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SOME OBSERVATIONS ON THE EARLY HISTORY OF THE COCONUT IN THE NEW WORLD[1]

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Some years ago, while engaged in a study of the distribution of aboriginal liquors among the Indians of Mexico and Central America, I became interested in the history of *tuba,* a coconut wine widely made in the State of Colima on the Pacific coast of Mexico. My first task was to determine whether the beverage was of pre-Columbian origin, but this apparently simple problem was found to have so many complexities and ramifications that it became necessary to examine the whole question of the origin and spread of the coconut. In the present paper I want to discuss the evidence regarding the aboriginal occurrence of the coconut in the New World, and to examine in some detail the possibility of oceanic dispersal.

1 This paper grew out of a chapter in my dissertation for the Ph. D. degree (*Aboriginal Drink Areas in New Spain,* University of California, Berkeley, 1940). Much of the background material was gathered in 1938-39 on a pre-doctoral field fellowship of the Social Science Research Council. To the Council and to Professor C. O. Sauer of the University of California I am much indebted for assistance and encouragement. Dr. L. H. Bailey of the Bailey Hortorium and Dr. B. E. Dahlgren of the Chicago Natural History Museum gave generously of their knowledge of the taxonomy and ecology of palms. Dr. C. H. Edmondson of the Bernice P. Bishop Museum, Honolulu, Hawaii, kindly made available the results of his experiments on the viability of coconuts after immersion in sea water. To all these gentlemen I record my thanks. I wish to state, however, that the opinions expressed in this paper do not always coincide with theirs. Any errors of fact or interpretation are mine alone.

I. *The Pre-Columbian Occurrence of the Coconut in the New World*

Even a cursory examination of the literature showed that there were two widely divergent opinions as to the center of origin of the coconut. The classical point of view on the subject was developed by de Candolle,[2] who, mainly on the basis of varietal diversification, linguistic evidence, and importance in native economies, considered the plant native to the Indonesian area. The contrary position was championed by Cook,[3] whose extensive first-hand experience with New World palms led him to the conclusion that the coconut was of American origin. He attempted to refute de Candolle's arguments, and advanced many others from culture history and botany to support his thesis. Unfortunately Cook found more in the literature than was really there, and the historical evidence, as will be shown, does not support a belief in an American origin of the coconut, though there is no doubt whatever that the coconut palm was already naturalized in some parts of America when the Europeans arrived. Cook's linguistic correlations are also unconvincing, and his botanical arguments, especially in the light of new developments, have lost much of their force. The historical evidence that bears on the problem is as follows:

1. Columbus found "many tall palms" and "large nuts of the kind belonging to India" on the north coast of Cuba about a month after his first landing in the Bahamas.[4] The "Indian nut" was already

[2] A. de Candolle, *L'Origine des Plantes Cultivées*, Paris, 1883.

[3] O. F. Cook, "The origin and distribution of the cocoa palm," *Contrib. Nat. Herbarium*, v. 7, 1901, pp. 257-293; "History of the coconut palm in America," *Contrib. Nat. Herbarium*, v. 14, 1910, pp. 271-342.

[4] Las Casas edited the journal of Columbus, and Navarrete (in his *Colección de los Viajes y Descubrimientos...*, v. 1, p. 60, Madrid, 1825) cites his rendering as follows: "...había un prado muy lindo y palmas muchas y altísimas más que las que había visto: "Halló nueces grandes de las de India, creo que dice, y ratones grandes de los de India también, y cangrejos grandísimos." The fact that Las Casas inserts "creo que dice" is of interest. Cook ("History of the coconut palm in America," p. 281) discusses this matter, and remarks: "Knowing that Columbus had not in reality reached the East Indies, Las Casas was inclined to pass lightly over the evidences that had deceived the Admiral... botanical science affords us no ground for refusing to believe that the statement refers to the coconut..."

known in Europe before the time of Columbus through the accounts of travelers in the East. Both Marco Polo and John of Monte Corvino had written about it as early as the 12th century.[5] Actual specimens of the coconut may have been brought to Europe at various times through the activity of Venetian traders. This testimony from the journal of Columbus is probably not worthy of credence, since it is a second-had statement queried by the contemporary editor, and since there seems to be no other mention of coconuts in the West Indies in the first years of the Spanish contact. When coconuts were introduced into Puerto Rico some decades later, they were brought from the Cape Verde Islands, not from Cuba.[6]

2. The first unimpeachable report of coconuts in America is given by Oviedo,[7] whose description of the palm and the nut is so clear and detailed as to leave no doubt that the species concerned is *Cocos nucifera*.[8] Of its distribution he says:

> Otras palmas hay que llaman cocos la fructa dellas... Estas palmas ó cocos son altos, é hay muchos dellos en la costa de la mar del Sur, en la provinçia del caçique Chiman, é muchos mas en la que llaman Borica, é muchos mas que en ambas partes en una isla del golpho austral que está en mar á çient leguas ó mas de la costa del Perú: lo qual, segund yo supe del piloto Pedro Corço, que en ella ha estado, diçe que desde Panamá hasta ella hay dosçientas é treynta leguas, é que desdel puerto de la Possession de Nicaragua hasta la misma isla hay çiento é treynta leguas.

The province of the cacique Chiman was known as Careta, located "en la costa del Poniente, veynte leguas del Darien, mas al Oçiden-

5 P. V. Mayuranathan, "The original home of the coconut," *J. Bombay Nat. Hist. Soc.*, v. 40, pp. 174-182, September, 1928. Also H. Yule, *Hobson-Jobson*, p. 176, London, 1886.

6 See footnote 23.

7 G. F. de Oviedo y Valdés, *Historia General y Natural de las Indias*, 4 vols., Madrid, 1851-1855, v. 1, pp. 335-336.

8 Chiovenda (E. Chiovenda, "La culla del coco," *Webbia*, v. 5, Florence, 1921-1923, pp. 199-294; 359-449. Reference on p. 418) does not believe that Oviedo found true coconuts in Central America. His doubt is based on Oviedo's mention of the slight roughness of coconut meat after chewing. In this we cannot follow him, since this harshness does exist, as anyone who has eaten coconut meat well knows.

te..." It was evidently a strip along the coast of the Bay of Panama, but must have reached in part entirely across the Isthmus, as Balboa arrived in Careta by boat from Darien.[9] Oviedo himselft came to Darien in 1514,[10] and was able to acquaint himself personally with conditions there. No doubt he saw his first coconut palm soon thereafter, for he writes:[11]

> Todas estas cosas escrebí yo, segund lo que tenía alcançado y entendido y en parte visto destos cocos, quando escrebí aquel reportorio [12] que se imprimió en Toledo año de mill é quinientos é veynte y seys... Después que escrebí el reportorio que he dicho, estuve en la provinçia é punta de Borica, é comí algunos destos cocos é llevé muchos adelante á Nicaragua...

Borica, or Burica, is the peninsula west of the Gulf of Chiriquí, and is roughly bisected by the present Costa Rica-Panama boundary. The reference to Cocos Island is of course unmistakable. He mentions Johan Cabeças [13] as the discoverer of the island, and makes the following additional comments:[14]

> ...[La isla que llaman de Cocos] es muy alta é de muchos palmares é otros arboles... Tienen muchos palmares de cocos a la costa de la mar, que paresçen ser vendiços como los de Burica. Allí se hallaron çiertos ydolos labrados de piedra.

3. Peter Martyr, who collected much valuable information by talking to people who had just returned from the New World, records an additional item about the coconut palms on the south coast of Panama, as well as a remarkably shrewd guess as to their origin:[15]

> The cocoa-tree, which I have above mentioned, grows luxuriantly in the country, especially along the south coast, which

[9] Oviedo, *op. cit.*, v. III, p. 8.

[10] *Ibid.*, v. III, p. 11.

[11] *Ibid.*, v. I, p. 337.

[12] *Sumario de la Natural Hystoria de las Indias*, Toledo, 1526.

[13] *Historia General y Natural de las Indias*, v. IV, p. 219.

[14] *Ibid.*, v. IV, p. 220.

[15] P. Martyr d'Anghiera, *De Orbe Novo*, in eight decades, transl. F. A. MacNutt, 2 vols., New York, 1912, v. II, p. 182. The citation is from Book IX of the fifth decade, written in 1522 or 1523, and the information may have been obtained from one of Balboa's men, or possibly from Oviedo himself. It is well known that Oviedo was frequently a guest in the home of Peter Martyr, where he was subjected to gentle pumping by his genial host. Cf. MacNutt's introduction.

> is washed by the sea throughout a great extent. It is alleged that on one of these beaches, two leagues in extent, which is alternately covered with water and dried up, cocoa-trees grow spontaneously. Some people believe that the germs of these trees were brought by the waves from unknown regions; doubtless those regions of India whence they take their origin.

4. Cook [16] cites Cieza de León in an attempt to substantiate his claim that the coconut is native to the Cauca Valley of Colombia. The original statement is as follows:[17]

> ...está veinte y tres leguas de la ciudad de Cartago y doce de la villa de Ancerma y una del rio grande, en una llanada que se hace entre dos rios pequeños, á manera de ladera, cercada de grandes palmares, diferentes de los que de suso he dicho, pero mas provechosos, porque sacan de lo interior de los árboles muy sabrosos palmitos, y la fruta que echan tambien lo es, de la cual, quebrada en unas piedras, sacan leche, y aun hacen nata y manteca singular, que encienden lámparas y arde como aceite. Yo he visto lo que digo, y he hecho en todo la experiencia.

Cook himself admits that the statement regarding cream and fat would probably not apply to *Cocos nucifera,* but rather to a "distinct species which has been called *Cocos butyracea.*" This plant, now reclassified as *Scheelea butyracea,* is a somewhat distant relative of the coconut, and, as will be pointed out below, closer relatives have been found native to other regions. Hence the testimony of Cieza de León does not help in establishing the pre-Columbian distribution of the coconut, and one of Cook's most important historical points breaks down. For it is precisely here, in the seasonally dry interior valleys at moderate elevations, that he would place the coconut's aboriginal home. The observations of Velasco [18] and of Humboldt and Bonpland,[19] who found true coconuts in the interior of Colombia, are of

[16] "History of the coconut palm in America," pp. 286-287.

[17] P. de Cieza de León, *La Crónica del Perú,* cap. XVII, in *Biblioteca de Autores Españoles, Historiadores Primitivos de Indias,* v. 2. Madrid, 1853, p. 370.

[18] J. Velasco, *Historia del Reino de Quito en la America Meridional,* 3 vols., Quito, 1841-1844, v. 1, pp. 52-54.

[19] A. von Humboldt and A. Bonpland, *Ideen zu einer Geographie der Pflanzen,* Tübingen, 1807. Coconuts are shown on a plate entitled "Naturgemälde der Anden." Additional evidence that the coconut is not native to this area is the statement on p. 22: "...Cocospalmen... ha man noch nirgends ursprünglich wildwachsend beobachtet."

no value for our purpose, since their observations were made more than two centuries later and allow ample time for post-conquest introductions.

5. Cook further mentions Puerto Rico and Brazil as areas where the coconut was distributed before the conquest,[20] citing Acosta, Champlain, and several other writers of the end of the 16th century or the beginning of the 17th.[21] Here he falls into the error of incautions extrapolation backward. Friederici [22] has shown that for both Puerto Rico [23] and Brazil [24] there is documentation regarding the introduction of the coconut in the middle of the sixteenth century.

6. Francisco Hernández, Protomédico de las Indias, spent the years 1570-1577 in New Spain on a commission to study the natural history of the region. In the first major printed edition [25] of his voluminous notes the following pertinent statements are to be found: *a)* The Mexicans call the Indian nut *coyolli*. *b)* The Portuguese call it *coccum* because of its eyes which make it resemble a monkey face. *c)* The coconut flourishes everywhere in the East Indies "and now also in the West Indies," especially in sandy localities by the sea.

[20] "History of the coconut palm in America," pp. 283-286.

[21] An earlier reference is López de Velasco, *Geografía y Descripción Universal de las Indias*, 1571-1574, ed. and publ. by J. Zaragoza, Madrid, 1894. On p. 129, speaking of the city of San Juan de Puerto Rico, he says: "La ciudad tiene de lejos buen parecer, por las muchas palmas de cocos muy altas que hay en ella..."

[22] G. Friederici, *Der Character der Entdeckung und Eroberung Amerikas durch die Europäer*, 3 vols., Stuttgart, 1925-1936, v. I, pp. 115-119.

[23] The information is contained in the *Relación Geográfica de Puerto Rico*, written in 1582 by "el bachiller Santa Clara" and published by German Latorre in his *Relaciones Geográficas de Indias*, Sevilla, 1919, pp. 35-61. The relevant statement (p. 48) is somewhat diffuse: "...ay gallinas venidas de guinea... No son naturales fueron echadas a mano el año de quarenta y nueve por diego corenco canonigo de cabo verde que fue el que trajo los arboles de coco para esta ysla que an multiplicado en abundançia por que el dio orden como hiziesen yngenios de agua conque hazen los açucares."

[24] Gabriel Soares de Souza, in his account of Brazil written sometime before 1587, relates: "Foram os primeiros cocos á Bahia de Cabo Verde, donde se encheu a terra, e houvera infinidade d'elles... não ha [no Brasil] quem lhes saiba... [aproveitar] do muito proveito que na India se faz dos palmares, pelo que não se faz n'esta terra conta d'estas arvores." (*Revista do Instituto Historico e Geographico do Brasil*, v. XIV, 1851, p. 157.)

[25] F. Hernández, *Rerum Medicarum Novae Hispaniae Thesaurus...*, Rome, 1651, cap. XL, pp. 71-74, entitled "De Nucis Indicae, et Cocci vocati arbore."

d) Various kinds of [coconut?] palms are found in different parts of New Spain. "Another kind flourishes on the south coast, and bears fruit much smaller than that mentioned above, yet, I believe, with the same properties." [26]

Hernández applies the Nahuatl word *coyolli* not only to the coconut but also to the areca palm of the Philippines.[27] Since neither of these is the true coyol, it is evident that statement *a)* cannot be accepted. Apparently here was no word at all in Nahuatl for the coconut, as will be shown below. The Portuguese origin of the word coco is corroborated by every other contemporary account. The occurrence of the coconut in the West Indies in the 1570's is obviously the result of its introduction to Puerto Rico from the Cape Verde Islands some 20 years earlier. Statement *c)* directly implies a recent introduction. As to the smaller size of the coconuts along the shores of the South Sea, Oviedo flatly contradicts him, and Alonso Ponce likewise.

In the extract of Hernández translated and edited by Ximénez [28] the range of the coconut on the west coast is somewhat extended:

> "...es arbol muy esponxiosso, àma los lugares maritimos, como se ve en las Islas Philipinas, y los que an estado en puerto Rico las avran visto, y en toda la costa de colima. y çacatula..."

7. The first definite mention of coconuts for the west coast of Mexico that has so far come to light is found in one of the *relaciones*

[26] *a)* and *b)* "Nvx Indica, quam vulgus Indorum *Maron*, Strabo verò (vt quidã volũt) Palman vocat, à Mexicensibus *Coyolli*, à Lusitanis ob oculus quosdam Cercopitheci similes Coccum, à vulgo verò Persarum, et Arabum nuncupatur *Harel*." *c)* "Nascitur passim apud orientales, et iam quoque apud occidentales Indos, ac praecipuè maritimis, arenosisq. locis." *d)* "In noua hac Hispania non vnicum obseruatur harum Palmarum genus, diversaq. alia genera obseruantur in alijs locis. Aliud namque littoribus australis pelagi prouenit, fructum ferens longè minorem praedicto eisdam tamen, vt existimo, facultatibus."

[27] *Op. cit.*, pp. 75-76.

[28] F. Ximénez, Quatro Libros de la Naturaleza... México, 1615. Second ed. by Nicolás León, Morelia, 1888, and another by Antonio Peñafiel, México, 1888. Cf. León, ed., p. 40. Ximénez does not correct the confusion of identity regarding *coyolli*.

geográficas [29] compiled around 1580 by order of Philip II. In the *relación* for Motín [30] we find the following statement:

> Los arboles que generalm.te tienen los naturales en esta provinª... que son frutiferos. son ciruelos platanos magueyes piñas guayavos aguacates çapotes blancos. çapotes negros mameyes xicoçapotes q aora se dan á poner y cocos. mocheles. anonas. E. ylamaçapotes...

Among "arboles que tienen silvestres," "quaocoyules" are mentioned.

In this account the coconut is clearly differentiated from the coyol, in contradistinction to the obvious uncertainty of Hernández. No mention is made of an introduction of the coconut by the Spaniards, as was done, for example, in the *relación* for Puerto Rico. Instead, the coconut is listed casually with thirteen other fruit-bearing trees, all of them, with the possible exception of "platanos", indigenous to the country. The belief that we are dealing here with the true coconut is further strengthened by the fact that in the *relación* for Motines del Oro for July 6, 1791 (Museo Nacional, México, Relaciones del Siglo XVIII, Legajo 4, Nº 56) special mention is made of the great quantity of coconuts in the area.

8. Alonso Ponce, Comisario General de la Orden de San Francisco, traveled widely in Mexico and Central America between the years 1584 and 1589. He visited Colima in 1587, and in this connection gives a lengthy and accurate description of coconuts and coconut palms. Unfortunately he has nothing to say as to the location or ownership of these palms, but he does remark that there were great numbers of them. The following statement is of considerable interest:

> ...debajo de esta corteza tienen una cáxcara delicada, pero muy dura y vedriosa, la cual es blanca cuando el coco no está bien

[29] The early *relaciones* for Colima and Acapulco seem to have been lost, as copies have turned up neither in the archives of Spain nor in those of Mexico. The *relación* for Zacatula, the original of which is located in the library of the University of Texas, does not mention coconuts.

[30] Jhoan All'de de Ruede, *Relación de Parte de la Proviª de Motin ques enla Costa. de la Mar del Sur en esta Nueva Espana,* May 27, 1580. Original in the Academia de la Historia, Madrid, 12-18-3, núm. 16, doc. IX, 27ff. (This *relation* covers only ff. 16-26v.) Manuscript copy of F. del Paso y Troncoso in the Museo Nacional, México. Photographic copy of the original in the University of California.

maduro, pero si lo está, se pone negra, y della se hacen los cocos que llevan á España, que sirven de vasos para beber.[31]

Evidently, then, a modest industry engaged in making drinking vessels out of coconut shells for export to Spain was already in existence in Colima in 1587. It is possible that the people so engaged were not Indians or Spaniards, but Filipines, for by this time there had been considerable contact with the Philippine Islands through the Manila galleon, which occasionally docked along the Colima coast in the first years after Legazpi's conquest.

II. *Evidence Against an American Origin of the Coconut*

If, then, it can be established without reasonable doubt that the coconut was present in the New World in aboriginal times, it is curious to observe its peculiarly sporadic occurrence. There appear to have been only two centers of distribution — the one around Cocos Islands, the Gulf of Panama, and Burica Point, the other along the west coast of Mexico, starting somewhere near Colima and continuing for an unknown distance south and east along the coast. The evidence for a third area in the West Indies is so scanty and unconvincing that it must be rejected. We must agree with de Candolle, Baccari,[32] Hill,[33] Mayuranathan, and Friederici,[34] all of whom affirm or imply that the coconut had come, somehow or other, from across the Pacific Ocean, and that it had not crossed into the Caribbean watershed in pre-Columbian time[35] or entered significantly into the economic life

31 Fr. A. Ponce, *Relación Breve... escrita por dos religiosos, sus compañeros*, 2 vols., Madrid, 1873, v. II, p. 108.

32 O. Beccari, "The origin and dispersal of *Cocos nucifera*," *Philippine J. Sci.*, v. 12, pp. 27-43, 1917.

33 A. W. Hill, "The original home and mode of dispersal of the coconut," *Nature*, v. 124, pp. 133-134, 151-153, July 27, 1929.

34 *Op. cit.*, v. I, pp. 116-119; also "Die Heimat der Kokospalme, vom Standpunkte der Völkerkunde aus beurteilt," Sonderdruck aus dem *Mitteilungsblatt der Gesellschaft für Völkerkunde*, Leipzig, nº 8, 16 p., 1938.

35 In this connection attention must be called to a serious error that has crept into the literature. In *Hernando Cortés, Five Letters (1519-1526)* publ. by Broadway Travellers, London, 1928, we find a number of references to the "cocoanut," whose presence was allegedly noted by Cortés on his march to Honduras as recorded in his fifth letter to the King, dated Sept. 3, 1526. A comparison with the original

of the natives. This relative unimportance is all the more striking when one considers the enormous role the coconut plays in the economic life of southeastern Asia, the Malay Archipelago, and the tropical islands of the Indian and Pacific Oceans.[36] Oviedo [37] explains this fact to some extent by saying that these functions were taken over by other plants pertaining to the American flora. But there is

Spanish *(Hernán Cortés, Cartas de Relación de la Conquista de Méjico,* 2 v., publ. by Calpe, Madrid, 1922) reveals nothing of the sort. In every case he refers either to cacao or to certain unidentified palms which were probably coquito *(Attalea cohune).*

Broadway Travellers	*Calpe (Vol. II)*
p.	*p.*
290: "cocoa nut"	133: "cacao"
319: "shoots and nuts of cocoanut palms"	174: "cuescos de palmas y palmitos"
322: "cocoa-nuts on the trees"	177: "cacao en los árboles"
324: "cocoanuts... and a few kernels"	179: "palmitos... y algunos cuescos de palmas"
325: "...we even ran short of cocoa-nuts, which could be cut only with great difficulty from exceptionally large and lofty palms, the work of cutting a single one taking two men a whole day and the fruit being then consumed in half an hour."	180: "...aun de aquellos palmitos sin sal no teníamos abasto, porque se cortaban con mucha dificultad de unas palmas muy gordas, y altas, que en todo un día dos hombres tenían que hacer en cortar uno; y, cortado, le comían en media hora."

(With respect to this last quotation it may be mentioned that the trunk of coconut palms are remarkably slender.)

[36] In a letter dated July 29, 1501, King Manuel of Portugal informed Ferdinand and Isabella about Cabral's voyage of discovery, and among other things described the usefulness of the coconut along the Malabar Coast of India, referring to "...cartas escritas en fojas de unos árboles que parecen palmas en que acordadamente escriben, y de estos árboles y de su fruto se hacen estas cosas que se siguen: azúcar, miel, aceite, vino, agua, vinagre, carbón y cuerdas para navíos, é para toda otra cosa é esteras, de que hacen algunas velas de naos, é se sirven de ellas en todo lo al que les cumple, y el dicho fruto allende de aquello que de él así se hace es grande mantenimiento suyo, principalmente en la mar..." (In Navarrete, *Colección de los Viages y Descubrimientos...,* v. III, p. 96, Madrid, 1829.) J. E. Tennent *(Ceylon,* 4th ed., v. I, p. 209, footnote 2, London, 1860) gives a very elaborate modern summary of its significance.

[37] *Historia General y Natural de las Indias,* v. I, p. 336: "...acá en nuestras Indias no curan los indios destas cuerdas é telas que se pueden hacer de la lana ó estopa destos cocos, segund que en Levante, porque acá hay mucho algodon é henequen é cabuya, con que se suple tal nesçessidad de cuerdas."

little doubt that at the time of the conquest only an insignificant proportion of the inhabitants of tropical America had ever so much as seen a coconut palm.

In spite of Cook's strong statements to the contrary, "coco" in the sense of "palm" or "nut" is not a native American word, but rather, as will be seen below, a word of romance derivation.[38] No relevant New World terms are to be found in the 16th century literature.[39] Cook cites Eden's translation[40] of Oviedo to the effect that "coco" comes from an Indian word "coca," a native term for the cry of a monkey, because a coconut has on it three depressions that look a little like a monkey face. This is a somewhat garbled version of the true story which Oviedo states most clearly:

> El nombre que se le dió de coco a esta fructa fué porque aquel lugar por donde prende, quando el coco nasçe, tiene un hoyo ó agujero redondo, é ençima de aquel otros dos hoyos naturalmente, é todos tres vienen a haçerse como un gesto de un monillo que paresçe que coca; é por esso se diçe coco.[41]

He gives the following additional statements of interest:

> [En la Isla Española hay palmas que...] llevan unos cuescos que paresçen cocos con tres agujeros, é tamaño cada coco destos como una nuez pequeña ó menores... Mas en la Tierra-Firme, allende de todas las maneras de palmas es dicho, de que hay innumerables en diversas partes, hay otras palmas que son bien altas y de buenos palmitos, é llevan por fructa unos cocos, no mayores que las açeytunas cordobesas, é al paresçcer assi son como el coco, sin la estopa, sino solo el cuesco con los tres agu-

[38] Attempts have been made to derive the word from the Egyptian *kuku*, a kind of palm; the Arabic *khukum*, a crab; the Latin *coccus*, a seed; and the old Spanish *coca*, a shell (presumably from Latin, *concha*). These etymologies have been shown to be either incorrect, or, at the least, very unlikely. (Cf. Yule, *op. cit.*, p. 175; Hill, *op. cit.*, p. 134; and Cook, "The origin and distribution of the cocoa palm," p. 267.)

[39] The other "American" names for the coconut mentioned by Cook ("History of the coconut palm in America," p. 316) can probably be accounted for by the well-known tendency among primitive groups to rename newly introduced objects in the light of their own experience. Such names were not recorded before the 17th century.

[40] "History of the coconut palm in America," pp. 279, 316.

[41] *Historia General y Natural de las Indias*, v. 1, p. 337.

> jerillos que le haçen paresçer al mono (cocando); y son estos cocos menudos y maçiços é no sirven de nada los cuescos por sí, despues de desnudos.[42]

Evidently, then, the word coco could be applied in those days to any palm nut bearing the three holes or depressions that could with a little imagination be considered a monkey face. We may even find here a possible explanation of Columbus' alleged encounter with coconuts in Cuba. He may have found some palm nuts with the three depressions of coconuts, but of inferior size. In his great desire to record everything favorable to his thesis that India was not far away, he may purposely have called these "Indian nuts." The fact that he speaks of large nuts may be ascribed to his great enthusiasm, or to wishful thinking. He does not call the nuts cocos, to be sure, but he may have used the criterion of the three depressions without using the name, which perhaps had not yet come into general usage.

Oviedo was by no means the first to use the word coco. He was familiar with coconuts in the East,[43] and it is probably there that the name was first applied. Pigafetta, the chronicler of Magellan, applied the word in 1521 to the coconuts he found in the Philippines.[44] One of the chief officers on this voyage was Duarte Barbosa, brother-in-law of Magellan, and it may be from him that Pigafetta got his first knowledge of the coconut. Barbosa had been in India from about 1500 to 1516 or 1517, and in the report of his stay there, completed about 1518, had also used the word coco.[45] The earliest record that we have of the use of the word is in the *Roteiro da Viagem de Vasco da Gama em MCCCCVCVII.*[46] The word, used as a plural, is spelled *coquos,* and is recorded in the journal under date of September 22 1498. Garcia da Orta[47] confirms the Portuguese use of the term,

[42] *Ibid.,* v. I, p. 333.

[43] Cf. footnote 37.

[44] A. Pigafetta, *Magellan's Voyage Around the World,* ed. by J. A. Robertson, 2 vols., Cleveland, 1906. In v. I, on pp. 94, 100, and 186, the word in the Italian MS is spelled variously *coco* and *cocho,* and the plural *coq*[s] and *cochi.*

[45] M. L. Dames, *The Book of Duarte Barbosa,* 2 vols. (Publ. Hakluyt Society, 2nd Ser., Nos. XLIV and XLIX), London, 1918 and 1921, v. II (XLIX), p. 90.

[46] 2nd. ed., Lisbon, 1861, p. 94.

[47] G. da Orta, *Colloquies on the Simples and Drugs of India,* 1st ed., 1563. Transl. C. Markham, London, 1913, p. 139.

writing: "...we, the Portuguese, with reference to those three holes gave it the name of Coco, because it seems like the face of an ape or other animal." Even today the noun coco is used in Spanish and Portuguese. It means "grimace."

In trying to prove that coco is an American word, Cook makes much of the fact that there are many Náhuatl words that are similar to *coco* or contain a reduplicated *co* as a constituent element. That is true, but has little bearing on the case. Among such words might be mentioned *cocotl,* esophagus; *cocoliste,* an epidemic fever; *acocotli,* gourd siphon; Texcoco, place name in the Valley of Mexico. The sound *co* is a fundamental linguistic unit in many languages, and the Náhuatl tongue seems to delight in tautophony *(e. g.,* Popocatépetl, cacahuatl, tlaatlatla, teteteittitiani). To clinch his argument Cook[48] points to *cocoyatic,* as allegedly given by Hernández, who says that the latter is an herb which "...has the leaves of... a small palm, whence the name." Cook is astonished that Hernández did not see the connection between this word and *coco,* the implication being that the herb was so named because of the resemblance of its leaves to those of the coconut palm, and that hence *coco* was a native Indian word. Unfortunately for the argument, Cook misread Hernández. The name of the herb is clearly spelled çoçoyatic, and Ximénez actually spells is Zozoyatic.

A similar argument might be based on the word *cocoyol* or *cocoyul,* a name sometimes applied in Mexico to the coyol palm *(Acrocomia* sp.), Náhuatl *coyolli* or *coyulli.* The reduplicated form was not used in preconquest times, however,[49] and is probably to be explained on the basis of a Spanish malpronunciation of *quauhcoyolli,* the coyol tree, from *quauhuitl,* tree, and coyolli, the specific name. The Spaniards were notoriously lax in such matters. In fact, they sometimes used the word coco when they meant cacao.[50]

One item Cook might have brought up in this connection is the derivation of the name Cocula, Náhutl *Cocollan,* which is borne by

48 "The origin and distribution of the cocoa palm," p. 267.

49 Cf. Hernández; A. de Molina, *Vocabulario en Lengua Mexicana y Castellana...,* México, 1571; Rémi Siméon, *Dictionnaire de la Langue Nahuatl,* Paris, 1885.

50 G. F. de Oviedo y Valdés, *Historia General y Natural de las Indias,* v. I, p. 138.

a town in Jalisco. García Cubas [51] translates the word as Coco-tlan, the place of cocos. Dávila Garibi,[52] however, has already pointed out that such an etymology cannot be Náhuatl, and hence would not apply "...al Cocula de Jalisco donde no hay ni sé que haya habido palmas de coco." [53] The Aztec hieroglyphic gives further evidence on this score. If Cocollan or Cocolan or Cocotlán [54] means the place of the coconuts, then we might logically expect the corresponding symbol in Aztec picture writing to show some sort of stylized palm tree or coconut. Peñafiel [55] has published many of these pictographs, among which the following might be mentioned:

Place name	*Derivation*	*Symbol*
Ahuacatlán	*aguacatl,* avocado	Tree with oval green fruit; teeth [56] in side of trunk.
Ichcatlán	*ichcatl, cotton*	Cotton bowl with two teeth below.
Octlán	*octli,* pulque	Bowl with froth spilling over top, surmounted by two teeth.
Tlaollan	*tlaolli,* maize grains removed from cob	Basket filled with maize grains.
Xocotla	*xocotl,* jocote (*Spondias,* sp.)	Tree with yellow fruit; teeth in side of trunk.

[51] A. García Cubas, *Diccionario Geográfico, Histórico y Biográfico de los Estados Unidos Mexicanos,* 5 vols., México, 1888-1891, v. II, p. 238.

[52] I. Dávila Garibi, *El Pequeño Cacicazgo de Cocóllan* (Publ. de la Junta Auxiliar de la Soc. Mex. de Georg. y Est. en el Estado de Jalisco), Guadalajara, 1918, p. 13.

[53] Cocula lies at an approximate elevation of 4,700 feet, which is undoubtedly too high for the growth of coconuts in latitude 20°. The writer has seen a few isolated specimens at Autlán, about 50 miles in a straight line southwest of Cocula, at an elevation of 3,300 feet. They were bearing nuts, but were probably pretty close to their altitudinal limit. Closer to the equator they can endure higher elevations. Thus Pittier (quoted by Cook, "History of the coconut palm in América," p. 332) has apparently seen them in Colombia about latitude 4° N at elevations up to 4,800 feet.

[54] The postscripts -lla, -llan, -la, -lan, -tla, -tlan are all interchangeable in Náhuatl nomenclature, and mean "the place of —," or "near the —."

[55] A. Peñafiel, *Nombres Geográficos de México; estudio jeroglífico de la matrícula de los tributos del Códice Mendocino,* México, 1885.

[56] The ending -tlan is often given pictorial expression by the drawing of teeth, from *tlantli,* tooth.

On the other hand we find:

Cocolan	?	Black cloud (?) with many convolutions.

The implication is plain. Whatever the Náhuatl root *coco* may mean when used in a place name, it does not refer to the coconut palm. The Siméon *Dictionnaire* equates the noun *coco* with "servante."

By the end of the 15th century the coconut occurred in a broad band through the tropics ranging from the east coast of Africa across the Indian Ocean, across Indonesia and the islands of the Pacific as far as the shores of Mexico and Central America. Greater India and Indo China were included in this distribution, while Australia [57] was left out. Vasco da Gama saw his first coconuts at Mozambique.[58] Our knowledge of the introduction of the coconut to the west coast of Africa and adjacent islands is still incomplete, though we know that they were growing in the Cape Verde Islands by 1549,[59] undoubtedly introduced by Portuguese sailors returning from the Indian Ocean. From Moorish and Indian navigators the Portuguese must quickly have learned the desirability of carrying coconuts for food on the high seas.[60] Francis Drake saw his first coconuts in the Cape Verde Islands in 1578, and describes them in detail.[61]

57 Beccari, op. cit., p. 38; Friederici, "Die Heimat der Kokospalme...," pp. 8, 12.

58 E. G. Ravenstein, *A Journal of the First Voyage of Vasco da Gama 1497-1499* (Hakluyt Soc. Publ. XCIX), London, 1898, p. 27.

59 Cf. footnote 23.

60 See reference thereto in King Manuel's letter of July 29, 1501, in footnote 36.

61 S. Purchas, *Hakluytus Posthumus or Purchas His Pilgrimes*, Glasgow, 1905, v. II, pp. 122-123: "Amongst other things we found here [in the Isle of Mayo, of the Cape Verde group] a kind of Fruit called Cocos; which, because it is not commonly knowne with us in England, I thought good to make some description of it. The Tree beareth no Leaves nor Branches, but at the very top the Fruit groweth in clusters, hard at the top of the stemme of the Tree, as big every severall Fruit as a man's head: but having taken off the uttermost Barke, which you shall find to be very full of strings or sinewes, as I may terme them, you shall come to a hard shell, which may hold of quantitie in Liquor a Pint commonly, or some a Quart, and some lesse: within that shell, of the thicknesse of halfe an ynch good, you shall have a kind of hard substance, and very white, and no lesse good and sweet then Almonds; within that againe a certaine cleare Liquor, which being drunke, you shall not onely find it very delicate and sweet, but most comfortable and cordiall."

Fifteenth century accounts of the west coast of Africa often mention palm varieties and palm wine, but the coconut appears to be unknown. Thus Diego Gómez, who in 1460 visited the coast around the mouth of the Gambia River (about 13° N), reports his meeting with a negro chief as follows: "And I went to him, carrying him some presents and biscuit, and some of our wine, for they have no wine except what is made from the date palm, and he gave me three negroes..." [62] It may be that Gómez was mistaken in his identification of the source of the wine, for Cadamosto,[63] who in 1455 had visited the country 150 miles to the north, writes as follows:

> Their drinks were water, milk, and palm-wine, which was distilled from a tree found in abundance in the country, but not the same that produces the date, though it is like it... It was not so abundant that all could have as much as they liked, but as the trees which produced it were spread through the fields and forests, every one procured what he could by his labour, and the nobles employed people to collect it for them.

From this description it would appear likely that the tree in question was the African oil palm, *Elaeis guineensis,* which even today is used as a source for wine in that part of Africa.[64]

All the available historical and cultural evidence would lean us to believe that the coconut is native to Polynesia and the East Indies, or to an adjacent land mass now possibly submerged. Varietal diversification, aboriginal economic significance, importance in tradition and ritual, linguistics, etc., all give convergent testimony of the great age of coconut cultivation in this part of the world. The botanical evidence is somewhat contradictory, and has caused Cook and his followers to incline toward an American origin. Their most powerful argument as follows:

> ...the whole family Cocaceae, consisting of about 20 genera and 200 species is... strictly American with the single exception of the rather aberrant African oil palm *(Elaeis guineensis),* which has, however, an American relative referred to the same genus... If other species of Cocos, or closely allied genera,

[62] Cited in R. H. Major, *The Life of Prince Henry... the Navigator,* London, 1868, p. 292.

[63] *Ibid.,* p. 266.

[64] A. Maurizio, *Geschichte der Gegorenen Getränke,* Berlin, 1933, p. 77.

existed in the tropics of the eastern hemisphere, we might not be so confident regarding the affinities of a type so different from its congeners as is the cocoanut. But with no oriental relatives in even generic range there is no rational basis for doubt that the species belongs to an American series.[65]

The facts and the reasoning must be admitted, but recent researches have brought out new data that deprive the argument of much of its force. Thus Beccari [66] has shown that there is a species of Elaeis in Madagascar *(Elaeis madagascariensis)* that is distinct from *E. guineensis,* which leads him to believe that Elaeis is a truly African genus. Bailey has recently pointed out that the African oil palm and its American relative are actually "very unlike in essential features, and it is strange indeed that they have been kept together in one genus all these years." [67] For the American palm he establishes the name *Corozo oleifera.* It would appear logical that if *Elaeis* can form a group completely apart from the American Cocoineae, then there is no compelling reason why *Cocos* should not likewise be separate. A further powerful argument for the eastern origin of the coconut was the discovery of a fossil *Cocos* in Pliocene strata in New Zealand.[68] The husks of these fossil coconuts are prolate spheroids, from 5 to 5.5 cm. in length and about 3.75 cm. in diameter, and the nuts show clearly the three foramina that gave rise to the name "coco." Their closeness to the modern coconut led Berry to refer them to the same genus.

That the coconut belongs to an American series of palms is incontrovertible, but this does not prove that *Cocos nucifera* originated in America. The facts are more readily harmonized if we think of the coconut as having developed in a secondary center of distribution of the Cocoineae. A center of development may be far away in space and time from a center of origin. The coconut's ancestors had evidently migrated across the Pacific before the late Tertiary. Primitive, possibly ancestral, forms were in New Zealand in the Pliocene, and

65 "The origin and distribution of the cocoa palm," pp. 270-271.

66 *Op. cit.,* p. 28.

67 L. H. Bailey, "Certain palms of Panama," *Gentes Herbarum,* v. III, fasc. II, 1933, p. 56.

68 E. W. Berry, "Cocos and Phymatocaryon in the Pliocene of New Zealand," *Am. J. Sci.,* 5th ser., v. XII, 1926, pp. 181-184.

there is no reason to suppose that the Old World distribution of such forms was restricted to New Zealand. Subsequently the New Zealand *Cocos* died out, perhaps as a result of low temperatures during the Pleistocene, while those nearer the equator lived on, to be adopted and adapted at a later time by man.

One point needs strong emphasis: The coconut is a cultivated plant. Truly wild coconuts are unknown. Coconuts growing without human care can usually be shown to have escaped, however remotely, from cultivation. The unique cultural significance of the coconut in the estern Pacific basin, both in economics and in tradition, points to an early domestication. There is no question but what the coconut is by far the most useful economic plant in most of Polynesia, and its importance in Indonesia is likewise exceedingly high. The relative uniformity of nomenclature associated with the plant and its parts over vast areas of the Pacific indicate that it was widely dispersed by human agency. This long-protracted preoccupation of man with the coconut has unquestionably involved much selection and rejection of more primitive forms in favor of the large-seeded varieties.

Such a conscious improvement of a wild stock [69] can have taken place only in a culture area where it would have meaning in terms of the total available plant complex. South America is out of the question, since the South American Indians utilize the coconut very little. Their available plant complex is otherwise so rich and varied that they have no particular need to utilize it. But if they had ever gone to the lengths of domesticating it, then they would certainly never have discarded it. In the western Pacific the situation is just the reserve. It would seem that the cultural factors involved make sense only if we ascribe the development of the large-seeded forms to a secondary center located in Indonesia and Polynesia.

III. *The Trans-Pacific Spread of the Coconut*

We may now turn to an examination of the possible mechanism whereby the coconut could have come to the New World. In view of

[69] Future research in genetics and cytology may show that the process was not quite so simple as indicated here. It may be that in addition to human selection of large-seeded forms genetic changes such as polyploidy were involved. Such mutations would not negate the major argument here presented, but would merely serve to hasten the process.

its 16th century distribution along the Pacific littoral, it is evident that it had come from the west, and that it had come late. It had not been able to cross the Isthmus of Panama before Balboa came, though it occurred in widely separated locations along the Pacific coast, spreading through 12 or 13 degrees of latitude. It is difficult to estimate the interval that may have elapsed between the first effective naturalization of the coconut in America and the coming of the Spaniards, but, in view of its restricted distribution to one side of a low narrow isthmus, a few centuries would probably give an ample margin of safety. Two hypotheses present themselves as possible explanations of the coconut's appearance in the New World — the one, that men, presumably Polynesians, brought coconuts in boats across the Pacific, the other, that coconuts were transported by ocean currents and established themselves here without human aid.

The discussion regarding possible contacts between Polynesia and aboriginal America has gone on for many years,[70] and it is not our purpose here to reopen that highly controversial subject. While there is some inferential evidence of cultural interchange between the two areas, it is highly doubtful that Polynesians brought coconuts directly to Panama. Trans-Pacific contacts almost certainly did not take place so close to the equator. It would be an exceedingly tedious if not impossible task for small boats to be sailed or paddled from west to east across the equatorial Pacific. Way stations are non-existent, and favorable winds so rare and ineffective that the voyagers could hardly hope to reach land before their limited food supply would be exhausted. Even with a full utilization of favorable ocean currents and occasional storms such an accomplishment must be considered as exceedingly unlikely.[71]

The difficulties in the way of oceanic distribution through natural agencies are rather less. Whereas unfavorable winds make an eastward voyage of sailboats in the equatorial belt highly improbable, a strong and persistent ocean current gives a ready mechanism for the

[70] For a recent statement see K. P. Emory, "Oceanian influence on American Indian culture," *J. Polynesian Soc.*, v. 51, nº 2, June, 1942, pp. 126-135.

[71] It should be recalled that Oviedo mentions the existence of stone idols on Cocos Island. If future research should turn up evidences of Polynesian occupation there, then there would be good reason to suppose that they brought the coconut to America.

natural spread of coconuts. And the greatest profusion of coconut palms so disseminated would be expected to occur precisely where they were found by Oviedo.

The Equatorial Countercurrent flows in a somewhat variable path between the 4th and 12th parallels of north latitude, starting near the Marshall Islands about Long. 170° E., continuing past Palmyra Island (162° W.) to Cocos Island (87° W.) and finally reaching the shores of Panama (*ca.* 80° W.) This current is a necessary consequence of the enormous transport of water westward by the great clockwise convection of the North Pacific and its counterclockwise analogue in the southern hemisphere. The cross-section of the Equatorial Countercurrent varies in width from 150 to 500 miles, and the eastward drift ranges from 12 to 48 miles a day, though the motion of the water is stronger and more definite in some places and in some seasons than in others. In the northern summer the current is particularly well defined, flowing without serious interruption all the way from the Marshall Islands to the Gulf of Panama. At the same time a fairly strong shore current flows from Panama to the mouth of the Gulf of California.[72]

Palmyra is the easternmost coconut-bearing atoll in Polynesia that is washed by the Equatorial Countercurrent. On the assumption of an average flow of 25 miles a day, it would take about 7 months for a coconut leaving Palmyra to arrive in the general neighborhood of Cocos Island. In another two weeks it might be cast upon the shores of Panama. We do not yet know what proportion of coconuts are viable after 7 months immersion in sea water.[73] This is a problem

[72] H. U. Sverdrup, "The Pacific Ocean," *Science,* v. 94, nº 2439, September 26, 1941, pp. 287-293; H. U. Sverdrup, M. W. Johnson, and R. R. Fleming, *The Oceans; their Physics, Chemistry, and General Biology,* New York, 1942, pp. 709, 712.

[73] Experiments carried on by C. H. Edmondson ("Viability of coconut seeds after floating in sea," *Occasional Papers of Bernice P. Bishop Museum,* v. XVI, nº 12, Honolulu, Hawaii, December, 3, 1941, pp. 293-304) have shown that cocoanuts are capable of germinating after having floated in the sea for periods up to 110 days. In a private communication dated May 4, 1944, Dr. Edmondson writes: "I am convinced that the coconut would survive a mucho longer period than 4 months." He adds, however: "A possible objection... to a sea voyage of 7 months from Palmyra to Cocos, as you calculate, is that the nut probably would not stay on top of the water that long. I find they are barely afloat after 4 months. They are very heavy and rest low in the water after this period. They also tend

that should be investigated experimentally, preferably with coconuts from Palmyra Island.[74] It might be argued that only a small percentage of the coconuts leaving Palmyra would ever come close enough to Cocos Island to be washed ashore. That is undoubtedly true. But a larger percentage would be cast up somewhere along the Central American coast, and from there later generations of coconuts could well be washed out toward Cocos Island by seasonal off-shore currents. The palms of Colima-Motín can also be considered as having an origin of this sort, the seeds probably having come from trees growing along the shore farther south.[75]

to accumulate a good deal of 'fouling' which is likely to pull them under. The actual floating time of a coconut should be determined... After the war I hope some work of this kind may be renewed in the Pacific, under conditions as natural as possible."

[74] The coconuts of Palmyra seem to be remarkably well adapted to marine dispersal. Beccari, who has examined some coconuts from there *(Cf.* J. F. Rock, "Palmyra Island, with a description of its flora," *College of Hawaii Publications,* Bulletin N° 4, April 19, 1916, pp. 44-48), remarks: "It is a well known fact that coconuts float on the waves, but I never thought their specific gravity was so low as it proves to be with these. The fruits of the Palmyra *Cocos* are trigonal in shape and on immersion in a basin of fresh water floated upon one of its sides on the top of the water, scarcely submerging any portion of its surface. Consider from this how great their buoyancy must be in sea water." The unusually low density of Palmyra coconuts would tend to neutralize to some extent the weight increase due to water logging and fouling mentioned by Dr. Edmondson in the preceding footnote.

[75] In the Biblioteca Nacional of Mexico there is a manuscript (X-7-503) from the early 17th century that strongly supports our opinion regarding the occasional casting on land and taking root of coconuts on the Pacific shores of America. The document is entitled "Viage que Don Iuan de Herrera y Montemayor hizo el año de M.DCXVII de Mexico al Reyno del Piru, y ciudad de Lima, y aduersos sucessos del," and is the story of a party of travelers who suffered shipwreck along the northern coast of Ecuador, and who gradually made their way south by land. The trek took many weeks and was accompanied by countless hardships. Most of the members of the expedition perished of hunger and thirst. The few survivors were often near death, but at one place, on a "clean and wide beach," when they had reached their last extremity of privation, their lives were saved by the appearance of a tall coconut palm which bore a prolific crop of nuts. There is absolutely no doubt that it was a true coconut palm, for the account reads (48v-49f):

"...quando se arrojauan quebrauanse, y era de ver la ansia con que

There is of course still the possibility that coconuts may have been carried part way across the Pacific in canoes and the rest of the way by ocean currents. The fact that Polynesians landed on microscopic Easter Island at such vast distances from their earlier settlements would indicate that they must have made many voyages eastward that never culminated in a landfall at all. Since coconuts were undoubtedly carried on these trips as part of the provisions, and since there must have been occasional disasters as the result of storms, it is not impossible that coconuts may have been brought in boats to a point much closer to Panama than Palmyra Island. This would materially shorten the period of immersion and give the seeds a better chance to survive. It would also make possible a wider range for the provenience of the parent stock.

The ability of coconuts to take root on tropical coast without the aid of man has been amply demonstrated. During the great volcanic eruption of 1883 every bit of life on the island of Krakatau was annihilated; yet, when botanists visited the uninhabited remnant of the island a few years later they found large numbers of young coconut palms beginning to grow.[76] Many coconuts were picked up on the beaches. These had unquestionably been brought by currents from nearby islands.

A final argument advanced by Cook against the possibility of oceanic dispersal of the coconut palm is based on the fact that coco-

baxauamos por ellos, por que no se perdiesse gota de agua... Hauia coco que tenia tres quartillos, y el ordinario media acumbre."

This was the only coconut palm the party found along the entire coast. Some days later, after they had traveled many leagues, southward, they encountered some Xibaro Indians who took them to the settlement of Quaque. There they made careful inquiries among the natives as to the occurrence of such palms, and were told that in the whole stretch of coast with which these people were familiar, the palms were entirely unknown (67v-68f):

"...respondieron todos, que no tenian noticia de tal, y que tenian bastante conocimiento de la tierra, y de lo mas oculto della, pero que tal Palma no ay en toda la playa, hasta el cabo de San Francisco, y Rio de las Esmeraldas, que es hasta donde han llegado ellos por tierra; con que queda bien aberiguado hauer sido milagro el que Dios vso con nosotros en orden a matarnos la hambre y sed, con que aquel parage llegamos."

The settlement of Quaque, now Coaque, is located at 0°02, N.

[76] Beccari, *op. cit.*, p. 34. *Cf.* also fig. 1 in Hill, *op. cit.*, p. 152, showing a young coconut palm sprouting on the still uninhabited island of Krakatau.

nuts do not grow naturally on the northern shores of Australia, whereas they are exceedingly plentiful across Torres Strait and on the islands farther east. While he admits that the nuts are sometimes cast up on distant shores by the sea, he feels that the embryo or the young palm would inevitably succumb to its environment were it not for man's watchful care. Since the Australians were not agriculturists, he argues,[77] coconuts never got established on that continent, whereas the Polynesians had them everywhere. Beccari, who has examined the problem more thoroughly, comes to the conclusion that the young shoots will take root on shores where unfavorable environmental factors, such as the presence of robber crags *(Birgus latro)*,[78] certain beetles, and suffocating vegetation are not too serious, and that under such conditions they will reproduce quite independently of human aid, just as do the other members of the halophilous strand flora. In particular he cites the coconuts of Palmyra Island as an example of prolific reproduction under truly wild conditions. Even if Polynesians brought the first coconuts to the island, the present luxuriant stands, which produce larger and finer fruit than most cultivated varieties, are flourishing without man's help.[79]

The shores of America were free from robber crabs.[80] The only serious hindrance to the natural establishment of coconuts along the entire coast from Panama to Colima was the occurrence of mangrove

77 "History of the coconut palm in America," p. 298.

78 The absence of coconuts from Australia seems to be due mainly to the activity of the robber crab. Joseph Banks, who accompanied Captain Cook on his first voyage to Australia, recorded in his journal under date of July 5, 1770, the following entry, which refers to the coast of northeast Queensland near the present location of Cooktown: "Went to the other side of the harbour, and walked along a sandy beach open to the trade wind. Here I found innumerable fruits, many of plants I had not seen in this country. Among them were some cocoanuts that had been opened... by a kind of crab... that feeds upon them. All these fruits were incrusted with sea productions, and many of them covered with barnacles, a sure sign that they have come far by sea, and as from some other country, probably that discovered by Quiros, and called Terra del Espiritu Santo [New Hebrides], as the latitudes according to his account agree pretty well with ours here." *(Journal of the Right Hon. Sir Joseph Banks,* ed. by J. D. Hooker, London, 1896, p. 284.)

79 Beccari, *op. cit.,* p. 37; Rock, *op. cit.,* p. 28 and plates IV and X.

80 Beccari, *op. cit.,* p. 30.

swamps,[81] which would certainly inhibit the growth of young coconut sprouts, if indeed they permitted them to gain a foothold at all. The tangle of shellfish-bearing aërial roots that extends beyond low tide level, and the black mud that they engender, forms an environment in which palm trees are not at home. It is not to be supposed, however, that coconuts had not become established elsewhere along the Central American or Mexican coast. While we have no 16th century records of stands between Burica and Colima, we do know that they were later found in other places, for example along the south shore of Guatemala and on islands in the Gulf of Fonseca. Lack of mention may merely be further evidence of relative scarcity and insignificance in native economy.

Washington, D. C.
U. S. A.

[81] There are no mangrove swamps around the shores of Cocos Island. (A. Stewart, "Notes on the botany of Cocos Island," *Proc. Cal. Acad. Sci.*, 4th ser., v. 1, 1912, p. 379.)