

## ANCIENT VERSUS MODERN DISTRIBUTION OF CULTIVATED PLANTS

If, as the diffusionists maintain, the early American civilization were derived from those of Eurasia, either across the Atlantic or the Pacific, it is indeed very strange that none of the animals and plants above listed "bridged the gap." Is it not logical to surmise that if advanced civilized peoples in pre-Columbian times succeeded in crossing either the Atlantic or the Pacific, that they would have taken with them at least some of the very numerous food plants basic to their economy? It can rather safely be assumed that expanding peoples in the long pre-history of the human race, after the establishment of agriculture, took their cultivated food plants and their domestic animals with them within the limits of the eastern and the western hemispheres; or that species once domesticated in this or that early center of agriculture were transmitted, with the same geographic limitations, from one people and area to other peoples and areas. This is exactly what the advanced Indian peoples did when they colonized and controlled Malaysia, beginning some 2,000 years ago, and it is exactly what the Polynesians did, to a much more limited extent, when they occupied the widely scattered Pacific Islands at apparently a somewhat later date. It is almost trite to mention the fact that this is also what the European colonists did in America beginning some 450 years ago. From what is now known regarding the distribution of these animals and plants there is no evidence that supports the idea of pre-Columbian contacts across either the Atlantic or the Pacific oceans.

## AUTOCHTHONOUS AMERICAN AGRICULTURE AND CIVILIZATIONS

The thesis that I maintain, on the basis of the present evidence, is that agriculture in America was autochthonous, and that the pre-Columbian high types of civilization in America based on that agriculture were also autochthonous. The conservative ethnologists support the idea that man entered America over a northern route, via Alaska, and this being so

they would of necessity have been nomads living by hunting and fishing, for in this northern region no practice of agriculture was possible. As they gradually expanded over the vast expanses of North and South America they eventually became acquainted with certain native plant species which they utilized for food. It is perhaps significant that in what is now the United States it is recorded that parts of more than 1100 different plant species were used for food, but it is interesting to note that scarcely a single one of these was of sufficient value to be developed as an agricultural crop. It was only after these expanding and essentially nomadic people reached Mexico that they found certain types of food plants that were amenable to cultivation, and it was only after they reached South America that they became acquainted with some of the most important ones. The development of agriculture in America, over a very long period of time, paralleled its development in Eurasia; but its basis in the two hemispheres was utterly different plants and animals, so utterly different that most of those in the New World belong in totally different genera than those of the Old World. Out of curiosity I checked the natural geographic distribution of the economic plants mentioned above in accordance with the currently accepted limits of the genera to which they belong. About thirty of the genera involved are strictly American; about sixty are strictly Eurasian; and only about twenty have indigenous species in both hemispheres.

#### WORLD CENTERS AS TO ORIGINS OF CULTIVATED PLANTS AND OF CIVILIZATIONS

Whatever the situation may have been, it is clear from the standpoint of the world's food supply, that America has played a most important part. Here as in the Old World, early civilizations developed in those regions where the basic plants and animals occurred as native species, and from these centers gradually expanded. The great centers of origin in America were Mexico, Central America, and certain parts of South America, notably the highlands of Chile, Peru, and Bolivia. In the Old World the important centers were Asia



Minor and adjacent parts of the Mediterranean basin, central Asia, certain parts of what is now India and China, and, perhaps of more secondary importance, Abyssinia. It is in these relatively limited areas that practically all of our basic food plants and domestic animals originated, and it is in these few centers that ancient high types of civilizations developed. Vast parts of the world have contributed little or nothing to our present great store of plants and animals species on which our agriculture and our civilizations are based and by which the latter is maintained.

#### A CONCLUSION BASED ON A FALSE ASSUMPTION

It is indeed strange that the extreme diffusionists give little or no attention to those manifest facts which are opposed to their preconceived theories. One is often tempted to accuse some of these theorists with having single track minds. They may seize on single aspects of the situation, such as pyramids in Mexico and Egypt, or the practice of mummification in Chile and Egypt, and ergo, these pre-Columbian American developments must have been derived from Egypt. The height of absurdity is reached when that arch-diffusionist, G. Elliott Smith, published his *Elephants and Ethnologists* in 1924 proving to his own satisfaction, on the basis of certain bas-reliefs from Yucatan, that the elephant trunks there depicted showed that when the sculpturing was done the elephant must have been known to whoever executed or directed the work; the elephant is strictly an Asiatic-Africa beast. All the bas-reliefs show is a conventionalized representation of the long tail of the very striking quetzal (*Pharomachrus mocino*) a bird which was worshipped by both the Maya and the Aztecs, especially in association with Quetzalcoatl, as god of the air. One might designate Smith's absurd conclusions as the prostitution of biology to "prove" an utterly false ethnological assumption.

There seems to be no limit to the imaginations of certain biologically ignorant diffusionists, yet apparently a few theoretical geneticists, unfamiliar with the broad field of plant distribution, have been taken in by their illogical conclusions

which were based on false assumptions. It is argued that agriculture originated in the Nile Valley, and yet there is no evidence to indicate that a single one of the basic cultivated food plants utilized by the ancient Egyptians, was native of the valley. Note G. Elliott Smith's remarkable claims regarding barley. If one wishes to reach the pinnacle of absurdity in casting about for an idea on which to base a theory, here it is. He says, correctly, that the grain would ripen at the beginning of the hot season, *but some months later, after the annual flood had subsided*, the young plants would appear above ground within a few days. As I have already observed any farmer's boy could have told him that barley seeds immersed in water, or scattered in mud, commence to absorb water immediately, and that within a week or two, such immersed seeds lose their germinating power and decay. And one of his disciples once argued with me, his claim being that barley seeds floated down the tributaries of the Nile from Abyssinia to the mud flats of the lower valley. A nice theory, but here again any farmer's boy could have told him that barley seed, like those of all the cereals, do not float, but sink to the bottom immediately they fall, or are placed, in water. Some wise man has observed: "There is nothing more devastating to a theory than a few facts." It apparently never occurred to those who originated this water resisting floating barley idea, and those who have accepted it, to perform the absurdly simple experiment of placing a few barley grains in water and observe what happened to them. Perhaps they didn't wish to spoil a good theory.

#### EKHOLM'S IDEAS

The latest manifestation of the idea that I have seen is the current exhibit at the American Museum of Natural History in New York, staged by Dr. Gordon F. Ekholm as reported in *Time* 54 (13): 66-68 1 fig. Sept. 26, 1949. I have not seen this exhibit and in this discussion I have been obliged to depend on the short publicity account cited. The exhibit was prepared for those attending the Twenty-ninth International Congress of Americanists, and Ekholm is quoted as saying



that he: "just wanted to see if they could explain the stuff." It consists of artifacts from pre-Columbian American sources, each matched by one of early Asiatic origin, and includes such items as fishhooks, bark cloth (tapa) and the wooden and stone pounding tools used in preparing it, totem poles, war clubs, blow guns, wooden drums, flutes, grinding stones, art forms, sculpture, plant parts chewed with lime for purposes of stimulation (the fruit of the betel nut palm in the Old World, the leaves of the cocaine plant in America) and the decorated spatulas used for dipping the lime out of the gourd containers, architecture, tools, etc., etc. In many cases there are, of course, close resemblances, but these resemblances to my perhaps not properly trained mind (for I am not a diffusionist except within reasonable limitations) prove nothing, except that early civilized man could and did develop the same techniques here and there independently. One surmises that the actual selections were made on the basis of only those items that support, or are assumed to support, a preconceived idea, for this is par excellence the method of the diffusionists; and some of the analogies and deductions are so far fetched as to be almost ludicrous. I quote from the Time report:

"How and when did the cultural elements (art forms, techniques, tools, customs) move across the Pacific? Doctor Ekholm does not know, but he suspects that the early high civilizations in Mesopotamia, Egypt, and the Indus Valley, characterized by agriculture, pottery-making and pyramid-building, set up a cultural tremor that lapped most of the world. Traders, explorers, fugitives and raiders carried the techniques with them, just as their modern equivalents carry the catching customs of modern industrialism. Probably faint ripples, relayed slowly from people to people, and from island to island for thousands of years, finally crossed the ocean."

One of the most fantastic suggestions is that associated with certain exhibits where the lotus is involved in decorative designs, from India, about 200 A. D., and from Chichen Itza, Yucatan. I quote: "Since the lotus is the symbol of Buddhism, Doctor Ekholm believes that the lotus design may have been brought to Yucatan by a Buddhist missionary." Now the lotus,

*Nelumbium nelumbo* Druce, is native of Asia. The only other species of the genus is *Nelumbium pentapetalum* Walt., native of North America. The two species are very similar in all characters except in the color of the flowers, those of the Asiatic species pink and those of the American one yellow. Because of its edible seeds the American species was very widely disseminated by the American Indians. It ranges from the northern limits of the United States to Mexico and Central America, and was, hence, very well known to the American peoples who developed the high civilizations of Central America, Yucatan, and Mexico. With such a very striking plant that was thoroughly familiar to them, I merely query why should they not utilize its large flowers as a basis of design? I conclude that in this case any resemblances between the New and the Old World lotus designs are merely coincidental. Pity the poor Buddhist missionary who had to make such an impossible voyage across the Pacific in times when boats were crude affairs and distinctly limited in size.

There is apparently nothing that is really new in the way of ideas in the exhibit I here briefly discuss. It is the old imaginary stuff of the romantic W. J. Perry-G. Elliott Smith school of diffusionists whose writings I have previously designated as forming sometimes interesting and entertaining fiction but to be treated as fictional contributions rather than as factual ones. Quite as unrealistic as their conclusions are those of such writers as Ignatius Donnelly, L. Spence, and others in support of the Atlantis hypothesis, to say nothing of weird ones of G. H. Cooper, and J. Chuchward. Good, perhaps, for publicity on occasion, but utterly unconvincing. No matter what one's convictions may be, there is little profit, in the long run, by arguing on the basis of half truths in support of a preconceived theory. I quote from a previous paper<sup>7</sup>:

"It is one thing to theorize about the diffusion of culture, but the actual implantation of culture on an alien people by casual contacts implicated by supposed pre-Columbian voy-

<sup>7</sup> Merrill, E. D. Domesticated Plants in Relation to the Diffusion of Culture. Botanical Review 4: 14-15. 1938, reprinted Chronica Botanica 10: 325-326. 1946.



ages across the Pacific or the Atlantic is quite another matter. If force be available, such as was the case with the early Spanish explorers, who were supported by supplies from the contacts with the homeland, this is one thing, but accidental contacts such as those predicated by enthusiastic but often illogical diffusionists across the vast expanses of the Pacific and the Atlantic, would be merely in the nature of forlorn hopes."

### INDEPENDENT DEVELOPMENTS

In general, in the dissemination of ideas and cultural advances, the extreme diffusionists think only in terms of a common center of origin for all great or significant advances. Many of them apparently cannot conceive that the same development may take place independently in different parts of the world. From the evidence available to me I can only conclude, as expressed above, that agriculture in North and South America was autochthonous, and that the pre-Columbian civilizations based on this agriculture, were also autochthonous. Consider what has happened in modern times in certain striking advances in our own civilization where, in spite of modern communications, Joseph Henry in the United States and Michael Faraday in England, working independently of each other, in 1831 almost simultaneously discovered one of the basic principles on which the electric dynamo was later based. As striking in another field are the two papers explaining organic evolution, the one by Charles Darwin, the other by Alfred Russell Wallace, where these two men, one working in England, the other prosecuting biological field work in the Malay Archipelago, independently reached almost identical conclusions at almost the same time; their papers were published in the same number of the Journal of the Linnean Society, Zoology, in 1858. We have almost the same picture in the development of anaesthesia by the use of ether and chloroform about a century ago.

A great many similar cases could be cited. But the fact remains that even in modern times great discoveries have been reached almost simultaneously by individuals working in

utter independence of each other; there is every reason to believe that this has happened over and over again in the history of developing civilizations. Now, however, that the child-like Russian propagandists are claiming that many of the great discoveries that, in the world at large, are credited to nationals of this or that non-Slavic country were discovered earlier by Russian workers, this discussion perhaps becomes academic.

#### EARLY AMERICAN DEVELOPMENTS BASED ON AMERICAN AGRICULTURE

As H. G. Wells expresses it in his *Outline of History*, vol. 2, chapter 14 § 6: "The art of the Maya civilization was particularly well developed. Some of the simpler sculpture of Peru is suggestive of Sumerian work, but the Maya stuff is like nothing the old world has ever produced, and it rises to a very high level of beauty indeed. The nearest resemblances, and they are not very near, are to be found in some south Indian carvings. It astonishes by its great plastic power and its perfection of design."

I would expand this idea, being convinced that all of the cultural advances of the pre-Columbian peoples in America, not only in basic agriculture, but all of the advances based on this indigenous agriculture, were a natural development. This includes all implements and techniques involved in the spinning and weaving of fibers, dyeing, architecture, sculpture, painting, astronomy, social, political and ecclesiastic organizations, methods of recording various events, pottery and ceramics, the utilization of gold and silver for ornamental work, the cutting of precious and semiprecious stones, hieroglyphics, in fact all advances made over their primitive ancestors of paleolithic and neolithic times. As they did develop *de novo*, as high a type of agriculture as did the peoples of the Old World, but based wholly on native American plants and animals, what reason is there for denying that they could, on the basis of this agriculture, develop the high types of civilization that so astonished the early European explorers? The surprising thing is that what they accomplished was done



under stone age conditions for they knew neither bronze nor iron and had no knowledge of the wheel.

#### LIMITATION ON EARLY OCEAN VOYAGES

For those diffusionists who so nonchalantly bring their early traders, explorers, fugitives, raiders, and even Buddhist missionaries across the vast expanse of the Pacific 2,000 years ago in the primitive boats which were then available, consider the voyages of the early European explorers with their much larger and more seaworthy ships. Thus Magellan's voyage across the Pacific in 1521, as tersely summarized by Wells in his Outline of History (slightly modified from an article on Magellan in the Encyclopedia Britannica):

"For *eight and ninety days* Magellan sailed unflinchingly over the vast, empty ocean, sighting nothing but two little desert islands. The crews were rotten with scurvy; there was little water and that bad, and putrid biscuits to eat. Rats were hunted eagerly; cowhide was gnawed and sawdust devoured to stay the pangs of hunger." Ninety eight days from Cabo Deseado at the western end of the Straits of Magellan to the Mariannas Islands and still 1100 nautical miles to go before reaching the Philippines!

Or a hundred and sixty-five years later, consider the voyage of Captain William Dampier, from Cape Corrientes on the west coast of Mexico to Guam, March 31 to May 20, 1686, fifty days, the crew also on very short rations, as expressed by Dampier on departing from Mexico: "For we had not 60 days Provision, at a little more than half a pint of Maize a day for each man, and no other Provision except 3 meals of salted *Jew-fish*." It is no wonder that fifty days later, after reaching Guam with rations for three days left, Dampier observed regarding the quality of the pork from the coconut-fed hogs in Guam that it was the "most excellent Meat, the best, I think, that I ever eat." The two passages quoted proves that long voyages may be made under most difficult food conditions, but it does not follow that the less able navigators of earlier days could have made such long voyages.

This little digression is included probably in a vain attempt to get the diffusionists "to stop, look, and listen," for Buddhism was not established until but about 500 B. C. which gives but a small margin of time for it to expand to tropical America and in any way effect the developing civilizations here. The Polynesians, in the twelfth century, unquestionably did reach the west coast of America, for they took back with them the sweet potato as noted above. There is no evidence that they acquired anything else from America, and very little evidence that they may have brought Polynesian products with them (perhaps the coconut and the *Lagenaria*). But the Polynesians, even though their boats were primitive judged by modern standards, were magnificent navigators. According to Doctor Buck they did not occupy the central Pacific islands until the fifth century A. D.

As far as I have been able to visualize the voyages of the early civilized peoples of India, who had contacts with the Malay Archipelago beginning between 500 and 400 B. C., these voyages were confined to the coastal regions and the mediterranean seas of the archipelago south of Asia. Their great advances in Malaysia were made from 800 to 1200 A. D., too late in history in relation to any possible voyages of discovery across the Pacific that may in any way have influenced the autochthonous civilizations of America, yet their great Malaysian empires controlled much of the Malay Archipelago and they extended their field to the Philippines and Formosa. They could have covered this vast area and never have been out of sight of land. The Chinese contacts with Malaysia came somewhat later than did those of the Indian peoples. Hence, from the standpoint of what we know of the early exploration of the Pacific region by any of the advanced peoples of Asia, I can only conclude that the ideas of the extreme diffusionists, that is, those who must bring all or some of the cultural advances in America from the old world via the Pacific route, are indeed: "Such stuff as dreams are made of."

#### CREDIT WHERE CREDIT IS DUE

Any people who could develop from nothing but an accumulated knowledge of wild plants that could be used for food



such manifestly high types of agriculture as did these early Americans might at least be credited with sufficient brain power to develop, on the basis of their own agriculture, the high types of pre-Columbian civilization that characterized certain parts of South America, Central America, Yucatan, and Mexico. There is no reason to "set up a cultural tremor" in Asia, that "lapped most of the world," or that "faint cultural ripples" finally crossed the Pacific to explain what, to my mind, was a purely American cultural development and one of which their present descendants may justly feel proud. Doubtless the diffusionists will consider me to be a botanical skeptic, but as a botanist I could only wish that they would do some work in the fields of phytogeography and zoogeography and consider the field of early agriculture before sounding off too loudly on their pet theories. This is probably a forlorn hope, for as Jeremiah XIII. 23 put the query: "Can the Ethiopian change his skin, or the leopard his spots?" We may expect, I suppose, more or less constant eruptions on the part of the diffusionist propagandists, as this or that individual sees, or imagines, developments in pre-Columbian America which simulate those of the Old World. Thus two mutually contradictory concepts may continue, the one based on preconceived theories and wishful thinking, the other based on the obvious fact that American civilizations were founded on a strictly American agriculture. It is admitted that the diffusionists have the inside track as to publicity, for often they come up with spectacular ideas; the data from botany, zoology, and agriculture are non-spectacular, and receive scant attention, yet I can only conclude that the biological data are infinitely more convincing than anything yet brought up by the diffusionists.

#### A CONSERVATIVE ETHNOLOGIST'S OPINION OF DIFFUSIONISTS

One suspects that some of the conservative ethnologists have little patience with the extreme diffusionists, and particularly with those who must bring all cultural advances in pre-Columbian America across vast expanses of the Atlantic

and Pacific oceans. Pertinent to this discussion is Spinden's<sup>8</sup> general summation:

"From all points of view, it appears that there are no sound reasons for the interpretation of history demanded by the romantic school in the science that studies the origin of man and his institutions. It is safe to file a general demurrer against mummifications, the couvade, helioliths, lost continents, African jargon, elephant trunks, and all other sensational arguments which have formed the basis for theories of occult migrations and forgotten conquests. One might as well have distribution of culture by telepathy or intellectual osmosis."

### THEORIES VERSUS FACTS

With the picture as it is to the non-distribution of domesticated animals and cultivated plants as between the two hemispheres previous to the close of the fifteenth and the early decades of the sixteenth century, one might be tempted to modify the last part of Spinden's statement to read: "One might as well have distribution of cultivated plants and domestic animals by telepathy and intellectual osmosis." With approximately 130 species of plants above listed that in their early distribution manifestly did not transcend the limits of the eastern or the western hemispheres, to say nothing of the domestic animals, we might grant the possibility of *one* species of *Gossypium* being introduced from Asia to America in pre-Magellan days (maize in the other direction is inadmissible) to satisfy the geneticists. But considering only the Old World species in the above incomplete list the odds would still be about 90 to 1 against the *Gossypium* possibility. I merely observe for the benefit of the non-technical reader that the genus *Gossypium* has native species producing good spinning cotton in both hemispheres and that the better ones were selected for cultivation independently in India and in tropical America. For those who manifestly are not well posted on the problems associated with the origin and distribution of cultivated plants, but who will set up theories that manifestly

<sup>8</sup> Smith, G. E., Spinden, H. J., and Goldenweiser, A. The Diffusion controversy. 1-106. 1927.



are diametrically opposed to what may be safely accepted as facts, no matter which of the numerous cultivated food plants be involved, I merely refer to Lord Acton's sage remark quoted above.

#### SOPHISTRIES, HALF-TRUTHS, AND INADEQUATE JUDGEMENTS

As Liberty Hyde Bailey has recently observed: "Our lives are guided by sophistries, half-truths, and inadequate judgments." This statement, to me, admirably sums up the situation that faces us in any consideration of the claims of the extreme diffusionists (and to this group I would now add certain theoretical geneticists) for to many of their expressed ideas, sophistries, half-truths, and particularly inadequate judgements definitely apply. Perhaps a fitting quotation with which to close this paper are the words that Shakespeare placed in Hamlet's mouth:

"There are more things in heaven and earth, Horatio  
Than are dreamt of in your philosophy."

#### DIOON MEJIAE, A NEW CYCAD FROM HONDURAS

Paul C. Standley and Louis O. Williams

THE most surprising botanical discovery in Honduras this year is a cycad of the genus *Dioon*. The native cycads of continental tropical America are few, and the genus *Dioon* has been known previously only from Mexico, where three species are found, one of them of rather wide distribution, and much cultivated for ornament in Mexican gardens. The occurrence of a Central American species, in a restricted locality far removed from the southern border of Mexico, could not have been predicted. As so often is the case with plants possessing ornamental value, this one, although unknown to botanists, has been familiar to many Hondurans for more than forty years, as a source of food, a garden plant, or even an article of

local commerce. It was first observed by the authors in February, 1949, in the garden of Dr. Isidoro Mejía h., in the town of Danlí in central-southern Honduras.

**Dioon Mejiae**, *Standl. & Williams, sp. nov.*

Planta acaulis vel trunco usque ad 1 m. vel ultra erecto crasso stipata; folia numerosa rigide coriacea, adscendentia, in statu juvenili tomentosa, cito glabrata, laete viridia, 1-2 m. longa et ultra, rhachi supra plana, subtus convexa; folii segmenta utroque latere 100 et ultra ca. 17-nervia, mediis ca. 17 cm. longis et 1.5 cm. latis, oppositis, pungenti-attenuatis, integris, superioribus sensim decrescentibus, inferioribus longe sensimque decrescentibus pauci-pungenti-serratis, infimis dentiformibus 1-2 mm. tantum longis; strobili feminei erecti breviter crasse stipati, ovoidei, ca. 30 cm. longi atque 20 cm. lati, apice subabrupte acuminati, ubique tomento densissimo pallide brunneo molli obtecti; squamae stipitem obtegentes lineari-lanceolatae, usque ad 18 cm. longae, longe angustequae attenuatae, extus dense lanosae; squamae strobili feminei deltoideo-ovatae ca. 8 cm. longae et 6 cm. latae, anguste obtusae, extus intusque dense lanosae; semina bene evoluta non visa.

Type in the Herbarium of Chicago Natural History Museum, cultivated in the garden of Dr. Isidoro Mejía h., Danlí, Dept. El Paraíso, HONDURAS, alt. 750 m., Feb. 17, 1949, *Standley 16756*; duplicate in the Herbarium of Escuela Agrícola Panamericana; accompanied by photographs of the type cone and of other plants in the garden of Doña María Luisa Gamero. The species is represented also by *Standley 16522* from Danlí; and *18034*, from Juticalpa, Dept. Olancho where planted in a garden; also by *E. D. Merrill & Louis O. Williams 15716*, from Danlí.

This new cycad is dedicated to Dr. Isidoro Mejía h., physician and surgeon of Danlí, who brought seed 40 years ago from a dry rocky canyon in the Department of Olancho, Honduras, on the road between Pueblo Nuevo and Olanchito, the only locality at which it has been found wild. From plants grown from these seeds, and propagated readily by "hijos" or suckers, the cycad has become common in gardens in various towns in the departments of El Paraíso and Olancho, and young sprouts have been planted recently at El Zamora-