



Ecology/Écologie

Marine turtles used to assist Austronesian sailors reaching new islands



Les tortues de mer pour aider les navigateurs austronésiens à trouver de nouvelles terres

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ABSTRACT

Austronesians colonized the islands of Rapa Nui, Hawaii, the Marquesas and Madagascar. All of these islands have been found to harbor Austronesian artifacts and also, all of them are known nesting sites for marine turtles. Turtles are well known for their transoceanic migrations, sometimes totalling thousands of miles, between feeding and nesting grounds. All marine turtles require land for nesting. Ancient Austronesians are known to have had outstanding navigation skills, which they used to adjust course directions. But these skills will have been insufficient to locate tiny, remote islands in the vast Indo-Pacific oceans. We postulate that the Austronesians must have had an understanding of the marine turtles' migration patterns and used this knowledge to locate remote and unknown islands. The depth and speed at which marine turtles migrate makes following them by outrigger canoes feasible. Humans have long capitalized on knowledge of animal behavior.

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RÉSUMÉ

Les Austronésiens ont colonisé des îles éloignées, comme Rapa Nui, Hawaii ou les Marquises, ainsi que Madagascar. Des artefacts austronésiens ont été découverts sur ces îles, qui sont aussi des sites de nidification pour les tortues de mer, qui sont connues pour effectuer de longues migrations transocéaniques, parfois de milliers de kilomètres, entre les sites de reproduction et les pâtures océaniques. Les anciens Austronésiens sont connus pour leur maîtrise de la navigation hauturière ; cependant, ces compétences sont insuffisantes pour localiser de petites îles dans les vastes océans Pacifique et Indien. Nous postulons que les Austronésiens ont dû comprendre la migration des tortues de mer et

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utiliser cette connaissance pour localiser des terres isolées et inconnues. Une pirogue peut suivre une tortue de mer compte tenu de la profondeur et de la vitesse auxquelles celles-ci migrent. Les Hommes ont ainsi utilisé les compétences des animaux à leur avantage depuis bien longtemps.

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1. Introduction

Austronesians discovered almost every island in the Pacific, including Hawaii, the Pitcairns and the Marquesas or Rapa Nui. They are amongst the most isolated islands (Fig. 1). These islands were then colonized by the Austronesians at ca. AD 1200 [1,2]. Austronesians have been sailing the Pacific for thousands of years, expanding into the far reaches of the Eastern and Northern Pacific as early as 3000 to 4000 years ago [3]. Without any navigational instruments, they developed skills for oceanic voyaging by using monsoon and trade winds, and the ocean currents. The Austronesians were the most advanced explorers of their time [3], using trade winds and accompanying currents to undertake voyages over distances of 6000 to 7000 km to the Americas [4], or between Hawaii, Tahiti and New Zealand [5], among the islands of Samoa, Tonga, and Fiji [6], or the Timor in the Maritime Southeast Asia [7]. The Austronesians were able to:

- determine direction in order to set an accurate course towards their known destinations;
- keep track of position en route and make any necessary directional adjustments;
- actually land on the island or stretch of coast to which they were heading [8].

While these skills may be sufficient to navigate to known destinations, it is unclear how those early sailors were able to locate at the time unknown (is)lands in the Pacific and Indian oceans. We hypothesize that the early Austronesians used the migration routes of sea turtles towards their nesting grounds to locate islands in the Pacific and Indian oceans.

2. Methodology

We compiled a set of > 700 references on turtles, ecology, island biogeography, allochthonous and autochthonous species, migrating species, Austronesians,

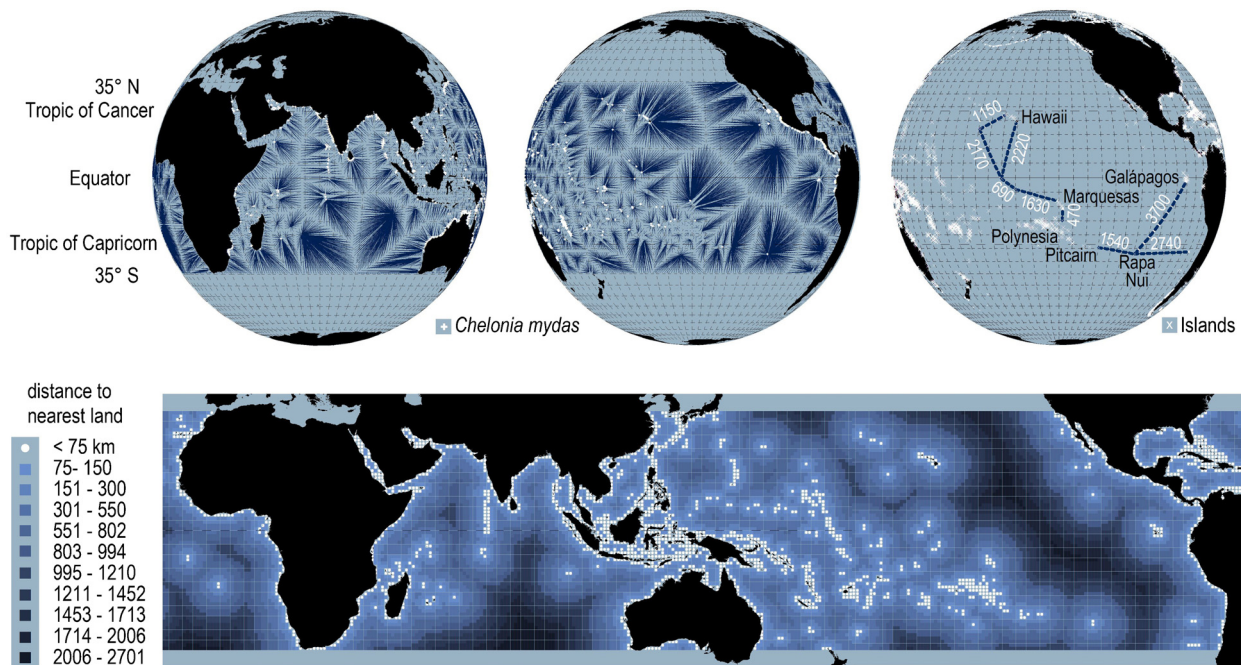


Fig. 1. Distribution of Green sea turtles (*Chelonia mydas*) and islands in the Pacific and Indian oceans [9]. Dark lines represent distances from points plotted every 1° longitudinal and latitudinal in the oceans to the nearest land. Distances between labeled islands are in kilometers (black for land masses, blue-grey for ocean; green turtles are breeding on the majority of the islands between 35° N and S). The South Central part of the Indian Ocean between Australia and the Mascarenes, and the Eastern and Northern parts of the Pacific Ocean are depauperate in islands. Islands like the Hawaii, the Marquesas, the Pitcairn and Rapa Nui are remote, the nearest land from Rapa Nui is at a distance of 1540 km.

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