular and even in botanical literature that it seems to be accepted on faith and passes unchallenged. The extent of this belief will be apparent when we consider that of the following quotations only the last two, or possibly three, make any mention of a second species, to which, moreover, they assign a wholly subordinate position.

Brazil nut.—One of the triangular edible seeds of a tall South American tre (*Bertholletia excelsa*).—Standard Twentieth Century Dictionary.

Brazil nut.—The seed of the fruit of *Bertholletia excelsa.*—Century Dictionary.

Brazil nut.—An oily 3-angled nut, the seed of the lecythidaceous Brazilian tree *Bertholletia excelsa.*—Webster's New International Dictionary.

Cream nut (*Bertholletia excelsa* Humb. and Bonp.).—This is a common nut in our markets brought from Brazil; hence it is often called Brazil nut.—Nut culture in the U.S., p. 106, Div. of Pomology, U.S. Dept. Agriculture

Brazil nuts, cream nuts, Para nuts.—These are edible nuts imported from Brazil. The nuts are the product of *Bertholletia excelsa* (Humboldt and Bonpland).—U.S. Disp., 19th ed., p. 1420.

Bertholletia excelsa.—Brazil nut.—A large tree belonging to the family Lecythidaceae, and yielding the Brazil or Para nuts of commerce. A tree 100 to 150 ft. high, distributed throughout northeastern South America to the Island of Trinidad.—COOK and COLLINS, Economic plants of Porto Rico, Contrib. U.S. Nat. Herb. **8**:91. 1903.

Bertholletia Humb. and Bonp.—Tall trees. One or two species. South America.

a. B. excelsa Humb. and Bonp.—*Seeds*, Brazil nuts, Para nuts, cream nuts, nigger toes, Castana nuts.—LYONS, A. B., Pl. names, sci. and pop., 2d ed., p. 71.

Bertholletia.—Brazil nut, Para nut, cream nut, nigger toe.—Species 2, both of which furnish Brazil nuts.—HASTINGS, G. T., in BAILEY'S Cycl. of Hort.

The Brazil nut, also called Para nut, from the port of shipment, is the seed of a large tree (*Bertholletia excelsa* Humb. and Bpl.).—Another species, *B. nobilis* Miers, also yields a similar nut.—WINTON, A. L., Microscopy of vegetable foods, p. 312.

This state of affairs seems to be due primarily to BONPLAND'S assumption, stated in connection with his description of *B. excelsa*,

that it is this species which furnishes the Brazil nut. The long time which elapsed previous to the identification of a second species allowed this view to become so thoroughly established that MIERS's work appears to have been overlooked by persons inter-

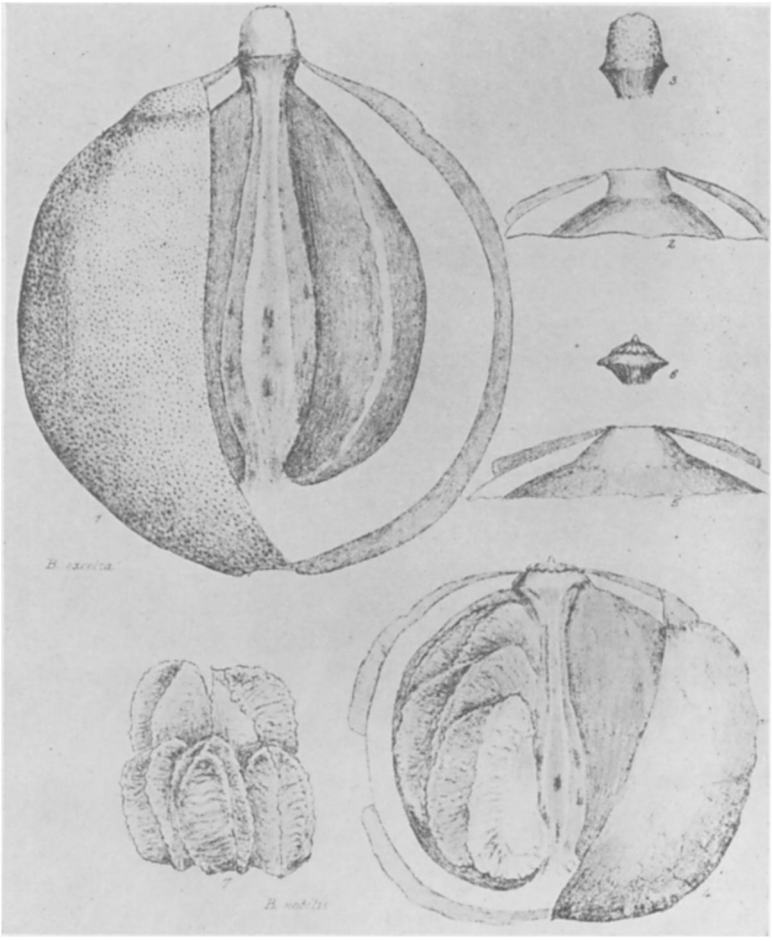


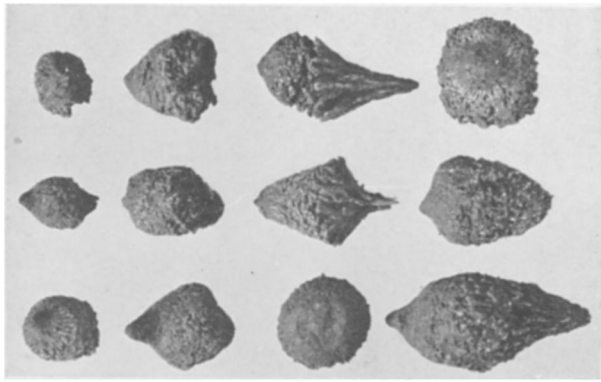
FIG. 1.—Reproduction of MIERS's drawings of *Bertholletia*, copied half-size from Trans. Linn. Soc. **30**: *pl. 37. figs. 1–3, Bertholletia excelsa: 1*, pyxidium cut open to show structure; *2*, section of opercular opening; *3*, operculum; *4–7, Bertholletia nobilis: 4*, pyxidium cut open to show structure; *5*, section of opercular opening; *6*, operculum; *7*, a cluster of seeds (Brazil nuts).—Published by courtesy of the Linnean Society of London.

ested in botany from the economic standpoint. The work of various botanists during this interval, and especially BERG'S description of *B. nobilis* under the name *B. excelsa*, no doubt contributed to the same end. Moreover, the seeds of the two species, so far as can be judged from the descriptions and drawings available, are so similar as to be distinguished with difficulty if at all.

After making a careful study of the situation, the writer has become convinced that the commonly accepted view is erroneous, and that the Brazil nuts of commerce are derived from *B. nobilis* Miers (*B. excelsa* Berg) and not from *B. excelsa* Humb. and Bonp. The reasons for this view are given below.

1. Commercial samples of Brazil nuts contain, in larger or smaller numbers, opercula derived from the fruit, and the presence of these in itself is evidence that the nuts were derived from *B. nobilis*, since, as has been noted in the comparison, the opercula fall from the mature pyxidia of *B. excelsa*, and hence would not find their way into samples of nuts from that source. On the other hand, their presence among nuts from *B. nobilis* is perfectly normal and what would be expected, since in this species the opercula fall into the interior of the pyxidia and become mixed with the nuts. Moreover, the opercula, so far as the writer has been able to observe, are always of the *B. nobilis* type, as shown in fig. 1. They vary in form from ovoidal bodies to cones of varying slope, being modified apparently by the size and degree of persistence of the columella, as well as by the extent of the grinding against surrounding nuts to which they have been subjected during shipment. All, however, are provided with a distinct apical point except where it has been broken off, in which case the fact is usually quite evident. It cannot be denied that the absence of opercula of the *B. excelsa* type does not preclude the possibility that nuts of this species may be occasionally mixed with those of *B. nobilis*, since the writer is not aware that it is possible to distinguish the species from the character of the nuts alone.

2. Every pyxidium of the Brazil nut which the writer has had an opportunity to examine has indicated that the fruit is that of *B. nobilis*. Their main points of structure are well shown in



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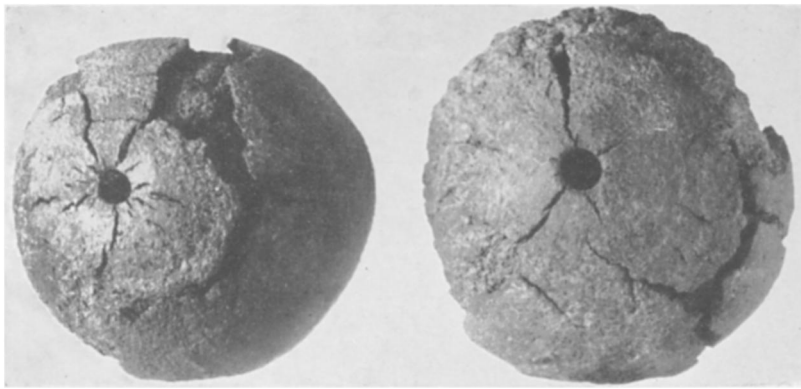

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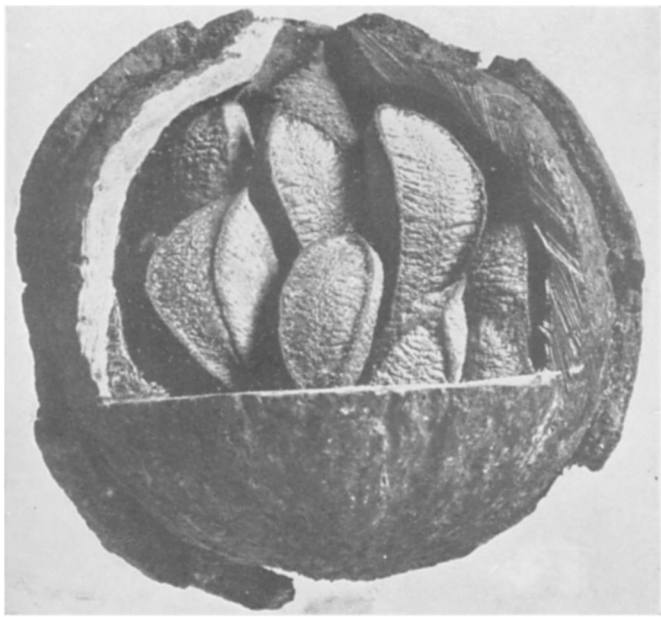

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figs. 2 and 3, which illustrate pyxidia obtained from different sources. A comparison of the photograph with MIERS's description of *B. nobilis* will leave no doubt of their identity. Most if not all of the pyxidia which the writer has examined were brought to this country by the importers of Brazil nuts, and represent the source of the nuts in which they deal.

3. The testimony of others, although comparatively scanty, should not be overlooked, since it is improbable that the authorities quoted as stating that the Brazil nut is the seed of *B. excelsa* have given the matter any exhaustive study. After this description of *B. nobilis,* MIERS states "these seeds are known in commerce as Brazil nuts," and proceeds to give statistics regarding their exportation and use. Moreover, BERG's error regarding *B. excelsa,* although perhaps adding to the confusion, is in reality indirect evidence of the same fact, since it is doubtful whether he would have confused the two species had he not been sure that the specimens from which he made his description were those of the Brazil nut, which he, in common with others of his time, regarded as *B. excelsa.*

NOTE.—Acknowledgment is due Mr. H. C. SKEELS of the Office of Foreign Seed and Plant Introduction, U.S. Dept. of Agriculture, who has reviewed the work and confirmed the conclusions of the writer.

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EXPLANATION OF PLATE VIII

Bertholletia nobilis Miers.—The form of the operculum and opercular opening, and the loose, broken cortex are characteristic of this species.

FIG. 1.—Opercula from commercial Brazil nuts; $\times\frac{2}{3}$.

FIG. 2.—Entire pyxidia; $\times\frac{3}{8}$.

FIG. 3.—Pyxidium cut open to show structure; nuts in place; small specimen; natural size.