

**ATOLL RESEARCH BULLETIN**

**NO. 445**

**ON THE ORIGIN OF DRIFT MATERIALS IN THE MARSHALL ISLANDS**

**BY**

**D.H.R. SPENNEMANN**

**ISSUED BY  
NATIONAL MUSEUM OF NATURAL HISTORY  
SMITHSONIAN INSTITUTION  
WASHINGTON, D.C., U.S.A.  
OCTOBER 1997**

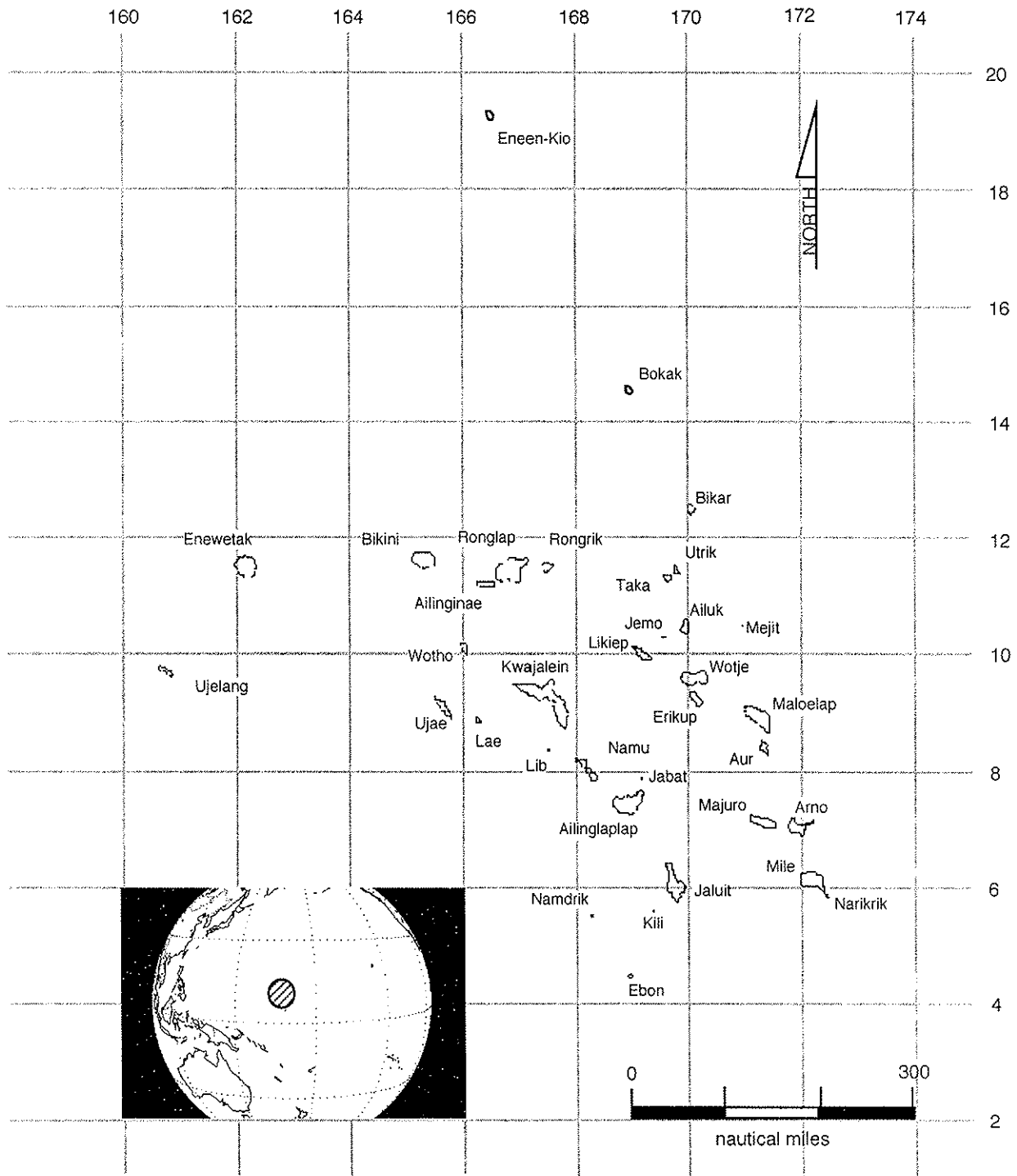


Figure 1 Index map of the Marshall Islands showing the atolls mentioned in the text.

# ON THE ORIGIN OF DRIFT MATERIALS IN THE MARSHALL ISLANDS

BY

Dirk H.R. Spennemann<sup>¶</sup>

The oceanic dispersal of plants and animals has been the focus of studies ever since organized natural history started in the Pacific, and the dispersal of terrestrial by sea rafting has been given due consideration. The finding of drift materials such as glass floats, tree trunks and seeds, is a common occurrence on the shores of Pacific Islands, but in most cases the origin of such material is unknown or at least equivocal. Thus while the principle of sea rafted dispersal is known and reported at length, there is a need to document those occasions where positive proof of origin can be furnished.

Recently a piece of pumice with a slab of obsidian (volcanic glass) attached to it was found on an atoll in the Marshall Islands—a coral atoll group devoid of volcanic materials (Spennemann & Ambrose 1997). It became necessary to review the archaeological and historical record of the nature and origin of drift materials washed up on the atolls of the Marshall Islands (Spennemann 1996). In view of the relevance of this information for biogeographical studies in general it seems prudent to furnish the salient points in a format accessible to a wider academic community.

## THE MARSHALL ISLANDS

The Marshall Islands, comprising 29 atolls and 5 islands, are located in the north-west equatorial Pacific, about 3790km west of Honolulu, about 2700km north of Fiji and 1500km east of Ponape. With the exception of the two northwestern atolls, Enewetak and Ujelang, the Marshall Islands are arranged in two island chains running roughly NNW to SSE: the western Ralik Chain and the eastern Ratak Chain (figure 1).

The current patterns in the Marshall Islands are complex and material can float in from both the east and the west. Three current zones can be encountered, which are the south equatorial current, running from east to west, the equatorial counter current, running from west to east, and the northern equatorial current running from east to west. During the northern summer the atolls south of Mile are located within the north equatorial counter current, which runs against the tradewinds (west to east). In the following northern winter these atolls are at or near the interface between the north equatorial counter current and the northern equatorial current (running east to west) (Barnes *et al.* 1948). In addition, the El Niño effect changes the sea surface temperatures and hence the climatic belts. Further, typhoons, whose frequencies seem to be running in synchrony with the occurrence of the El Niño effect (Spennemann & Marschner 1995), bring material from other destinations to the Marshalls.

---

<sup>¶</sup> The Johnstone Centre, Charles Sturt University, PO Box 789, Albury NSW 2640, Australia.

The first European account of the occurrence of driftwood in the Marshall Islands was reported by Adalbert von Chamisso who noted that it was seen on Wotje in 1816 on occasion of the visit by the Russian Exploring Expedition commanded by Otto von Kotzebue (Chamisso 1910, p. 156). Driftwood is a common occurrence throughout the atolls of the Marshall Islands (Hager 1886, p. 57), and has been reported from the shoreline of many atolls, such as Majuro (Spennemann 1992); Arno (Wells 1951, p. 3); Mile (pers. obs. ); Wotje (Chamisso 1910); Kwajalein (Fosberg 1956: plate 13A); Ebon (pers. obs.), Nadikdik (pers obs.); Maloelap (pers obs.); and Jaluit (Schneider 1891). It has also been found in the centre of other islets, such as on Wake (Eneen-Kio) Atoll (Grooch 1936, p. 92; 1938) or Bokak (Taongi) Atoll (Irmer 1895), both in the northern Marshalls.

### HISTORIC EVIDENCE FOR THE ORIGIN OF DRIFT MATERIAL

Only a few of the drift items encountered on the shores of the Marshall Islands allow an accurate identification of their origin. References to these is scattered are the literature. These are discussed below and summarised in table 1.

Wells reported that driftwood trees arriving from North America (mainly California) and carried by the Northern Equatorial Current are not uncommon on the atolls of the Marshall Islands. He encountered a cut fir log measuring 1.5 by 16.5m (5 by 55 feet) and a trunk of a redwood tree on Arno Atoll (Wells 1951, p. 3). Grooch (1936) reported the presence of drift logs on Wake and the current author has seen large cut drift logs in various islands on Majuro, Mile and Nadikdik Atolls. Traditional Marshallese culture has several references to fir trees and their uses (compiled in Spennemann 1996).

Another report on drift material coming from the east is the case of a rubber dinghy. On 27 May 1943 a Consolidated B-24 'Liberator' bomber crashed into the sea 225m NW of Palmyra Atoll (crash site approx 8°32'N 164°20'W). The three survivors of the US crew drifted for 47 days in an inflatable life raft and eventually arrived on Japanese-held Maloelap Atoll, having floated across the reef into the lagoon (JICPOA 1944).

In a similar case, a small fishing vessel went missing in 1979 off Hana, Maui, Hawaiian Islands and was eventually found washed up on Bokak Atoll in 1989 (Thomas 1989, p. 33).

Drift voyages by canoes from the west are also documented: Lamotrekese are reported on Arno (Chamisso 1986, p. 264; Kotzebue 1821, p. II 89), Pingelapese arrived on Jaluit (Krämer & Nevermann 1938, p. 35) and on different occasions, Yapese drifted to Aur Atoll (18<sup>th</sup> century, Chamisso 1986, p. 264) and Kili Island (Hezel 1979, p. 127; entry for 1868, *Bark Syringia*). In addition canoes from Woleai arrived in the Marshalls (Chamisso 1986; Erdland 1914, p. 315).

Before the introduction of bamboo plants to the Marshalls by the Japanese colonial administration, sea rafted bamboo was much sought after for use as bamboo containers and the like (Krämer & Nevermann 1938; Knappe collection Erfurt, unpubl.). The rafted bamboo came from sources in South East Asia, most likely Indonesia or the Philippines.

*Table 1 Known points of origin for drift materials encountered on atolls of the Marshall Islands*

Locality	Target	Item floated
Apaiang, Kiribati	Mile	canoe load of people
California, North America	Arno, Majuro, Mile, Nadikdik, Wake	cut fir logs
Central Solomons	Mile, Wotje	canoe hull
Japan		boats
Kiribati (general)	Ebon, Namorik	canoe load of people
Kiribati (general)	Mile	sailboat hull
Krakatau, Indonesia	Ailuk etc.	pumice
Lamotrek Atoll, FSM	Arno	canoe load of people
Maui, Hawaii	Bokak	skiff
Palmyra Atoll (225 nmNW of...)	Maloelap	rubber dinghy from crashed B-24
Philippines (?)		bamboo
Pingelap Atoll, FSM	Jaluit	canoe load of people
Tuluman I., Bismarcks, PNG	Nadikdik	piece of pumice/obsidian
Woleai Atoll, FSM	Kili	canoe load of people
Yap, FSM	Kili, Aur	canoe load of people

Similarly, following the explosion of Krakatau in 1883 large amounts of pumice were produced which were washed ashore in the Marshall Islands (Grundemann 1887, p. 442; Sachet 1955).

Even though the Marshall Islands' atolls are in the zone of the north equatorial counter current, the origin of objects from Japan cannot be excluded. There are abundant examples of Japanese Junks drifting to Siberia, Alaska, Canada, mainland USA, Hawaii, the Marianas and Guam, Palau and even the Marshall Islands (Kakubayashi 1983).

In addition, material from sources south of the equator has been documented. During a pedestrian survey on Nadikdik Atoll (5°45' N, 172°10' E) the author found a piece of pumice with a slab of obsidian attached to it. As the atoll had been completely water washed with a 12m high storm surge and devastated with a large loss of life during a typhoon in 1905, it was very likely that the deposition of the pumice occurred after that time. Quantitative chemical analysis of major elements in the obsidian showed that Tuluman Island in the Bismarck Archipelago is the most probable source of the material (Spennemann & Ambrose in press). Tuluman Island emerged from the sea in 1953 and produced massive amounts of pumice and obsidian in periodic eruptions until around 1957 (Reynolds *et al.* 1980).

Washed up canoe hulls are other indicators of drift materials in the Marshall Islands. The author has seen two canoe hulls which appear to be Solomon Islands canoes. One was seen on Mile Atoll, the other, a Binabina-style canoe from the central Solomon Islands, on Wotje Atoll (Spennemann 1996).

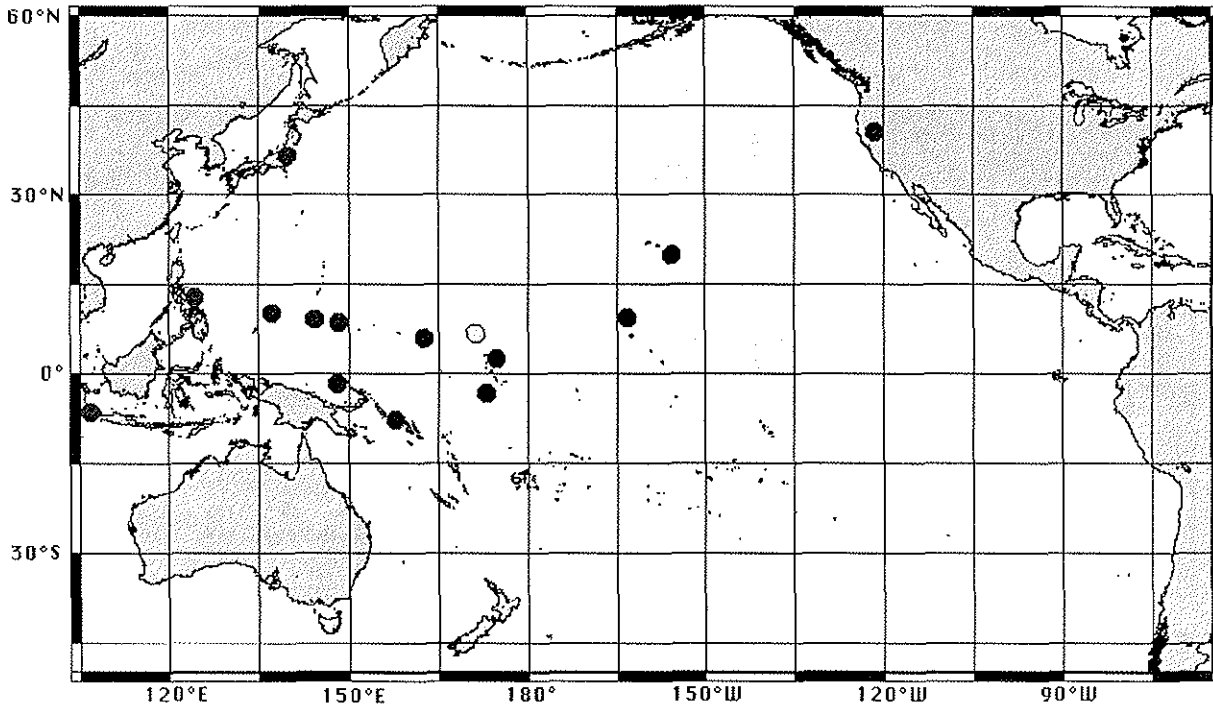


Figure 2. Map of the Pacific Ocean showing the origin of the drift materials encountered in the Marshalls. The greyed dot indicates the location of the southern atolls of the Marshall Islands

I-Kiribati canoes (with or without crew) were often found adrift. A sail boat hull of a modern Kiribati design drifted ashore in Mile in the late 1980s and has been refurbished since (own obs.) I-Kiribati canoes were often stranded on the southern Marshalls, especially Arno and Mile, and these atolls have several genealogical links with the northern and central atolls of Kiribati. Shipwrecked i-Kiribati crew were picked up by the brig *Mercury* south of Ebon in 1858 (Hezel 1979, p. 121). In 1882 other i-Kiribati were found drifting south of Ebon by the American vessel *Northern Light* (Hezel 1979, p. 139). During the 19<sup>th</sup> century dispersed i-Kiribati were also living on Namorik (1851; Hezel 1979, p. 121; 1868; *ibid.* 127) and Jaluit (1871; *ibid.* 129; 1879 *ibid.* 136). Two Catholic missionaries together with fourteen Gilbertese left Apaiang Atoll *en route* to Marakei in early September 1942. The canoe eventually wrecked on Mile Atoll in the Marshalls (Richard 1957, p. 401). Even today, i-Kiribati fishermen occasionally drift to the shores of the southern Marshall Islands.

In addition, there is evidence for internal drift in the Marshall Islands archipelago. Following the 1905 typhoon that hit the southern atolls of Nadikdik, Mile, Arno and

Jaluit, the remains of canoes, wooden bowls, houses and corpses were washed ashore on Enewetak Atoll (Jeschke 1906). Following a devastating typhoon in 1840 survivors from Mejit Island were washed ashore on Likiep Atoll (Erdland 1914, p. 18). Both of these cases of east to west drift are well within the range of expectations given the overall current pattern.

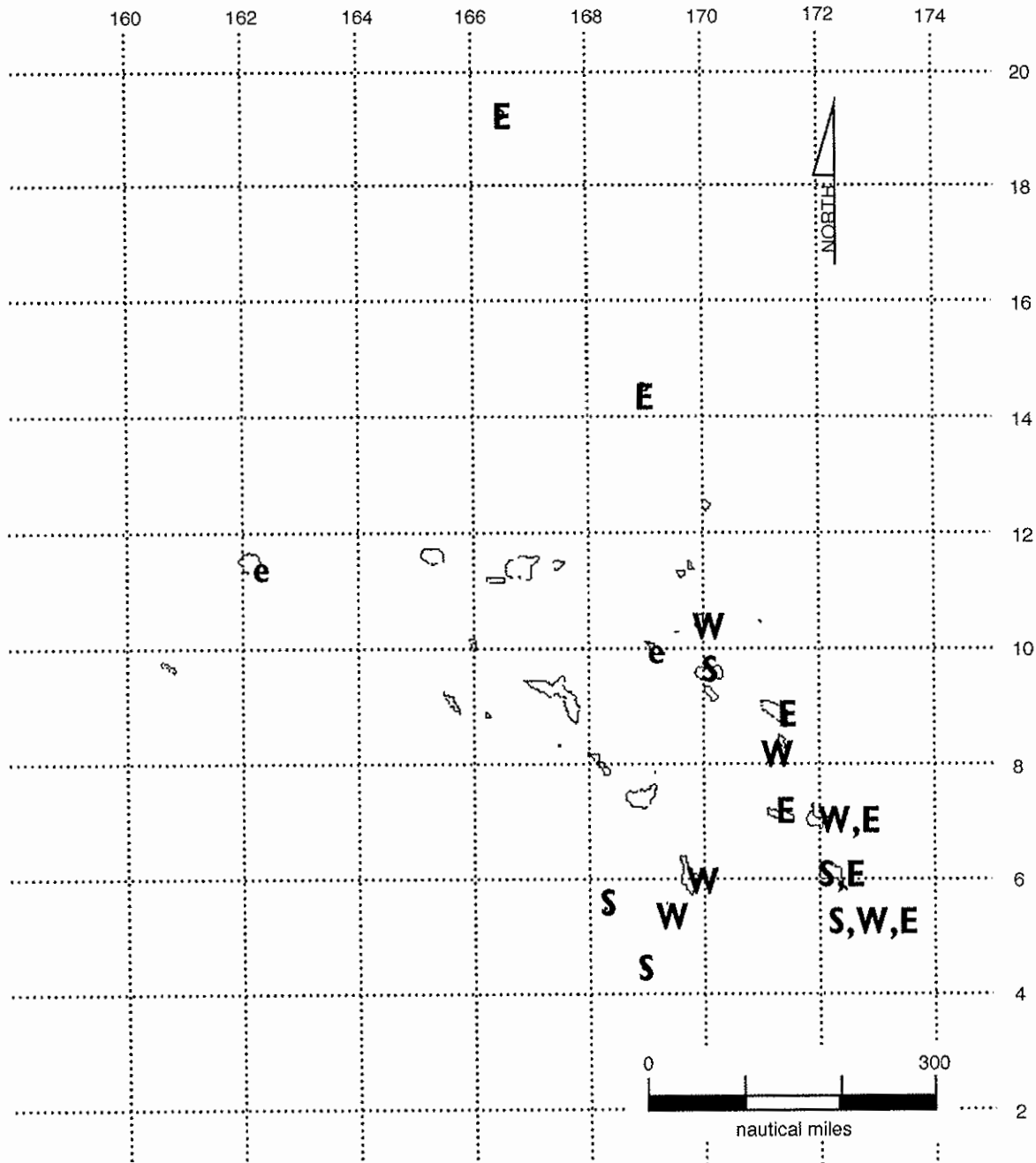


Figure 3. Map of the Marshall Islands showing the direction from where drift materials came from. Small letters designate drift within the Marshalls.

## IMPLICATIONS

The locations of confirmed origin of sea rafted materials have been plotted in figure 2. It becomes evident that material from *all* areas of the Pacific (with the exception—so far—of South America and Australia proper) has arrived in the Marshall Islands. The distribution of the origin of sourced materials on the various Marshall Islands atolls has been plotted in figure 3 which shows that the southern atolls are more favoured in this respect than the northern locales.

The perusal of current pattern charts provides are too coarse a resolution and does not allow to assess micro variations, a scale that is required to make useful predictions. For example, a mere perusal of the current charts would not have made likely for example the dispersal of material from the Solomons or the Bismarck Archipelago.

As this small compilation has shown, there is still a need to systematically compile and draw on the historic literature and make use other contemporary material and sources. Coupled with a reassessment of the Holocene sea-level curve this observation may have a bearing on the interpretation of the distribution of mangrove species in Eastern Micronesia.

## BIBLIOGRAPHY

- Barnes, C.A., D.F. Bumpus and J. Lyman (1948) Ocean circulation in the Marshall Islands area. *Transactions of the American Geophysical Union* 29(6): 871-876.
- Chamisso, A. von (1910) *Reise um die Welt mit der Romanzoffschen Entdeckungs-expedition in den Jahren 1815-1818 auf der Brig Rurik, Capitän Otto v. Kotzebue Zweiter Theil: Bemerkungen und Ansichten. Chamisso's Werke Vierter Theil*. Berlin: G.Hempel.
- Chamisso, A. von (1986) *A voyage around the world with the Romanzov exploring expedition in the years 1815-1818 in the Brig Rurick, Captain Otto von Kotzebue*. (translated by H.Kratz). Honolulu: University of Hawaii Press.
- Erdland, A. (1914) *Die Marschall-Insulaner*. Anthropos Ethnologische Bibliothek. Münster i.W. Bd. 2, Heft 1.
- Fosberg, F.R. (1956) *Military Geography of the Northern Marshalls*. Engineer Intelligence Dossier, Strategic Study Marshall, Subfile 19, Analysis of the Natural Environment. Prepared under the direction of the Chief of Engineers, U.S. Army by the Intelligence Division Office of the Engineer Headquarters United States Army Forces Far East with personnel of the United States Geological Survey.
- Grooch, W.S. (1936) *Skyway to Asia*. New York: Longman & Green.
- Grundemann, D. (1887) Unser kleinstes Schutzgebiet, die Marschallinseln. *Deutsche Kolonialzeitung* 4, 441-444.
- Hager, C. (1886) *Die Marschall-Inseln*. Leipzig.
- Hezel, F. X. (1979) *Foreign ships in Micronesia. A compendium of ship contacts with the Caroline and Marshall Islands 1521-1885*. Saipan, Mariana Is.: F.J.Hezel & Trust Territory Historic Preservation Office.



- Irmer, G. (1895) Letter Kaiserlicher Landshauptmann für das Schutzgebiet der Marschall Inseln Dr. Irmer to Reichskanzler Fürst zu Hohenlohe-Schilligsfürst. Trip report on a voyage to Bikar and Bokak. Letter dated Jaluit 14 December 1895. in Auswärtiges Amt Kolonial-Abtheilung AIII Acten betreffend Deutsche Südsee Phosphat Gesellschaft. Gesellschaften und Vereine 10f N. 4. File 2459 Vol 1. June 1906 to 15 March 1907. National Library of Australia, Microfilm MfM G 8525.
- Jeschke, C. (1906) Bericht über die Marschall-Inseln. *Petermanns Mitteilungen* 52, 270-277.
- JICPOA (1944) "Prisoner of War Interrogation Report, 6th Base Force Secret Number 330, Headquarters 6th Base Force July 1943" and "Prisoner of War Interrogation Report Annex 23 July 1943" translation of captured Japanese document JICPOA Item 5703 captured at Kwajalein Atoll, Received JCPOA 11 February 1944 contained in file "Joint Intelligence Centre Pacific Ocean Areas. Translations of Japanese documents captured Makin-Kwajalein Atoll-Namur Island-Munda and Tarawa. Also primary interrogation of Japanese prisoners of war, March 1944. Record series AWM54 file 423/4/40 Part I. Archives of the Australian War Memorial, Canberra, Australia.
- Kakuyabashi, F. (1983) Japanese drift records and the Sharp hypothesis. *Journal of the Polynesian Society* 90, 515-524.
- Kotzebue, O. von (1821) *A voyage of discovery into the South Sea and Beering's Straits. for the purpose of exploring a north-east passage undertaken in the years 1815-1818, at the expense of His Highness the Chancellor of the Empire, Count Romanzoff in the ship Rurick, under the command of the Lieutenant in the Russian Imperial Navy, Otto von Kotzebue.* 3 vols. London: Longman, Hurst, Rees, Orme and Brown.
- Krämer, A. & H. Nevermann (1938) Ralik-Ratak (Marschall Inseln). In: G.Thilenius (ed.), *Ergebnisse der Südsee-Expedition 1908-1910. II. Ethnographie, B: Mikronesien.* Vol. 11: Hamburg: Friedrichsen & de Gruyter.
- Reynolds, M.A., J.G. Best and R.W. Johnson (1980) The 1953-57 eruption of Tulumano volcano: rhyolitic activity in the northern Bismark Sea. *Geological Survey of Papua New Guinea, Memoir* 7
- Richard, D. E. (1957) *The United States Naval Administration of the Trust Territory of the Pacific Islands. Vol. 1: The Wartime Military Government Period 1942-1945.* Washington, DC: U.S. General Printing Office.
- Sachet, M.-H. (1955) Pumice and other extraneous volcanic material on coral atolls. *Atoll Research Bulletin* 38. Washington: Pacific Science Board.
- Schneider, E. (1891) Tagebuchblätter von Jaluit. *Deutsche Kolonialzeitung* 4, 30-34;46-48;58-61;75-77.
- Spennemann, D.H.R. (1992) *Cultural Resource Management Plan for Majuro Atoll, Republic of the Marshall Islands.* 2 Vols. Washington: U.S.Department of Interior, Office of Territorial and International Affairs. Part I: Management Plan 543 pp. Part II: Appendices 352 pp
- Spennemann, D.H.R. (1996) Gifts from the waves. A case of marine transport of obsidian to Nadikdik Atoll and the occurrence of other drift materials in the Marshall Islands. *Johnstone Centre of Parks, Recreation and Heritage Report* N° 23. Albury, NSW.: Charles Sturt University, The Johnstone Centre of Parks, Recreation and Heritage
- Spennemann, D.H.R. and W. R. Ambrose (1997) Floating obsidian and its implications for the interpretation of Pacific prehistory. *Antiquity* 71(271): 188-193.

- Spennemann, D.H.R. and I. G. Marschner (1995) Association between ENSO and typhoons in the Marshall Islands. *Disasters* 19(3), 194-197.
- Thomas, P.E. (ed.) (1989) Report of the Northern Marshall Islands Natural Diversity and Protected Areas Survey, 7-24 September 1988. Noumea: South Pacific Regional Environmental Programme.
- Wells, J.W. (1951) The Coral Reefs of Arno Atoll, Marshall Islands. *Atoll Research Bulletin* 9. Washington: Pacific Science Board, National Research Council.