

Gulf Stream Coconuts. The Harries-Baker Test for Discrimination between Flotsam/Jetsam and Natural Dissemination

GERHARD C. CADÉE
*Royal Netherlands
Institute for Sea Research,
Texel, Netherlands*

Harries and Baker's (2005) paper in PALMS was based on the discovery of coconuts (*Cocos nucifera*) with their husks intact in drift on Balevulin Beach on Tiree (Inner Hebrides, UK). They argued that such entire coconuts might arrive with the Gulf Stream from the Caribbean. They suggested a viability test to prove this and suggested trying to let them germinate at a warm moist place at a minimum temperature of 25°C. I am not so sure this 'Harries-Baker' test is conclusive. Flotsam and jetsam coconuts might also germinate, and the time needed to reach Europe with the Gulf Stream might be too long for the coconuts to remain viable.

Nelson (2000) wrote an excellent book on tropical seeds and fruits stranded on beaches in north-western Europe. He enumerated some 36 different species of genuine Gulf Stream drift seeds and fruits identified from European coasts. The first were found on the coast of Cornwall already more than 400 years ago.

Cornwall is still a favorite and rich place for collectors of tropical drift. Darke (2003) collected here over 200 larger tropical drift seeds in four years! Nelson (2000) also mentioned some 20 other exotic species that are not real long-distance floaters but probably transported by man to our coasts. For some

seeds and fruits it remains difficult to discriminate between transport by man and by the Gulf stream (Cadée 1997, Nelson 2000, Brochard & Cadée 2005); among these is the coconut (Fig. 1) (Nelson 2000, Cadée 1988a).

Guppy (1917) estimated the time needed for tropical drift seeds to cross the Atlantic Ocean to be on average 14 months based on drift bottles released in the north-eastern part of the West Indies and reaching the European coast. Such bottles were filled partly with sand to decrease the effect of wind and make them follow the surface water layer. Empty plastic bottles offer a much larger surface to the wind and these may travel much faster over the Atlantic Ocean – the fastest took 4 months (Cadée 1988b). From experiments with drifters that can be followed via satellites we know the path travelled is not a straight line but one with many spirals (e.g., Otto & van Aken, 1996, fig. 11), so the distance traveled by drifting objects is much longer than as the crow flies. This fact was already obvious from shipwrecks that were followed from the US coast all over the Atlantic (e.g., the *W.L. White* wrecked 13 March 1888 near Cape Hatteras and stranded 23 January 1889 on the Outer Hebrides, see Krümmel, 1911 fig. 169).

Viability of coconuts after floating in sea

Although it is repeatedly stated that coconuts do not remain viable after a couple of months floating in the sea (Nelson 2000, Brochard & Cadée 2005), actual experiments are scarce. Thor Heyerdahl's experiments aboard the *Kon-Tiki* in 1947 are probably the most famous. Its cruise over the Pacific from Peru to Raroia took from 28 April to 7 August 1947. The coconuts kept under the raft in contact with seawater did not remain viable. Seawater had slowly penetrated the area of the coconut eyes, causing microorganisms to start the rotting process. However, of those kept on deck (as food), a number started germinating, and after 10 weeks at sea, the *Kon-Tiki* had six coconut palms of one foot length on board (Heyerdahl, 1948, 1968). During their *Kon-Tiki* cruise, Heyerdahl was unaware of the experiments of Edmondson (1941), which he, however, mentioned in 1968.

Edmondson (1941) did more quantitative experiments on viability of coconuts after floating in the ocean. Unfortunately his experiment did not last more than 4 months. Contrary to the data of Heyerdahl, he observed that 10 out of 15 coconuts were capable of developing after having floated up to 110 days



1. A 21 cm long coconut with husk found on the beach of the Island of Texel in the 1980's by Dr R. Witbaard (collection G.C. Cadée)

in the sea. Some started germinating during the experiment. Remarkable was the long time it took the coconuts, planted in the Botanical Garden after the experiment, to sprout (from 3 months to over one year). The roots appeared before the stem, one specimen having floated 28 days required 582 days for the stem to emerge.

Some comments on Harries and Baker (2005)

Harries and Baker (2005) stated that it could take a coconut 6 months to cross the Atlantic. However, the time needed will be at least twice as long. Even the wreck of the *White*, which must have profited more from westerly winds than a coconut, took 11 months to cross the Atlantic from near Cape Hatteras to the Outer Hebrides. Coconuts must come from the Caribbean farther away.

Whether coconuts can remain viable after drifting in seawater for one year or more remains questionable. The experiments on the *Kon-Tiki* indicated that coconuts could not survive three months in seawater. Edmondson (1941) noticed that 2/3 of his coconuts remained viable after floating up to 110 days. No newer and longer experiments are known to me. Harries and Baker (2005) may be right that the Caribbean coconut has wild type characteristics, one of which is slow germination.

Harries and Baker (2005) stated that very few coconuts are nowadays shipped across the Atlantic *with their husks intact*. Nevertheless,

such intact coconuts do arrive on the Dutch coast, albeit less often than those without husks. One of the regular beachcombers on the island of Texel, the Netherlands, my colleague Maarten Brugge (pers. comm.), regularly collects coconuts on Texel's beach, most without husk but some intact; even in 2005 he collected one with husk.

The Dutch coast receives far fewer genuine tropical drift seeds and fruits than the UK coasts. Brochard and Cadée (2005) could document only 35 for the period 1955–2003 (exclusive of the coconuts, which they thought mainly to be man-transported). Darke (2003) collected more tropical drift seeds per year on the Cornish coast! Darke mentioned only one coconut but did not state whether this had its husk intact. Some years ago, germinating coconuts could be bought in flower markets in the Netherlands, so there must have been transport of intact coconuts. However, coconuts may drift almost forever. Perry and Dennis (2003) described a coconut (without husk) that had floated for >30 years! So coconuts certainly will be able to cross the Atlantic as Gulf Stream drift.

Cadée (1988b) mentioned a coconut that was found during the exceptional warm summer of 1947 by L.F. Weijdt to have germinated on Engelsmansplaat, an uninhabited, very high tidal flat in the Dutch Wadden Sea. This coconut passed the Harries-Baker test. There are rumors (which I have not yet checked) that more have been found in the warmer summers of recent years. Is this proof of Harries and Baker's "natural dissemination"? I still think this could have been a man-transported coconut, even though they may also pass the Harries-Baker test.

Acknowledgments

I am very grateful to my son Niels (RSPB, Edinburgh) for sending me "Mystery of island coconut bounty" from BBC News Scotland of 18 September 2006, based on the Three coconuts. Remarkable that BBC news believed that Dr. W.J. Baker considered the possibility of commercial growing coconuts in the UK, which must have been a practical joke to get BBC interested. I also thank Dr. W.J. Baker (Kew) for discussions via e-mail and for sending me a copy of his paper (with Harries) in PALMS. I thank Maarten Brugge (Texel) for his data on coconuts from the beach of Texel.

LITERATURE CITED

- BROCHARD, C. AND G.C. CADÉE. 2005. Tropische drijfzaden van de Nederlandse kust. Strandwerkgroep (SWG) Tabellenserie 30: 1–66.
- CADÉE, G.C. 1988a. Seeds of *Attalea funifera* Mart. and a review of other tropical seeds from the Dutch coast. Porcupine Newsletter. 4(3): 51–54.
- CADÉE, G.C. 1988b. Bottles crossing the Atlantic Ocean. Letter to the editor, Irish Naturalist J. 22: 449.
- CADÉE, G.C. 1997. The human factor in tropical drift fruits and seeds from the Dutch coast. The Drifting Seed. 3(2): 3–4.
- DARKE, N. 2003. Cornish drift seeds. The Drifting Seed 9(1): 5.
- EDMONDSON, C.H. 1941. Viability of coconut seeds after floating in sea. Occasional Papers B.P. Bishop Museum, Honolulu, Hawaii 16(12): 293–304.
- GUPPY, H.B. 1917. Plants, seeds, and currents in the West Indies and Azores. Williams & Norgate, London.
- HARRIES, H.C. AND W.J. BAKER. 2005. The Gulf Stream coconut: flotsam and jetsam or natural dissemination? PALMS 49: 195–198.
- HEYERDAHL, T. 1948. The Kon-Tiki Expedition. Oslo.
- HEYERDAHL, T. 1968. The coconuts on Cocos Island. p. 133–148. In: HEYERDAHL, T., Sea Routes to Polynesia, Allen & Unwin, London.
- KRÜMMEL, O. 1911. Handbuch der Ozeanographie. vol. 2. Englehorn, Stuttgart.
- NELSON, E.C. 2000. Sea beans and nickar nuts. A handbook of exotic seeds and fruits stranded on beaches in north-western Europe, BSBI Handbook, London, 156 pp.
- OTTO, L. AND H.M. VAN AKEN. 1996. Surface circulation in the northeast Atlantic as observed with drifters. Deep-Sea Res. I. Oceanographic Res. Papers. 43: 467–499.
- PERRY, E.L. AND J.V. DENNIS. 2003. Sea-Beans from the Tropics. Krieger Publishing, Malabar, Florida.