48.312 Pacific Pre-History

How relevant is modern experimental voyaging to understanding the settlement of Oceania?

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'The exploration of the Pacific and the settlement of its remote islands were remarkable episodes in human prehistory'.[1] Recently, a variety of modern experimental voyages have been undertaken to try to provide more information on this period, to prove one individual's theories or disprove another's, or for more personal reasons, such as excitement. In order to assess the relevance of data so gained, it is necessary to look at why experimental voyaging developed. This essay will then consider the quality and range of information gained from modern expeditions, discuss the drawbacks or shortfalls, and the unexpected results. Lastly it will assess information gained from other research methods, and the revised model of settlement patterns.

Prior to about 1965, little was known about how people navigated around Oceania. The orthodox view, held by writers such as Elsdon Best, Abraham Fornander, Percy Smith and Peter Buck, was that navigator heroes such as Kupe were able to discover new lands and return with sailing directions.[2] Andrew Sharp presented an alternative view in his *Ancient Voyagers in the Pacific* and *Ancient Voyagers in Polynesia*, written in 1957 and 1963 respectively. He proposed that voyaging was one-way, and that although canoes might have been hunting for new land, any discovery was necessarily accidental. He believed that islanders lacked navigational skills, and they and their weak, clumsy vessels were at the mercy of the sea and wind.[3] These statements caused a wave of experimental voyages. In order to prove Sharp wrong, researchers found that they had to study traditional boat building, sailing and navigation.

Initially modern experimental voyages provided some useful information on vessel types. The canoes sighted by the first European explorers varied, and ranged from those over 30 metres long to small fishing canoes. Double canoes were common in Polynesia, and single outriggers in Micronesia, within a preferred range of 50 to 75 feet long.[4] They featured a planked construction throughout most of the Pacific, and although some vessels 'went about' in a Western manner, others were 'shunted' end for end to keep the outrigger into the wind.

NOTES

1. 1687 Declaration of Indulgence; J.P. Kenyon, *The Stuart Constitution*, p. 410.
2. D.R. Lacey, *Dissent and Parlimentary Politics in England 1661-1689,* p. 174.
3. 1687 Declaration of Indulgence; Kenyon, p. 410.
4. The King's Answer; S.M. Janney, *The Life of William Penn,* p. 287.
5. 1687 Declaration of Independence; Kenyon, p. 411.
6. Janney, p. 286.
7. 1687 Declaration of Indulgence; Kenyon, p. 411.
8. J.R. Western, *Monarchy and Revolution: the English State in the 1680s,* p. 209.
9. M.R. Watts, *The Dissenters from the Reformation to the French Revolution,* p. 249.
10. V. Buranelli, *The King and the Quaker: A Study of William Penn and James II*, p. 123.

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Lewis believed they could have made good an average speed of 100 to 150 miles per day, unless they were tacking. It appears that they could not sail closer than some 75 degrees off the wind, a figure confirmed by the performance of the 'Hokule'a'.[5] Gilbertese single outriggers commonly have an asymmetrical hull, as in the case of 'Taratai', to overcome the pull of the outrigger and make the canoe sail in a straight line. It was estimated by Lewis that the largest canoes were capable of carrying numerous people and sufficient supplies for four to six weeks.[6]

It appears that travelling canoes were 'large, fast and safe',[7] and information gathered by David Lewis served to refute Andrew Sharp's belief that craft were unsafe and unseaworthy. 'Hokule'a' was built to a traditional design but with modern materials so is a 'performance-accurate vessel, not a technology-accurate replica',[8] as traditional materials and skills were not available in Polynesia. In contrast, 'Taratai' was built in a traditional Gilbert Island's manner. However, her building put immense pressure on the small village community to supply the materials, especially the quantity of sennit to lash the parts together, and suitable wood for the outrigger floats, and the vessel was not strong and suffered a variety of problems.[9] It is evident from this project that many traditional skills have been lost in Micronesia, as well as in Polynesia, and a large part of the benefit of modern experimental voyaging is in relearning these building skills. Unfortunately, only 'Hokule'a' underwent full performance trials to obtain as much data as possible on large voyaging canoes, but the latter project has shown that such vessels were capable of sailing not only before the wind, but to windward as well, using a traditional sail size and pattern.

The second area where experimental voyaging has provided information is that of navigational methods. Most knowledge regarding traditional navigational techniques used in the settlement of Oceania had been lost since European contact. It appears that some knowledge was forfeited earlier, as inter-island voyaging links, such as the legendary return voyages between Tahiti and Hawai'i, were broken. David Lewis undertook the first navigational experimental voyage in 1965, sailing his catamaran 'Rehu Moana' from Tahiti to New Zealand without instruments, to test steering by sun and stars alone. Lewis carried out a further series of experiments in 1968-9, with the master navigators Hipour of the Caroline Islands and Iotiebata of the Gilbert Islands.[10] When the 'Hokule'a' project commenced, the team leaders were unable to locate a Polynesian with the skills to navigate without instruments in a traditional manner. As a major aspect of this experiment involved the relationship

between canoe performance and navigation,[11] Ben Finney persuaded Mau Piailug of Satawal to guide the vessel to Tahiti using non-instrument methods. The most important data gained, from the point of view of studying traditional navigation, was a schedule of dead reckoning positions estimated by Mau Piailug and David Lewis, in comparison to actual positions as calculated by the accompanying yacht 'Meotai'.

These, and other studies of navigation systems, agree that there are three key elements to successfully navigating a canoe or other vessel using traditional methods. Firstly, the navigator has to set a course in the desired direction, and hold that course. He then steers by the stars, using either zenith stars, star paths, star pairs (as Nainoa Thompson of the 'Hokule'a' did), polar stars, known constellations or a sidereal or star compass. At dawn and sunset, the sun is able to be used as a fairly accurate guide. During the day, the navigator steers by the swell patterns or the direction of the wind. Secondly, the navigator has to maintain a running fix of the position by dead reckoning, including judging the net effect of currents and leeway. Local knowledge of the currents and the vessel's capabilities assists in this regard, but master navigators also have skill at reading currents from the appearance of the sea. Sharp believed that dead reckoning errors accumulated over a long voyage, but after these projects, it is now understood that errors in dead reckoning tend to cancel each other out. Lastly, the navigator has to make landfall. The earliest information from modern voyaging regarding techniques for finding land was tested by David Lewis on 'Isbjorn', and later successfully tested by 'Hokule'a'. Many islands occur in groups in the Pacific, so once the navigator has located and identified any island, he can then sail up or down the chain until the destination is reached. Navigators had a range of techniques to 'expand the target'[12] which included knowledge of birds that roost at night but feed at sea, and their ranges, as distinct species travelled different distances. Navigators also used cloud formations that commonly build up over islands, the reflection of atolls on clouds, flotsam, changing sea colours to indicate deeper reefs, phosphorescence, and swell patterns, as swells are deflected by the presence of land. Such signs can increase the target by an estimated 30 miles, and Lewis believes that use of such signs was widespread in Oceania. Experimental voyaging did not discover these techniques so much as assist with definition and testing, notably on voyages by David Lewis and 'Hokule'a'.

Having defined navigational techniques, experimental voyages have suggested ways in which such techniques were used to improve the chances of a successful voyage.

Navigators have a knowledge of latitude from their knowledge of the night sky, to within about half a degree. Irwin suggests that to return to a known island, navigators aimed to sail to the correct latitude, then when the stars were at expected positions, they would turn the canoe and sail downwind until the island was located.[13] The 'Hokule'a' demonstrated this technique on her return to Hawai'i. Although Nainoa Thompson was further to the east than expected, latitude sailing allowed the canoe to make landfall safely.

The other area in which experimental voyagers were able to present new or previously unconsidered information was in strategic use of weather patterns to assist canoes to reach intended destinations. In this field, most work has been undertaken by researchers involved in the 'Hokule'a' project, and it has been extensively documented by Ben Finney. The two main ways in which weather patterns were used to make 'Hokule'a's' voyaging easier were in sailing upwind from west to east, from Samoa to Tahiti, and in sailing south-west from Rarotonga to New Zealand. To travel eastwards, the 'Hokule'a' demonstrated the use of favourable wind shifts to get as much easting as possible. This could have been achieved in summer using episodes of monsoonal westerlies, but the risk of tropical storms convinced Nainoa Thompson, the navigator, to attempt a winter crossing using intermittent westerly winds caused by 'low pressure troughs emanating from subtropical depressions to the south'.[14] He proposed to use these westerlies whenever possible, then head south during the resumption of the trade winds so the canoe could catch the westerly associated with the next trough sooner. The voyage to New Zealand was planned to exploit easterly wind flows along the northern sides of high pressure systems, a feature of the late spring weather on the north-eastern approaches to New Zealand.[15] The 'Hokule'a' experiments clearly showed how it is possible to exploit seasonal winds to sail against prevailing trade winds, and in this regard, Finney has suggested that El Nino phenomenon could have also played a part in the settlement of Oceania, as it causes an unusual number of summer westerlies, to assist sailing to the east, the direction of settlement.

One of the first questions in the debate on settlement of Oceania is that of accidental or deliberate voyaging. Recent experimental voyaging has been able to shed some light on this issue. Only one modern experimental voyage can be said to have been accidental, that of 'Taratai II', once her outrigger separated from the hull. The crew were rescued from their life raft, and the hull drifted to Rabi, in Fiji.[16] Deliberate voyages have been shown to be possible, and to have a high degree of success. The multiple expeditions of 'Hokule'a' around

the Pacific, and the voyage to Fiji of 'Taratai', clearly demonstrate the potential of traditional vessel types. In the case of the 'Hokule'a', and of David Lewis' experiments, traditional navigation methods were also used. It is now clear that settlement must generally be attributed to deliberate voyaging, as domesticated plants and animals, and sufficient population numbers were transported with settlers. However, this does not rule out occasional accidental voyages, when fishermen or inter-island travellers could have been blown off course by adverse weather. Irwin has suggested that not only were voyages deliberate, but that they were not generally one-way excursions. Briefly, he believes that voyagers sailed upwind into the prevailing easterly winds in an attempt to discover land, with the opportunity to return to the island of their origin by sailing downwind.[17] For all but the longest voyages, the canoe would then return to the island of origin, and colonising canoes would depart later. He suggests that this system of return voyaging had two benefits, firstly of vastly improving the survival rate, and secondly of improving the knowledge of the area by sharing it with those from the source island. The 'Hokule'a' has undertaken three return voyages between Hawai'i and the Tuvalus, which demonstrate that this was possible.

We have seen that modern experimental voyaging provided information in the areas of canoe strengths and abilities, navigation techniques and strategic use of weather patterns, and added some evidence to the case for deliberate voyaging. However, the information provided has not been able to answer a number of questions, or conclusively prove whether a method or route was used to settle Oceania. There have not been a wide range of voyages, and not all were well documented. Leith Duncan suggests that 'the major role of experimental voyaging must be in relearning',[18] until the skills of earlier cultures become natural to the users. Each project encountered problems due to the loss of knowledge of canoe building and traditional navigation skills, and cost is also a limiting factor.

These shortfalls aside, these projects had an unexpected consequence, that of a cultural revival. After the 'Hokule'a's' first voyage between Hawai'i and Tahiti in 1976, Polynesians regarded it 'as tangible proof of the nautical abilities of their ancestors, and saw the canoe as a symbol of their heritage as an exploring, pioneering people'.[19] There was an increase in building of replica voyaging canoes[20] and in interest in navigation methods, symbolised by the training of Nainoa Thompson, whom Mau Piailug assisted to become the first modern, traditional Hawaiian navigator.

Modern experimental voyaging has provided some useful information in the settlement debate, but it has also had a role in fitting in with and testing information from other research projects and computer simulations. Gladwin undertook research of navigation systems on Puluwat Atoll in the Caroline Islands that provided information that supplemented and expanded Lewis' research. A massive computer simulation study by Levison, Ward and Webb eliminated drift voyages as the means of settlement of most of the Pacific, and a more recent simulation reported by Irwin has assisted him in framing his settlement model.

As Finney suggests, 'the true significance of the 'Hokule'a' voyage(s) .... goes far beyond the debate on two-way voyaging'[21] as experimental voyaging fleshes out the information supplied by archaeologists, botanists and linguists on how the settlement of wider Oceania was achieved. The most recent and fullest model of Oceanic settlement is that developed by Geoffrey Irwin. He suggests that settlement was 'done purposely and rapidly', and in a 'navigationally systematic' manner.[22] The computer simulation undertaken by Levison, Ward and Webb in 1973 shows that the remote Pacific was settled intentionally,[23] however, Irwin's model takes this further and looks at the methods. He notes that the larger Melanesian islands, as far as the Solomon Islands, were settled in the Pleistocene period. It appears that development in vessels and simple navigation was required before further expansion was possible, as the next settlers did not move into the area until some 25,000 thousand years later. They were the first deep-sea sailors, people known as Lapita, who appeared around 1500 B.C. in the Bismarck Archipelago. During the next 1000 years, the Lapita people moved rapidly to settle on the Solomons, Santa Cruz, Vanuatu, New Caledonia, Fiji and West Polynesia. They were associated with a particular form of incised pottery, but were also seen as a maritime culture, whose people fished, kept domesticated plants and animals, and appear to have traded items over a large area.[24] The Lapita people were the ancestors of present day Pacific Islanders, and it was they who developed and used the maritime technology and skills that present day experimental voyagers are attempting to relearn.

Modern experimental voyaging is a nautical application of experimental archaeology. It has taken information supplied by researchers and tested it in a practical way, by the building of replica canoes, and by sailing a variety of craft using traditional methods. This has had benefits in giving greater knowledge of canoe technology and practical navigation, but more especially in an unexpected way, with regard to understanding how weather patterns

could have been exploited to assist settlement. The associated cultural revival was also an unexpected bonus of such projects. The information gained has been used in developing the latest settlement model, along with information sourced from other methods of research. Together, they give a clearer picture of how Pacific Islander's ancestors 'conquered the Pacific with stone-age vessels that swept ever towards the sunrise'.[25]

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1. Geoffrey Irwin, 'Against, Across and Down the Wind: a Case for the Systematic Exploration of the Remote Pacific Islands', *Journal of the Polynesian Society* 98:2 (1989), p. 167.

2. Geoffrey Irwin, *The Prehistoric Exploration and Colonisation of the Pacific*, Cambridge, 1992, p. 1; Andrew Sharp, *Ancient Voyagers in Polynesia*, Auckland 1963, p. 15.

3. Sharp, pp. 33, 70.

4. David Lewis, *We the Navigators*, Canberra, 1973, pp. 253-54.

5. Ben Finney, 'Anomalous Westerlies, El Nino, and the Colonization of Polynesia', *American Anthropologist* 87:1 (1985), p. 10.

6. Lewis, *We the Navigators*, pp. 273-75.

7. Irwin, *Prehistoric Exploration*, pp. 43-44.

8. Leith Duncan, 'Experimental Voyaging in the Pacific', *Journal of the Polynesian Society* 91:3 (1982), p. 461; Ben Finney, 'Voyaging', in *The Prehistory of Polynesia*, (ed) Jesse Jennings, Canberra, 1979, p. 329.

9. James Siers, *Taratai*, Wellington, 1977, pp. 96, 101, 108.

10. Lewis, *We the Navigators*, pp. 3-8.

11. Duncan, p. 463.

12. Finney, 'Voyaging', p. 334; Lewis, *We the Navigators,* p. 153; Irwin, *Prehistoric Exploration*, p. 47.

13. Irwin, *Prehistoric Exploration*, p. 52.

14. Ben Finney, Richard Rhodes, Paul Frost, and Nainoa Thompson, 'Wait for the West Wind', *Journal of the Polynesian Society* 98:3 (1989), p. 291.

15. Ben Finney, *From Sea to Space*, Palmerston North, 1992, p. 38.

16. James Siers, *Taratai II*, Wellington, 1978, p. 134.

17. Irwin, 'Against, Across and Down the Wind', p. 174.

18. Duncan, p. 463.

19. Finney, *From Sea to Space*, pp. 19-20.

20. Duncan, p. 463.

21. Finney, 'Voyaging', pp. 341-43.

22. Irwin, 'Against, Across and Down the Wind', p. 167.

23. Michael Levison, R. Gerard Ward and John W. Webb, *The Settlement of Polynesia: A Computer Simulation*, Canberra, 1973, p. 62.

24. Irwin, *Prehistoric Exploration*, pp. 17, 31, 38.

25. Finney, 'Voyaging' p. 324.

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What changes were taking place on the manors in fifteenth-century England?

Amanda Vallely

The period from the Black Death in 1347-8 to the end of the fifteenth century was a time of enormous change on the manors throughout England. The plague had a dynamic impact on every aspect of the old manorial system. It resulted in the shortage and increased mobility of labour; higher costs and smaller profits for the lords; the breakdown of manorial discipline; the end of direct exploitation of the demesnes; the social and economic promotion of the peasants; different forms of administration; new methods of agriculture; the acceleration of the enclosure movement and by the end of the fifteenth century, the almost total disappearance of serfdom. The rate or extent of these changes was not uniform throughout the country due to such factors as different regional economies, and the differences between lay and ecclesiastical estates. However, in general terms, the very foundations of the traditional manorial system had been altered.

The manor, in its 'ideal' form, was an agricultural estate, great or small over which lordship was exercised.[1] The estate was divided into two parts: the demesne or the lord's home farm from which the lord derived the direct profits of agricultural production; and the tenants' or customary land, from which the lord drew rent. The size of tenants' holdings varied from manor to manor but ranged on average from 25 to 30 acres down to five acres or less.[2] The whole system was organised for the benefit of the lord and the scope for exploitation of his tenants was limitless. The situation of the tenant amounted to personal unfreedom.[3] Those who were villeins by blood were tied to the land and could not leave without the lord's licence. Besides the heavy burden of rent, every tenant was liable to perform labour services on the lord's demesne. They had no protection by common law - only by the custom of the manor. Furthermore, they were subject to fines levied by the lord's court such as leyrwite if their daughter had a child out of wedlock, and heriot, a fine to enter into their inheritance.

This manorial system flourished in the years prior to the Black Death. Markets were expanding, the price of cereals was high in relation to agricultural wages, the population was increasing so land for cultivation was in demand, and there was no shortage of potential