

ORIGIN AND EARLY HISTORY OF THE PEANUT

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The peanut, *Arachis hypogaea* L., is a native South American legume. At the time of the discovery of America and European expansion into the New World, this cultivated species was known and grown widely throughout the tropical and subtropical areas of this hemisphere. The early Spanish and Portuguese explorers found the Indians cultivating the peanut in several of the West Indian Islands, in Mexico, on the northeast and east coasts of Brazil, in all the warm land of the Rio de la Plata basin (Argentina, Paraguay, Bolivia, extreme southwest Brazil), and extensively in Peru. From these regions the peanut was disseminated to Europe, to both coasts of Africa, to Asia, and to the Pacific Islands. Eventually, it traveled to the colonial seaboard of the present southeastern United States, but the time and place of its introduction was not documented.

CHRONOLOGICAL HISTORY

Table 1 documents the descriptions and illustrations of the peanut found in the chronicles and natural histories of the 16th and 17th centuries (Hammons, 1973). No effort is made to discuss the extensive literature of the 18th century.

Before the Spanish colonization, the Incas cultivated the peanut throughout the coastal regions of Peru. In his history of the Incas, Garcilaso de la Vega (1609) describes the peanut as another vegetable which is raised under the ground, called by the Indians *ynchic*. He reports that the Spanish introduced the name *mani* from the Antilles to designate the peanut they found growing in Peru.

Bartolomé Las Casas, who sailed in 1502 to Hispaniola (now Haiti Dominican Republic), was a missionary throughout the Spanish lands from 1510 to 1547. Although Las Casas may have been the first European to encounter the peanut, his "Apologetic History," begun about 1527, was not published until 1875. Concerning the peanut he wrote (Las Casas, 1909): "They had another fruit which was sown and grew beneath the soil; which were not roots but which resembled the meat of the filbert nut. . . . These had thin shells in which they grew and. . . (they) were dried in the manner of the sweet pea or chick pea at the time they are ready for harvest. They are called *mani*." (Tr.: M. Latham and R. Hammons).

The first written notice of the peanut appears to be that of Captain Gonzalo Fernández de Oviedo y Valdés, who came to Santo Domingo in 1513 and later became governor of Hispaniola and royal historiographer of the Indies. In 1525 he sent Charles V his *Sumario Historia*, printed in Toledo 2 years later (Oviedo, 1527), and in 1535 began publishing his *Historia general de las Indias*.

Table 1. The peanut in early post-Columbian historical records: A chronology for the 16th and 17th centuries (after Hammons, 1973).

(The material is arranged to emphasize the geographical distribution of the peanut in the New World at the time of exploration of the chroniclers rather than the publication date which sometimes was many decades beyond the actual event.)

Time	Location	Author	Publication date
Pre-Conquest	New Spain	Las Casas	1875
1502-1547	Peru	Garcilaso de la Vega	1609
1513-1524	Hispaniola	de Oviedo y Valdes	1527, 1535
1534-1554	La Plata basin	Schmidt	1567
1555-1560	Rio de Janeiro	de Léry	1578
1558-1566	Mexico	Sahagún	1829
pre-1569*	Peru	Monardes	1569, 1574
1570-1587	Bahia, Brazil	Soares de Souza	1825
1571	Peru	de Acosta	1588-89
1571-1577	Mexico	Hernández	1605, 1651, 1790
*	Brazil, Peru	Clusius	1605
*	West Indies	Bauhini, C.	1623
*	Brazil	de Laet	1625, 1630
*	Americas	Parkinson	1640
1637-1644	Pernambuco	Marcgrave	1648, 1658
*	Brazil, Peru	Bauhino, J.	1650
pre-1653	New Spain	Cobo	1653
pre-1654	French Antilles	Dutertre	1654
*	Americas	Jonstonus	1662
*	Americas	Ray	1686
1687-1689	Jamaica, Barbados	Sloane	1696, 1707
*	Americas	Plukener	1691
1693	Guadeloupe	Plumier	1693, 1703
1697	Guadeloupe	Labat	1724

* Indicates European compiler describing and illustrating material collected by others in New World.

Oviedo first published the common Amerindian name *mani* for the peanut, the name still used in Cuba and Spanish South America. In chapter V, he writes (Oviedo, 1535) "Concerning the *mani*, which is another fruit and ordinary food which the Indians have on Hispaniola and other islands of the Indies: Another fruit which the Indians have on Hispaniola is called *mani*. They sow it and harvest it. It is a very common crop in their gardens and fields. It is about the size of a pine nut with the shell. They consider it a healthy food . . . Its consumption among the Indians is very common. It is abundant on this and other islands" (Tr.: M. Latham and R. Hammons).

A later edition (1851) states that the *mani* is "sown and grows underground, which upon pulling by the branches it is uprooted and on the runners there are found such fruit located inside pods as in chickpeas, . . . which are very tasty when eaten raw or roasted." (Tr.: M. Latham and R. Hammons). This statement does not appear in the earlier edition (Oviedo, 1527).

Although South America is the unquestioned place of original cultivation, it is significant that this earliest publication documents the wide distribution of this important crop plant that had occurred before the discovery of America.

Ulrich Schmidt, historian of the Spanish conquests of the Rio de la Plata basin, 1534-1555, frequently mentions the peanut (*manduiss*, *mandubi*) as an important plant in these warm lands. A German mercenary, Schmidt (1567)

encountered the peanut as early as 1542 when his expedition up the Paragua from Asunción met Surucus Indians who had "maize and mandioca and also other roots, such as *mandi* (peanut) which resembled filberts." (Tr.: M. Latham and R. Hammons).

The peanut was described unmistakably by Jean de Léry, a Calvinist missionary with the Huguenot colony founded in 1555 on an island in Rio de Janeiro bay (de Léry, 1578): "The savages also have fruits called *manobi*. They grow in the soil like truffles connected one to the other by fine filaments. The pod has a seed the size of hazelnut and a similar taste; it is grey brown and the hull is the hardness of the pea. Although I have eaten this fruit many times, I cannot say whether the plant has leaves or seeds . . ." (Tr.: T. E. Stewart).

The first purposeful introduction of the peanut into Europe went unrecorded. Useful and exotic American plants were commonly collected and introduced into Europe from the time of Columbus' first voyage. Therefore, it is probable that the peanut was carried to Europe early in the 16th century. However, the earliest recorded introduction appears to be that reported in 1574 by Nicolas Monardes, a Seville physician. Monardes (1574) also failed to associate the fruit with a plant. His description follows:

"Thei sent me from the Peru, a fruite very good, that groweth under the yearth, and very faire to beholde, and of a very good taste in eatyng, this fruit hath no roote, nor doeth produce any plante, nor plante doeth produce it, . . . It is of the greatnesse of half a finger rounde, . . . it is of a baie coullour: It hath within it a little cernell, . . . the rinde of it is taunie, and somewhat white, parted into two partes . . . It is a fruite of good savour and taste, and eatyng of it, it seemeth that you eate Nuttes.

"This fruit groweth under the yearth, in the coaste of the River Maronnon, and it is not in any other parte of all the Indias. It is to bee eaten greene and drie, and the beste wai is to toste it, . . . It is a fruite in greate reputation, as well as emongest the Indians as the Spaniades, and with greate reason, for I have eaten of theim, whiche thei have brought me, and thei have a good taste. . . ."

About this time, the Portuguese naturalist Gabriel Soares de Souza, who lived in Brazil, 1570-1587, gave the first detailed description of the plant, its cultivation, and artificial curing by smoke drying (Soares, 1587):

"Chap. 47: In which is stated the nature of the *amendois* and their use.

"We have to pay special attention to the peanut because it is known only in Brasil, which sprout under ground, where they are planted by hand, a hand's breadth apart, the leaves are similar to those of the Spanish beans and have runners along the ground. Each plant produces a big plate of these peanuts, which grow on the ends of the roots and are the size of acorns, and has a hull of similar thickness and hardness, but it is white and curled and has inside each shell 3 and 4 peanuts, which have the appearance of pinon nuts, with the hulls but thicker. They have a brownish skin from which thy are easily removed as with the pinon nuts, the inner part of which is white. Eaten raw, they have the same taste as raw chick-

peas, but they are usually eaten roasted and cooked in the shell, like chestnuts and are very tasty, and toasted outside of the shell they are better . . . These peanuts are planted in a loose humid soil the preparation of which has not involved any male human being; only the female Indian and halfbreed females plant them; and the husbands know nothing about these labors, if the husbands or their male slaves were to plant them they would not sprout. The females also harvest them, and as is the custom, the same ones that planted them; and to last all year they are cured in smoke and kept there until the new crop.

"Portuguese women make all the sweet things from this fruit which are made from almonds, and which are cut and covered with a sugar mixture as confections . . . February is the right time to plant peanuts, and they are not beneath the ground any longer than May, which is time to harvest the crop, which females do with a much celebration." (Tr.: T. B. Stewart).

After Cortés conquered Mexico, many reports of the natural resources of the land were sent to Spain. Few of these documents are available for study, and the early distribution and use of the peanut in Mexico are not yet clear.

During 1558-66, Friar Bernardino de Sahagún compiled an encyclopedia in Nahuatl of the Aztecs but it was not published until 1829. Sahagún (1820-30) mentioned the folk-medicine use of *tlacacauatl* (Nahautl for peanut). He did not, however, list peanuts among the principal food plants of central Mexico. It is not recognized among the record of tribute that Montezuma extracted from tribes the Aztecs conquered.

The peanut apparently was not of great importance in early Mexico. It may actually have been introduced from the West Indies by the Spaniards as implied by Hernandez (1604). If this was so, Krapovickas (1968) suggests that the introduction was probably of the *hypogaea* type grown in the Antilles. The compound name *tlacacauatl*, or earth cacao, has been cited as evidence of its late arrival in Mexico. Recent archeological evidence, cited subsequently, clearly shows an antiquity of cultivation in Mexico, but the absence of any other species of *Arachis* is substantive evidence that the cultivated peanut is not native to Mexico, nor was it domesticated there.

In a discussion of food plants used in South America, José de Acosta (1588) notes "In those countries they have divers sortes . . . I remember . . . *mani*, and an infinite number of other kinds."

The peanut did not go unnoticed. Early in the 17th century descriptions and illustrations appeared regularly in the European literature, and the plant soon became known in botanical gardens. Many early naturalists were compilers, annotators, illustrators, copiers, and editors who systematized the observations of others and rarely saw the plants whose descriptions and figures they put into their folios. Among those describing and illustrating the peanut during the 17th century were Clusius (1605), Bauhini (1623), de Laet (1625), Parkinson (1640), Bauhino (1650), Jonstonus (1662), Ray (1686), and Plukenet (1691). In sharp contrast are the works of Marcgrave (1648, 1658), Cobo (1653) and the French priests Dùtertre (1654), Labat (1742) and Plumier (1693, 1703), whose descriptions and figures were made in most cases from living material observed and collected in nature. Sloane (1696, 1707-25) qual-

ifies as a collector but he also had access to vast collections made by others. This fits him more properly in the former group.

Monardes' book, revised in 1574, was published in English in 1577 and in several other languages by the early 1600's. Clusius printed Latin editions in 1579 and 1605. In the latter work, Clusius (1605) cited Monardes' and de Léry's descriptions of the peanut and suggested that they were probably of the same fruit. Because neither of these writers actually saw the peanut plant, and de Léry and Monardes observed fruits of distinctly different botanical varieties, the question of proper identity, once raised by Clusius, was to preoccupy natural historians for centuries.

Clusius seems to be the first to draw the peanut seed. His illustration (1605), reproduced as Figure 1A, shows seed with a net-veined testa and a pronounced hilum.

In describing this figure, Clusius says "the kernel has merely been removed from its shell, a strong covering, distinguished by its dark thin membrane and many veins, and cleaving firmly to the kernel; the substance itself is firm, shining white, as if the flesh of the Indian nut is baked, endowed indeed with no odor, but filled with a pleasing taste." (Tr.: B. W. Smith).

Gaspard Bauhin (1623) lists *mani* and *mandues* among the "root" crops for the West Indies and other areas of Hispanic America but peanut does not appear in his listing of Thomas Hariot's "root" crops from Virginia.

The first figure of the peanut fruit beaked pods of a Brazilian cultigen with 2 or 3 seed cavities (see Figure 1B) appears to be that of Jan de Laet (1625), naturalist, editor and a managing director of the Dutch West India Company. His ship captains brought many plant collections from the New World. De Laet's 1625 description follows de Léry's (1578) text. In the second Dutch edition, de Laet (1630) published the illustration of peanut fruits reproduced as Figure 1B (This figure also appears in the enlarged Latin edition of 1633 and in the French edition of 1640, with a slightly revised description).

Parkinson (1640), a London apothecary and director of the Royal Gardens at Hampton Court, described the peanut as:

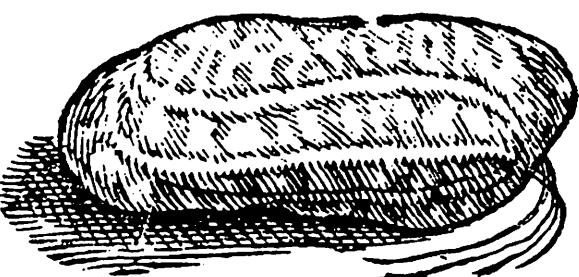
"Arachus γυποΓΕΙΣ Americanus, the underground cicheling of America or Indian Earth-nuts . . . are very likely to grow from such like plants as are formerly described, not onely by the name but by the sight and taste of the thing it selfe, for wee have not yet seene the face thereof above ground, yet the fruit or Pease-cods (as I may so call it) is farre larger, whose huske is thicke and somewhat long, round at both ends, or a little hooked at the lower end, of a sullen whitish colour on the outside, striped, and as it were wrinkled, bunching out into two parts, where the two nuts . . . lie joyning close one unto another, being somewhat long, with the roundnesse firme and solide, and of a darke reddish colour on the outside, and white within tasting sweet like a Nut, but more oily . . . and the last growth in most places of America, as well to the South, as West parts thereof, both on the maine and Ilands."

The Dutch wrested the northeastern part of the Brazilian coast between Natal and Porto Calvo from the Spanish in 1630. Count Johann Mori (Maurice) of Nassau-Siegen, Governor-General of these possessions in 1636

Fig. 1. Earliest illustrations of peanut seed and fruit.



A. Peanut seed (after Clusius, 1605).

B. Beaked pods of a Brazilian peanut with 2 or 3 seed each (after de Laet, 1625).
- By permission of the Houghton Library, Harvard University.

44, instituted a scientific exploration of the environs of Pernambuco (or Recife) where he resided. This exploration was made by his personal physician, Willem Piso, and the German naturalist George Marcgrave of Liebstad, a close friend of Maurice's, during 1638-41. Their notes and figures were published, in part, under the editorship of de Laet who was literary executor after Marcgrave's untimely death in 1644.

Their "Natural History of Brazil" is composed of Piso's four books *De Medicina Brasiliensi* and Marcgrave's eight books *Historiae Rerum Naturalium Brasiliæ*. Marcgrave (1648, 1658) called the peanut by its Brazilian Indian name *mundubi* and showed the fruits growing on the roots, an error perpetuated well into the 20th century (see Smith, 1950). Marcgrave's illustration, reproduced in Figure 2 shows 2-seeded fruits, quadrifoliate leaves, with leaflets opposite. Flowers appear in the axillary position.

The text of Marcgrave's (1648) description follows:

"Vol. I, p. 37, *Mundubi* - A Brazilian herb rising to a foot or two feet in height, stem quadrangular or striate, from green becoming reddish, and hairy. From different directions branchlets are sprouted forth, at first as if enclosing the stem and accompanied by narrow, acuminate leaflets; soon they have a node and are extended three or four digits in length; in a row; four leaves on any branchlet, two always opposite each other, a little more than two digits long, a digit and a half broad, a pleasing green above, like trefoil, becoming a little whitened below, finished with almost parallel, conspicuous nerves and fine veinlets, covered also with scattered hairs. Near the origin of the branchlets which bear the leaves, a pedicel appears about a digit and half long, attenuated bearing a little yellow flower, reddish along the edges, consisting of two petals in the manner of vetch or trefoil. The root of this (plant) by no means long, attenuated, intricate, filamentous, from which pods are grown from somewhat whitish to grey, of the form of the smallest cucurbits, oblong, fragile, of the size of a balsam fruit: any one contains also two kernels, covered with a rich dark red skin, the flesh within white, oleaginous, tasting of pistachio nuts, which are recommended baked and are served during dessert . . . The whole fruit being shaken, the seeds rattle within.

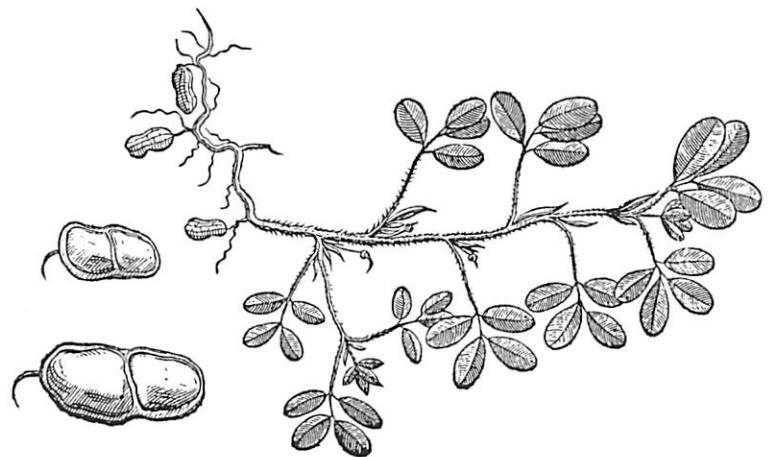
"Compare Monardes cap. LX *Ancbic* of Peru, the same is called *Mani* in Spanish, as reported lib. X, cap. 2 of the description of America." (Tr.: B. W. Smith).

There is apparently no reference to the peanut in Piso's section of the 1648 publication. Ten years later he issued a second edition under the title *De Indiae Utriusque re Naturali et Medica*. The first part of this folio, *Historiae Naturalis et Medicinali Indiae Occidentalis*, consists of Marcgrave's "Natural History of Brazil" and Piso's "Medicinal Plants" interwoven to form 5 books. Marcgrave's description of the peanut re-appears in book IV, cap. 64, page 256 (Marcgrave, 1658). The illustration in the 1658 edition (reproduced as our Figure 2B) not only shows the plant branch and 2 pods from the 1648 publication, but also adds the 2 pods from de Laet (1625), together with a 3-segmented opened pod.

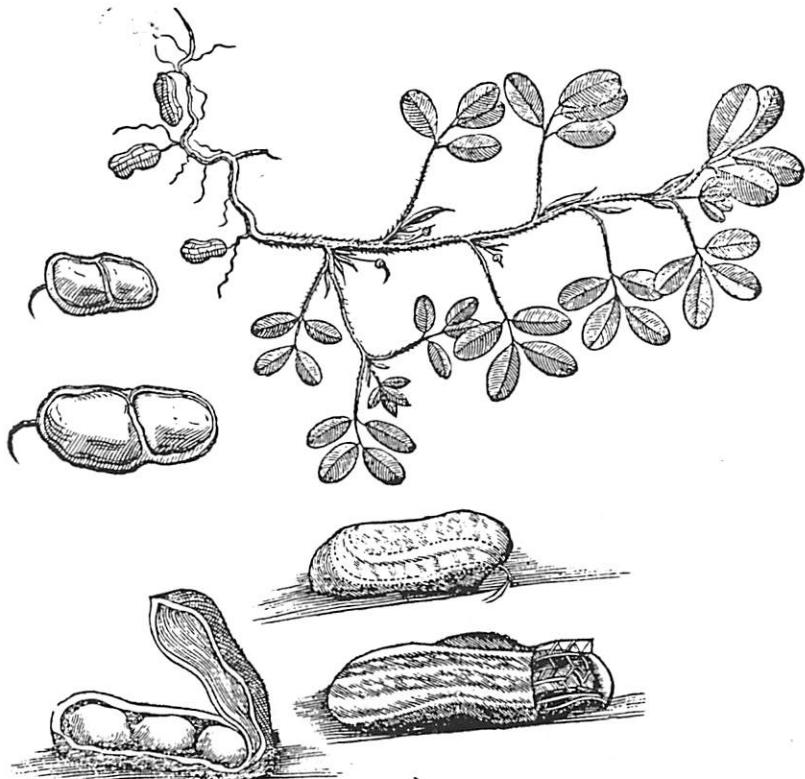
Bauhin (1650) quoted de Léry's (1578) description of the peanut, but questioned Clusius' (1605) interpretation of it, and cast doubt on Monardes' (1569) description of the fruit. Such botanical confusion persisted for three centuries (Smith, 1950).

In a classic study of Inca history compiled between 1612 and 1653, Father

Fig. 2. Plant and several fruits of Brazilian peanuts, ca. 1640.



A. Portion of plant with two-seeded fruit, illustrated in Marcgrave, 1648.



B. Several additional fruits, of another type, were added to the previous material for the illustration in Marcgrave, 1658. The pods appear to be those from de Laet (1625) shown in our Figure 1B.

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Bernabé Cobo (1653) describes the peanut:

The *maní* is a root different from all the other of the Indies, the plant is short and very close to the ground. The fruit of this plant are small roots, each are the size of the small finger somewhat shorter, with a whitish skin very wrinkled and are thin and slender that when slightly pressed between the fingers it breaks; inside of it each root has 2 or 3 seeds very much resembling the pinenuts, covered by a red skin very slender, like that of the almond, which when removed leave the seed very white like the husked pinenut, it divides into two parts like the bean. This root is eaten as a fruit, it has good taste cooked or toasted;.... It makes good nougat, confection, and other treats.

"The way this plant produces fruit is by having thin 'veins' or slender roots as in sweet potato and to uproot it, the plant is pulled and comes out with many little rootlets of *maní*. Quite a few are left in the soil but these are gathered by digging around in the soil...." (Tr.: M. Latham, C. del Valle, & R. Hammons).

Cobo (1653) used Indian vernacular names to document the peanut's diffusion in pre-Columbian America: "This root is called *Maní* in the language of Hispaniola. Mexicans call it *Cacaguate*, and the Peruvian Indians call it *Inchic* in the Quichua language and *Chocopa* in the Aymara language."

The first French botanist in the islands of America, to which the French came in 1625, was Jean Baptiste Dutertre. The Island-Caribs brought the peanut plant to him in Guadeloupe where Dutertre (1654) coined the name *Pistaches*, a name he is thought (André, 1932) to have derived from Marcgrave's (1648) account of their subterranean fruiting. In the location, configuration, and morphology of organs, Dutertre's figure bears a striking likeness to the plant figured in Marcgrave (1648). Moreover, Dutertre's three-segmented pod has the same shape and appearance as the opened pod figured first in the revised edition of Marcgrave's (1658) work (see Figure 2B).

Dutertre describes the peanut as "another plant, whose frutes grow in the earth ... called *Pistache*, because of its shape and taste. It is a little plant that runs along the ground and produces from its small red hairy stems, which are very slender, some short thickened 'queuës,' and four leaflets, similar to sweet clover, and from the junction of these shoots it sends out bright little yellow-and-russet flowers.... This plant produces small grey underground pods, which pop when squeezed: each contains two or three large fruits like a filbert nut, the seed coat is red and the inside is white, oily and of the same taste as the European pistachio." (Tr.: H. Cutler).

Jonstonus (1662) collated the descriptions previously published in Clusius (1605), Nieremberg, Bauhino (1650), de Laet (1625), and Monardes (1569), using Clusius' Latin edition of the latter's book.

John Ray (1686) traced the etymology of the name *Arachidna* used by Parkinson (1640), and compiled a description of the peanut primarily from those published by Parkinson and Marcgrave (1648, 1658).

British naturalists came late to the West Indies. Sir Hans Sloane, physician to Queen Anne, visited Jamaica, Barbados, and St. Kitts in 1687-88. In his technical catalogue of plants, Sloane (1696) described the peanut under the Latin phrase *Arachidna Indiae utriusque tetraphylla* and cited the common name synonomies *manobi*, *mandory*, *mundubi*, *anchic*, *ibimani*, *maní*, *ynchic*, *pistache*,

mandues, earthnuts or pindalls. Sloane refers to at least 14 of the preceding authors who recorded the peanut in the Americas. His frequent references indicate that the peanut was commonly known and used in the islands he visited (1696).

Even prior to the publication of Sloane's Catalogue, Leonard Plukenet (1691) had indexed 8 previous references to the peanut which he called *Senna Tetraphyllas*, and Sloane cited Plukenet. Figure 2 in Plukenet (1691, cf. 1769 edit.) is an especially good illustration of a portion of a branch with leaves and flowers, a pod with 2 seed cavities and a seed. The pod has average reticulation and a moderate beak.

French naturalist Charles Plumier (1693) is credited (André, 1932) with coining the French name "Arachide" for the plant called *manobi* in parts of South America and in the Antilles.

Jean Baptiste Labat, who lived in the French Antilles for 12 years, 1693-1705, give a remarkable description of the peanut, which he calls *Pistaches des Isles*. He reports (1742) that the fruits:

"Came from a plant that is hardly a foot high and which is ordinarily a creeper, because its stem is too feeble to support it. It puts out a lot of slender stems, that are red and velvety, accompanied by little 'queues', which carry leaves almost like sweet clover and nasturtium-colored flowers, which are yellow with red at the edges and at the extremities. The flowers are delicate and their short life is due to the fact that they are shrivelled up by the heat of the sun.

"The fruit is found in the earth where it must be looked for. It is attached by filaments to hairs that the roots put out (sic) which come from stems distributed on the surface of the earth, where they enter and produce pods 12, 15, and 18 'lignes' long which are 4, 5, or 6 'lignes' in diameter (a 'ligne' = 2.25 mm). ... The interior is covered with a fine white skin that is smooth and lustrous; the outside is brown colored with white streaks, and ridges go from one end of the shell to the other and these are totally connected by a network of lines which divide the surface into a number of small areas. The seed which is contained in these pods has the shape of an olive when it is single, but ordinarily there are two or three in a pod where they take up the entire space so tightly that they take on different shapes. The seed are covered with a reddish seed coat when they come out of the earth, but the color changes to gray when the fruit is dry. The skin adheres lightly to the fruit when it is fresh and one has only to squeeze it between the fingers to remove it. When dry it is difficult to remove. The meat that it covers is white, compact and dense and it has the odor and taste that resembles an acorn. When the fruit is roasted in its pod the seedcoat becomes powdery and the white meat which it surrounds turns a greyish color and acquires the taste and aroma of roasted almonds." (Tr.: H. Cutler).

Concerning the alimentary uses of the peanut, Labat (1742) notes the belief "that these fruits are good for the stomach, ... (but) eating them raw exaggerates their bad taste and they are indigestible and cause great heating.... They produce less undesirable effects when roasted, since they stimulate the appetite and thirst: people use them to make sugar peanuts, marzipan, and they put into hash and stews as a substitute for chestnuts...."

Labat critically examined the three statements about the peanut given by his colleague Dutertre (1654), *viz.*, that when overindulged they produce headaches, that they are used to make poultices to heal snakebites, and that the expressed oil is like sweet almond oil. In evaluating these claims, Labat (1742) says: "I have not experimented at all, nor have I heard tell that this fruit caused anyone headaches. I am very sure that no one has ever thought to cure snakebite with such a remedy, and, during the many years that I spent in the islands, I have not heard of anyone recommending expressing the oil from the *Pistaches* even though we might often enough have had an urgent need for it."

From Labat's comment on the persistence of the peanut in volunteering in fields where grown, it appears probable that the type he described possessed appreciable fresh-seed dormancy. Labat's figure (1742) of the peanut is a reverse of Dutertre's (1654) illustration. Both figures seem identical with the plant branch and opened pod figured in Marcgrave (1658) (our Figure 2B).

Plumier visited Guadeloupe in 1697 while Labat was there. In a subsequent publication, Plumier (1703) described and figured the peanut fruit, flower parts, and seed, but he did not show vegetative plant parts.

At the beginning of the eighteenth century the serious student of the peanut had available for use more than 20 historical or botanical works describing or discussing the peanut, including the rather comprehensive reviews or bibliographies of Jonstonus, Ray, Plukenet, Sloane, and Labat. In addition to the widely circulated Latin editions, nearly all of these had appeared in most of the major languages of western Europe.

The only major reference currently known from the first 2 centuries of the discovery which was not available before 1700 is the important work of Soares de Souza (1587), which was not published until 1825. All of the authors cited in Table 1 knew that the peanut was native to the Americas.

ARCHAEOLOGICAL EVIDENCE

The New World origin of the cultivated peanut was conclusively demonstrated by the finding of fruits of this crop in the prehistoric cemetery of Ancón on the Peruvian coast near Lima (Squier, 1877). Many graves contained terra cotta jars holding various still-well-preserved foods among which the peanut was conspicuous. Numerous specimens since recovered there are associated with the early Ancón culture dating approximately 500 to 750 B.C. (Towle, 1961).

Farther north near Trujillo, funerary vases were decorated with replicas of peanut pods sculptured in relief. Some were mold-made vessels where peanut pods had been used when making the mold. At Chimbote, an earthenware pan with peanuts painted on the handle was recovered from a grave.

Bird's discoveries (1948, 1949), at about latitude 8° S on the coast-line of the Chicama Valley, have given the best dates yet established for the occurrence of peanuts in Peru. He places the appearance of peanuts prior to maize at Huaca Prieta and probably contemporaneous with warty squash. Since neither peanuts nor warty squash appear in the pre-ceramic refuse, they may have been introduced in association with the first pottery. Carbon dating for the beginning of the ceramic period, and thus for peanuts, ranges from 1200 to 1500 B.C.

The usual cultivar of *A. hypogaea* found in the coastal sites of Peru has the long, slender, ribbed pod with the sharp, recurved beak typical of subsp. *hypogaea* var. *hirsuta* (Krapovickas, 1968). Their similarity, in external morphology and seed number, to peanuts sold today in Lima markets indicates the extensive cultivation practiced in ancient Peru.

In addition to the predominant type, Towle (1961) recovered a smaller fruit from a site at Supe, Peru, that dates to the Early Ancón period. Its modest reticulation and lack of dorsal humps suggest selection under domestication. This second type resembles several cultivars grown in the USA in recent years (See Plate I, facing p. 352 in Peanuts - Culture and Uses, 1973).

Archaeological evidence for the antiquity of peanuts has recently been found at Pampa Grande and Purmarca in northwest Argentina and the cultural periods associated with these remains are currently under investigation (A. Krapovickas, pers. comm., 1980).

The discovery of ethnobotanical samples of cultivated peanuts in Coxcatlan cave in the Tehuacan valley of Mexico established the peanut as a cultigen on both American continents for centuries before their discovery by Europeans. These are dated about 100 A.D. Although present in later phases (A.D. 800-1540), they were never abundant (MacNeish, 1965; Smith, 1967). There are no known illustrations of peanuts in surviving Aztec codices.

Phytomorphic representations and ethnobotanical remains of peanut have yet to be found in Brazil and Bolivia, where the climate is less favorable for the preservation of archaeological plant remains. As more material becomes available, it should be possible to assess the interplay among different areas of the New World on the basis of changes in the cultigen(s). Present evidence indicates that the peanut was an introduced crop of minor importance in Mexico. In contrast, contact between the arid coast of Peru and the Gran Pantanal regions was prolonged and effective, as shown by the presence of peanuts, manioc, and *Capsicum chinense*, which were domesticated east of the Andes, in the early ceramic cultures to the west.

Thus, for the present, the deductions drawn from the archaeological data must be supplemented and extended by evidence from the natural historians and other disciplines.

GEOGRAPHICAL ORIGIN

The peanut today is an important food crop generally distributed in the tropical, sub-tropical, and warm temperate zones of the earth. All wild species in the genus are found only in South America. They are distributed from northeastern Brazil to northwestern Argentina and from the south coast of Uruguay to the northwestern Mato Grosso - a land area between latitudes 0° - 35°S and longitudes 35° - 66° W, south of the Amazon and from the eastern base of the Andes to the Atlantic (Gregory and Gregory, 1979; Gregory et al., 1980).

Krapovickas observed that the center of diversity of *Arachis* is in the Mato Grosso of Brazil. Here are found most of the sections into which the genus has been divided (Krapovickas, 1968). Gregory et al. (1980) have postulated a Planalto profile from Corumbá to Joazeiro, Brazil, as the center of the area from which the present distribution of *Arachis* arose.

The specific place of geographical origin for a plant known from archaeological data to have been under cultivation for 3,500 years is observed by human migrations and crop-plant exchanges during these centuries. A vast number of morphological forms have evolved. A taxonomic synthesis of this variation appears in Smartt and Stalker, Chapter 2.

Origin of the Cultivated Peanut

Krapovickas (1968) hypothesizes that the cultivated peanut originated in southern Bolivia-northwestern Argentina. There exists in this area an important center of variability for subsp. *hypogaea*, the subspecies with the greatest affinity with both the wild annuals and with the *A. villosa* group. The eastern foothills of the Andes have a great range of ecologically distinct environments. There is abundant evidence for natural hybridization and the establishment of recombinant types.

The diversity of uses is further evidence of the antiquity of peanuts in this area of small-scale cultivation. The seeds are eaten at one of several stages — from immature to fully ripe, raw or cooked. They are boiled, broiled, roasted, crushed, or ground and mixed with other food. The whole young pods are occasionally used in soups after boiling. In addition, peanuts are used to make a beer and a non-alcoholic drink. The oil is also processed into soap.

Cardenas (1969) supports a Bolivian origin. He reports a wide range of variation in pod and seed morphology.

The cytotaxonomic background of *Arachis* and a possible mode of evolution for *A. hypogaea*, and the varietal classification of this species are treated elsewhere (see Smartt and Stalker, Chapter 2, and Gregory et al., 1980).

The exact origin of the peanut is still unknown and will remain a subject of scientific inquiry. Extensive collections of local landraces of cultivated peanuts by Krapovickas, Rigoni, Pietrarelli, Gregory, Hammons, Langford, Simpson, Banks, Schinini, Zurita, Gibbons, and others are available. Their characteristic patterns of variation will provide additional information on its original habitat.

Dispersion of *Arachis hypogaea*

There is no evidence for pre-Columbian migration of *Arachis hypogaea* to the Old World. The peanut was too valuable not to have been used had it been known (Waldron, 1919). The New World natural historians (Table 1) knew it to be a new species. Although the Dutch found the peanut cultivated in the Moluccas by 1690 (Rumpf, 1747), they had control of Brazil a half century earlier and would have carried it, with other useful plants, to the Netherlands East Indies.

At least 2 distinct forms — a 2-seeded Brazilian and a 3-seeded Peruvian type — were distributed over the world early from South America (Dubard, 1906). Most authorities credit the Portuguese with enriching African agriculture by introducing the peanut there from Brazil, then to the Malabar coast of southwestern India, and possibly to other lands. However, I found no documentation that they did and, if so, when.

The Peruvian (*hirsuta*) type was transported to the western Pacific, to China

and Java (Indonesia), and to Madagascar. Dubard (1906) found a concurrence in morphology and configuration of pods for random samples taken in the last 3 places named, and between these and the "humpbacked" peanuts found in the tombs at Ancón, Peru. These peanuts undoubtedly moved up the west coast from Peru to Mexico, and thence across the Pacific as an item of trade on the Acapulco - Manila galleon line which regularly scheduled crossings for 250 years to 1815 (Krapovickas, 1968).

In all these lands, the peanut became readapted and specialized and returned again from Africa, with the slaves and after them, to tropical America and the United States. We can only speculate on the time and place of the first introduction into the United States (Higgins, 1951). The popular notion that the peanut was first introduced here from Africa on slave ships rests primarily upon an interpretation by Sloane (1707-25) of a statement made by Clusius a century earlier. According to Burkhill (1901), "Clusius (*Rariorum Plantarum Historia*, ii, p. 79, 1601) informs us that the slavers took as food for their captives on the voyage from the Guinea Coast of Lisbon, roots of the sweet potato, 'besides certain nuts,' and these nuts Sloane (Vol. I: 184) identifies as fruits of *Arachis*." But, as Burkhill also pointed out, Clusius' information does not place Sloane's identification beyond question.

A small-podded peanut with the spreading runner growth habit (var. *hypogaea*) was the earliest form successfully introduced into the southeastern United States. This full-season peanut was known variously as African, Wilmington, North Carolina, Georgia, or Southeastern runner. Although it probably came from Africa, its pod and seed morphology, growth habit and branching pattern agree with those peanuts described and illustrated in the Antilles (West Indies) by 17th Century French naturalists (Dutertre, 1654; Plumier, 1693; Labat, 1742). Thus, direct introduction from these Caribbean Islands to the United States cannot be ruled out.

Soares de Souza (1587) recorded plants having a comparatively short growing season (February to May) and pods containing 3 to 4 seeds under cultivation in Brazil in the 1570's. This part of his description agrees with the local forms of peanuts collected from subsistence cultivators in that area (Plate I facing p. 352, Gregory et al., 1973).

More information is available concerning the spanish (*vulgaris*) type. The Guarani area of northeastern Argentina, Paraguay, and southern Brazil is the center of variation for *vulgaris*, and it was distributed from this region. Krapovickas (1968) reports that F. L. Gilii and G. Xuarez documented its introduction into Europe. They said the seed came in 1784 from Brazil to Don José Campos in Lisbon and part of these were sent on to Rome. Apparently the spanish type was spread by Tabares de Ulloa (1798) in Valencia and from there taken to the south of France by Lucien Bonaparte in 1801 (André, 1932; Burkhill, 1901). Dubuc (1822) records that the oil was first extracted in Europe by the Spaniards who cultivated the crop for oil and for preparation of chocolate-covered peanuts. Tabares, later Bishop of Valencia, invented the first machine to shell peanuts. The description of this device appeared in the 1805 supplemental issue of Abbé Francois Rozier's *Traité Général d'Agriculture*.

A small-podded type requiring a relatively short growing season and adaptable to diverse environmental conditions, the spanish peanut was introduced into the U. S. from Malaga, Spain, in 1871. Thomas B. Rowland of

Norfolk, Virginia, procured 227 kg which he distributed free among planters in the area (Anon., 1918b). An earlier consignment arrived in 1868 from the same area (McClenney, 1935), but apparently the seed were not saved. Rowland invented the first peanut polisher, which operated by one-mule power, but nevertheless embodied the principle of all subsequent polishers.

The origin of the large-seeded virginia type (var. *hypogaea*) is still uncertain. The Bolivian and Amazonian geographic regions have been associated with this type (Gregory et al., 1980), but there is obvious need for further clarification. A considerable range of secondary variation occurs in the African continent. McClenney (1935) thought the large-seeded type was cultivated in Virginia as early as 1844 by a Dr. Harris; other records show that it was sometime after the pioneer work of Rowland before the jumbo peanut was introduced. It was not initially popular as a food. The virginia peanut of U. S. commerce is thought to be a chance hybrid, combining the large size of the jumbo with the prolific "running" trait of the old-time virginia (african) runner (Anon. 1918a).

The valencia type (var. *fastigiata*) peanut spread throughout the world from Paraguay and central Brazil (Krapovickas, 1968). Dubard (1906) described the fruit, but Beattie (1911) apparently coined the name, referring to a recent introduction into the United States from Valencia, Spain. This term soon characterized a group of cultivars with similar traits.

The Waspada cultivar, which matured in 4 to 5 months, may have been the first purposeful introduction of a particular type for a specific agricultural use. It was introduced into Java in 1875, tested in unreplicated trials, and released to growers as a replacement for the common form which had a growing period of 8 to 9 months (Holle, 1877).

Ethnological Comparisons

Ethnological studies of the major Indian tribes of South America document the widespread culture of the peanut throughout most of the area and provide indirect evidence for its domestication long before the Spanish Conquest. J. H. Steward and his collaborators (1943-59) trace its dispersion, through records of the food plants sown and cultivated, in the 6 volumes of the "Handbook of South American Indians." The following account, documented in Hammons (1973), summarizes the common use of the peanut as described in Stewart's Handbook.

The Spaniards found some 40 food plants, including peanut, in the Andean valleys. The Mojo and Bauré Indians of eastern Bolivia had large plantations where they grew peanuts preferably along sandy beaches.

Sixteenth century Indians in upper Paraguay had peanuts as one of their main vegetable crops for trade in the markets of Asunción. Peanuts were found with the aborigines throughout the vast tropical forest where they were grown as a staple crop by tribe after tribe on farms in natural or man-made clearings. In central Brazil, the large gardens of the Tapirape guaranteed them an economy of abundance. Peanut, a principal cultigen, was planted and harvested by women, as Soares (1587) had noted on the coast. The Arawak grew peanuts with the aid of irrigation.

LINGUISTIC AFFINITIES

As Garcilaso (1609) noted, the Spanish introduced the name *mani* from the West Indies and substituted it for the Incan *yncbic* in common use in Peru. Since that time, many attempts through linguistics have been made to trace the dispersal of the peanut. The Spanish in Mexico however, accepted the Nahuatl name, *cacahuate*, modified it slightly and took it to Spain, where the peanut is known as *cacahuite*. The Portuguese name *amendoim* apparently stems from a number of cognate words still used in Brazil. Vernacular names have been studied by Waldron (1919), Williams (1928), and Chevalier (1933).

Amerindian names for peanut were correlated by Krapovickas (1968) with the peanut's diffusion throughout South America. In the Tupi-Guaraní region, numerous variants of *manduvi* occur; in the remainder of the continent, the vernacular names show little linguistic similarity. Variant forms of *manduvi* appear in the eastern Andean foothills interspersed with other names of Arawak affinity. The Arawaks inhabited a vast area extending from the Caribbean to the heart of South America as far as the Bolivian border with the Chaco.

Krapovickas (1968) holds that the presumed area of origin of *Arachis hypogaea* is in a region in which Arawak linguistic influences predominate. Although he does not necessarily conclude that the Arawaks were responsible for the spread of the peanut from its center of origin to the Caribbean Islands, that is a tenable hypothesis, consistent with the available evidence.

Further exploration in 1978, 1979, and 1980 brought new material for both *Arachis hypogaea* and its wild relatives. Studies of these populations will provide additional information on the origin and diffusion of the peanut.

INDUSTRIAL DEVELOPMENTS

Industrial development of the peanut followed the world-wide shortage of oil in Europe during the first few decades of the 1800's. Credit for initiating the commercialization of peanuts in West Africa is difficult to fix with any precision because conflicting claims fail to differentiate between samples imported for experimental purposes and shipments to mills for crushing. Once the trade was initiated, peanut exports increased at a phenomenal rate. Gambian peanut exports to Britain, for example, went from 213 baskets in 1834 to 47 tons the year following and had increased to thousands of tons a year by the early 1840's (Brooks, 1975).

The first recorded American imports from the Gambia were in 1835, and American purchases dominated the Gambian market from 1837 to 1841. Americans were interested in West African peanuts for a different reason than the Europeans—Americans relished roasted peanuts (Brooks, 1975).

French industrialists undertook experiments of their own during the 1830's. Jaubert, a Gorée trader who had sent a sample of peanut oil to Marseille in 1833, is credited (Flückiger and Hanbury, 1879) with initiating the industry with a shipment of 722 kg in 1840, when France reduced the tariff on peanuts (Brooks, 1975). The first large quantity of peanuts was imported from the Cape Verde Islands to Marseilles in 1848 and since that time it has been one of the most important raw materials used in the French oil industry (Schlossstein, 1918).

In the United States the increased need for oil for various uses has caused an expansion in production in times of war. Until the Civil War, it was grown mainly in gardens of the South. Between 1865 and 1870, the crop doubled and trebled. Other spurts occurred in the late 1890's.

As the boll weevil became a serious menace to the cotton crop, farmers in Alabama, Georgia and the Carolinas turned to the peanut for relief during the decade from 1909. Acreage expanded rapidly during World War I as better equipment became available for planting and harvesting the crop. Some 11,800,000 kg of peanut oil was processed in the U.S. in 1916 at 50 mills—mostly converted cottonseed oil mills. Agriculturists and businessmen of Coffee County, Alabama, raised \$3,000 to erect a monument in 1919 in tribute to the boll weevil for diversifying agriculture.

Until about 1900, peanuts were consumed mostly roasted in the shell. An effort was made in 1894 to popularize peanut butter as a nutritious, easily digested health food at the Sanitarium at Battle Creek, Michigan. Dr. John H. Kellogg, director of that institution, obtained the first 2 patents (U. S. Pat. 580,787, April 13, 1897; U. S. Pat. 604,493, May 24, 1898) for making peanut butter. Joseph Lambert, formerly employed at the Sanitarium, began in 1896 to manufacture and market equipment for making peanut butter. Three small machines, a roaster, a blancher, and a hand nut-grinding mill, constituted the original peanut butter outfit. Lambert soon changed to the manufacturing of machinery alone (Grohens, 1920). By 1899, several brands of peanut butter were on the market. Peanut production and commercial use for food manufacture expanded rapidly thereafter as equipment was developed for many phases of peanut processing.

About 1901 two developments occurred that expanded the market immensely. In Chicago, F. W. and H. S. Mills brought out the penny-in-the-slot peanut machine; and in New York and Norfolk, confectioners began to make peanut candy on a big scale. Within a few years, more than 30,000 of the machines were in use, giving great impetus to the Spanish peanut in North Carolina (Anon. 1918b).

By 1900, the industry had reached the point where, if some less laborious method was not found than hand picking the pods from the vines, peanut culture would have to be discontinued. Several attempts were made to construct a machine for this purpose. From these experiments the first successful machine was made in Richmond, Virginia in 1904. F. F. Ferguson and J. T. Bentall received U. S. Patent No. 808,442 for this picker on December 26, 1905.

From 1920 to 1940 the area in U. S. production and yield/ha remained relatively stable. In 1941, peanuts for oil were designated by the U. S. Government as an essential crop. Area and total production expanded dramatically and one result was the demonstrated need for improved technology. Breeding programs accelerated the development of new cultivars. Date-of-planting, spacing, and leafspot control studies provided a basis for attaining higher yield per unit area.

However, 2 developments in the late 1940's made the most profound impact upon the U. S. production. First, between 1948 and 1950, a reduction in demand led to establishment of a fixed production area. Farmers responded by applying available technology in a production package that escalated yields. Second, in 1948, W. D. Kinney (USDA) and J. L. Shepherd (Univ. Ga. Co-

astal Plain Station, Tifton, Georgia) developed a once-over mobile peanut combine, which was quickly adopted by the industry. These were the forerunners of many innovations in research which are developed more fully in other chapters of this book.

ACKNOWLEDGMENTS

This chapter draws heavily upon information published by the author (Hammons, 1973) in PEANUT: CULTURE AND USES, American Peanut Res. and Educ. Assoc., Inc.

Thanks are due to H. G. Cutler, M. Latham, and T. B. Stewart, ARS-USDA, Tifton, GA; Ben W. Smith, North Carolina State Univ., Raleigh, NC; and C. G. del Valle (formerly with the Georgia Coastal Plain Station, Tifton, GA) for assistance with the foreign language translations.

P. Gillier, IRHO, Paris; A. Krapovickas, IBONE, Corrientes, Argentina; Ben W. Smith, NCSU, Raleigh, NC; E. Cheek, CPES, Tifton, GA; and the National Agricultural Library, USDA, Beltsville, MD, were most helpful in obtaining copies of publications cited in this chapter.

Amram Ashri (Israel) and J. Smartt (England) made critical reviews of the chapter and offered many constructive suggestions.

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