



***Cerbera* sp. (Apocynaceae) drift mesocarps: first record from British waters and a summary of previous records from north-western Europe**

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Abstract: On 21 March 2010, a *Cerbera* sp. mesocarp was found stranded on Carlyon Beach, St. Austell, southern Cornwall (SX 0615 5217), Britain. The specimen represents the first record of a *Cerbera* mesocarp from British waters and the fifth from north-western Europe.

Résumé : *Mésocarpe dérivant de Cerbera sp. (Apocynaceae) : premier signalement dans les eaux britanniques et résumé des signalements précédents dans le nord-ouest de l'Europe.* Le 21 Mars 2010, un mésocarpe de *Cerbera* sp. a été trouvé échoué sur la plage de Carlyon, à St. Austell, dans le sud de la Cornouailles (SX 0615 5217), en Grande-Bretagne. Le spécimen représente le premier signalement d'un mésocarpe de *Cerbera* dans les eaux britanniques et le cinquième en provenance du nord-ouest de l'Europe.

Keywords: *Cerbera* • Cornwall • First British record • NW European records

Introduction

Cerbera is a genus of medium-sized evergreen trees and shrubs (4-40 m tall), native to tropical Asia, Australia, and various islands in the Indian and western Pacific Oceans. Six species of *Cerbera* are currently recognised worldwide: *C. manghas* L. (western Indian Ocean islands to eastern Asia, Malesia, Micronesia, Melanesia & northern Australia), *C. odollam* Gaertner (southern India and Sri

Lanka to eastern Asia, Malesia, Melanesia & Polynesia), *C. inflata* S.T. Blake (NE Queensland, Australia & New Guinea), *C. laeta* Leeuwenberg (endemic to New Guinea), *C. floribunda* Schumann (Western Australia, Malesia & Melanesia), and *C. dumicola* P. Forester (endemic to Queensland, Australia) [Hemsley, 1885; Fosberg & Sachet, 1987; Ash, 1992; Forster, 1992; Vander Velde & Vander Velde, 2006; Alvarado-Cardenas & Ochoterena, 2007; Middleton, 2007 & 2014; Endress et al., 2014]. Middleton (2007) cautioned that care must be exercised when interpreting the earlier literature on *Cerbera* as species have often been confused with each other, especially *C. manghas* and *C. odollam*.

Although *C. manghas* is considered to be native to Madagascar, Seychelles and Mauritius, it is thought to have been introduced by man to the island of Pemba off Tanzania (Muir, 1937). Curiously, *Cerbera* have not been recorded from the mainland coast of tropical east Africa (Goyder et al., 2012; Anon., 2016a). *C. laeta* was introduced from Papua New Guinea to Hawaii (Middleton, 2007; Sullivan et al., 2009), while *C. manghas* and *C. odollam* are commonly cultivated in coastal areas of Kauai (Middleton, 2007), including the National Tropical Botanical Garden (Tim Flynn, pers. comm.). Although both of the latter species are also privately cultivated in Florida (Zoe Cabuk & Kristi Van Benschoten, pers. comm.), there are no records of any stranded *Cerbera* mesocarps from the NW Atlantic region (Guppy, 1917; Ed Perry, pers. comm.).

Many *Cerbera* species are found in either coastal or riverine habitats. *C. manghas* is a salt-water tolerant species (Shi et al., 2005), generally found in the littoral zone behind mangrove areas, and often in monsoon vine thickets along the shore. However, it may also extend inland into lowland rainforest communities at elevations of up to 150 m. Although *C. odollam* mostly occurs in low altitude riverine habitats, muddy river deltas, near mangrove swamps, and along sandy coasts, Guppy (1906) recorded the species at elevations of over 800 m in inland areas of Fiji. *C. floribunda* grows along creeks or in marshy areas and is always found near permanent water. *C. dunicola* primarily occurs in lancewood (*Acacia shirleyi* Maiden) thickets away from the coast, but may also be found in semi-evergreen vine thickets near the coast. *C. inflata* grows in rainforests at elevations of up to 2250 m, generally away from permanent water. Little is known about the natural habitat and ecology of *C. laeta* (Guppy, 1906; Ridley, 1930; Forster, 1992; Middleton, 2007).

Cerbera produces relatively large ovoid-globose-ellipsoidal fleshy fruits (drupes) measuring 4.0-12.0 cm in length and 2.0-9.0 cm in diameter, which usually contains one comparatively small seed. The thick fibrous-corky mesocarp and lignified endocarp (Umezawa, 2003) provide natural buoyancy which may facilitate natural hydrochorous seed dispersal, at least locally. Although mesocarps of both *C. manghas* and *C. odollam* are frequently found stranded on shorelines throughout most of their natural and introduced range (Hemsley, 1885; Guppy, 1890 & 1906; MacCaughy, 1918; Ridley, 1930; Hacker, 1990; Smith, 1990, 1994 & 1999; Smith et al., 1990; Longhorn, 2004; Sullivan et al., 2009; Anon., 2016b), curiously none have been recorded from the mainland coast of tropical east Africa (Ridley, 1930; Muir, 1937; Cadée, 2000; Hosten-Willems, 2005 & 2007; John & Sandie Burrows pers. comm; and Paul Meintjes, pers. comm.). There are also no known records of *Cerbera* mesocarps from the west coast of tropical Africa (SE Atlantic) [Burgt, 1997].

While *Cerbera* mesocarps may drift in ocean currents for long distances, their maximum period of buoyancy and seed viability are unknown (Gunn & Dennis, 1999). In New Guinea drift, Hemsley (1885) noted that the seeds within stranded decaying fruits of *C. odollam* were invariably dead. He remarked that 'the fibrous fruit of this common sea-shore tree would doubtless bear long immersion without injury to the exalbuminous seeds, though the seeds of these are quite dead'. In Fijian estuaries, Guppy (1906) noted that locally derived floating fruits of *C. odollam* failed to germinate. Gunn & Dennis (1999) hypothesized that since *Cerbera* does not have a pantropical distribution, its seeds are probably not long-lived. They suggested that seed viability may be compromised because the area of the mesocarp wall separating the fruit halves is relatively thin and therefore easily penetrated by sea water, particularly during long distance oceanic drifting.

All parts of *Cerbera* are highly toxic because they contain, inter alia, cerberin, a cardiac glycoside which blocks electric impulses in the body, including the heart (Lazarides & Hince, 1993; Shen et al., 2007; Carlier et al., 2014; Gorantla et al., 2014). Maillaud et al. (2010) recently reported two cases of accidental fatal poisoning in humans in the Loyalty Islands (New Caledonia) following the consumption of Coconut Crabs (*Birgus latro* L.) which contained residues of *C. manghas* toxins. The seeds of *C. manghas* were routinely used as an ordeal poison in Madagascar, accounting for the death of at least 3000 people per annum until the practice was discontinued during the mid-19th century (Lindley, 1849). However, more recently, Gaillard et al. (2004) and Eddleston & Haggalla (2008) highlighted the widespread misuse of *C. odollam* and *C. manghas* respectively in both suicide and homicide cases in southern India. Although *Cerbera*-related poisonings have not been detected so far in the western world (Fuchs et al., 2011), Carlier et al. (2014) noted that some cities are home to large ethnic populations with an ancestral knowledge of the poisonous properties of *Cerbera* and recommended that the associated toxins should be routinely analysed by toxicology laboratories. Kawohl & Habermeyer (2005) highlighted the increasing trend in suicidal patients seeking information via the internet about plant poisoning methods.

Although the direct or indirect consumption of *Cerbera* fruits and seeds can be fatal to humans, they are deliberately targeted and eaten with impunity by some natural predators e.g. *B. latro* (Maillaud et al., 2010) and seed dispersers e.g. Cassowaries *Casuaris spp.* (Wright, 2005). In New Guinea, Filardi & Tewksbury (2005) noted that the ground-foraging Palm Cockatoo *Probosciger aterrimus* (Gmelin, 1810), avoided the fresh fruits, but not the seeds of *C. floribunda*. Fall et al. (2007) hypothesised that the extinction of several species of large fruit-eating

pigeons in the Vava'u Islands (Tonga) may have left several of the largest seeded trees (including *C. odollam*) without natural animal dispersal vectors.

Despite their notorious reputation, *Cerbera* trees and shrubs also have some less ominous and potentially beneficial uses. The wood is used locally for mouldings, carvings, interior finishing's, packaging, fuel and charcoal. The bark, sap (latex), leaves, flowers and roots have traditionally been used as a purgative and for inducing abortion. The seeds and young fruits yield oil that is used as a fish and dog poison, an insecticide, candle making, and as an external treatment for various skin ailments and cardiac disorders. *C. manghas* is cultivated as an ornamental tree and the mesocarps are used in Western countries to make dried flower arrangements (Forster, 1992; Cambie & Ash, 1994; Middleton, 2007; Giesen et al., 2006; Shen et al., 2007; Anon., 2016a).

Review of NW European records

Details of all known NW European records of *Cerbera* are summarised in Table 1. Since 1973, three specimens of *Cerbera* mesocarps have been recorded from the Dutch coast, one from Jersey, and one from Britain. One specimen was definitively identified as *C. odollam*, one as *C. manghas*, and three as *Cerbera sp.*

On 21 March 2010, a *Cerbera sp.* mesocarp was found stranded on Carlyon Beach, St. Austell, southern Cornwall (SX 0615 5217), Britain (Fig. 1). The specimen, which measured c.50 mm in length and c.30 mm in diameter, represents the first record of a *Cerbera* mesocarp from British waters and the fifth from north-western Europe. There was no evidence of any visible epibionts on the external surface of the mesocarp which may support the view that the specimen had not been drifting for a significant period at sea prior to stranding. However, it is possible that the presence of growth-inhibiting toxins



Figure 1. *Cerbera* mesocarp from Carlyon Beach, St. Austell, southern Cornwall, Britain. March 2010.

within the mesocarps may account for the absence of marine bio-fouling epibionts.

Cadée (1995, 1996 & 1997), Cadée & Nijhuis (2001) and Brochard & Cadée (2005) suggested that *Cerbera* mesocarps found stranded on NW European coasts were unlikely to be true peregrine drifters, and were most likely transported and discarded there by man, 'as no ocean current can be envisaged that transports seeds from southeast Asia to Northwest Europe'. Although the absence of stranded *Cerbera* specimens either in the NW (Ed Perry, pers. comm.) or SE Atlantic (Van der Burgt, 1997; Xander Van der Burgt, pers. comm.) lends support to this hypothesis, there is circumstantial evidence that the mesocarps could have floated all the way from the Indian Ocean or even southeast Asia.

A number of experiments with surface drifters have demonstrated that Indian Ocean water frequently leaks via the Agulhas Current around the southern tip of South Africa into the South Atlantic and is carried northwards along the

Table 1. NW European records of stranded *Cerbera* mesocarps

Species	Date	Location	Maximum Length (mm)	Maximum Diameter (mm)	Length/Diameter Ratio	Collector	Reference
<i>C. odollam</i>	1973	Texel, Netherlands				C. Ellen	Cadée (1995, 1996 & 1997)
<i>Cerbera sp.</i>	1981	Ouddorp, Netherlands	100	80	1,2	A. de Graff	de Graff (1984)
<i>C. manghas</i>	2 March 1982	Bonne Nuit Beach, Jersey, Channel Islands				Dan Laffoley	Nelson (2000)
<i>Cerbera sp.</i>	12 April 1982	Scheveningen, Netherlands	102	91	1,1	M.H. de Smit	de Smit & Wagner (1985)
<i>Cerbera sp.</i>	21 March 2010	Carlyon Beach, St. Austell, Cornwall (SX 0615 5217), Britain	c.50	c.30	c.1.7	David Fenwick	This paper

western coast of Africa via the Benguela Current and westwards via the South Atlantic Drift to South America (Steinke & Ward, 2003; Richardson, 2007; Guerra et al. 2018). Ebbesmeyer (2003) noted that a plastic drift card which had been released off Cape Town on 17 April 1966 was recovered 19 months later on 25 September 1968, at Stuart Beach, 80 km north of Miami, SE Florida, USA, having drifted at an average speed of c.14 km.day⁻¹. He also noted that a large log of mahogany originating from a wreck in the Mozambique Channel, between the eastern coast of Africa and Madagascar (Indian Ocean), was found stranded at Cape Town, on the Atlantic coast of South Africa, and hypothesized that some of these mahogany logs could wash ashore in England if they remained afloat for 4 years.

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