discussion on the ecological significance of threatened plant communities grazed by both livestock and wild herbivores, and implications of changing land-use practices on the natural vegetation.

The rich fauna of the cold desert region of India has been considered in chapters 7–10. Chapter 11 concludes that the mammalian fauna of Tajikistan Pamir region is species-poor, and suggests that the main threats to large mammals in Pamir are poaching, overgrazing, intensive harvesting and poor economy of local people.

The agro-ecosystems of the Indian cold desert region have been dealt with in chapters 12 (Spiti catchment), 13 (Lahaul valley) and 14 (Niti valley). These studies indicate that: (i) traditional agricultural systems are repositories of huge agro-biodiversity, (ii) replacement of traditional staple food and fodder crops by cash crop has significant socio-economic and ecological implications, and (iii) socio-cultural transformation coupled with development policy interventions have provided new means of livelihoods. Changes taking place in nomadic lifestyles of Changpas in Changthang, Ladakh and the consequences of migration and economic development programmes are described in chapter 15. Traditional grazing systems of Spiti valley and the traditional agricultural production system of villages located in Nanda Devi Biosphere Reserve are analysed in chapters 16 and 17. Indigenous knowledge about environment and natural resources and impacts of policy-driven changes in a village in Deqin County, Yunnan, China are dealt with in chapter 18. Enforcement of state policies over the past 50 years coupled with changes in traditional resource management systems have caused deterioration of environmental quality and increase in the frequency of natural disasters. The impacts of global processes, viz. international trade, migration, tourism, climate change and global environmental awareness, on primary production in Annapurna conservation area, Manang valley, Nepal are considered in chapter 19. Chapter 20 suggests that global warming is the primary factor leading to desertification in the Maduo County region of Northeastern Qinghai-Tibetan plateau. Ecological health in the Himalayan cold desert region is reported to be the single biggest contributor, followed by per capita resource availability and human development status, to the adaptive capacity (chapter 21). How an international railroad acts as a barrier in the long distance migration of Mongolian gazelles of Gobi steppe region is highlighted in chapter 22. Land degradation strongly impacts livelihood of the local people, besides affecting biodiversity and ecosystem health in the Pamir-Alai Mountains of Central Asia (chapter 23).

The productivity and profitability of cash crops, which have replaced the traditional crops, are low because of poor nutrient and crop management practices (chapter 24). Seabuckthorn (*Hippophae rhamnoides* L.) and apricot (*Prunus armeniaca* L.) are found important for sustainable livelihood and socio-economic development in Ladakh (chapters 25 and 26 respectively). Chapter 27 stresses the importance of low cost agro-technologies in the improvement of the livelihood of local people. The improvement of livestock husbandry and pasture use system, introduction of new animal husbandry systems, coupling of Alpine livestock system with crop systems and improving herdsmen's education level can sustainably protect the cold desert ecosystems in China (chapter 28). Establishment of high-yielding forage crops can promote restoration of desertified land in Inner Mongolia (chapter 29). Micro-hydroelectricity units can provide the people of Ladakh access to electricity (chapter 30).

The chapters collectively highlight the factors responsible for environmental degradation in the cold desert region and suggest measures for promoting environmental conservation and sustainable livelihoods. However, out of 30 chapters, 26 represent trans-Himalayan deserts and only 4 are concerned with other cold deserts of Asia. Gobi desert, which is the third largest cold desert of the world, is almost neglected and only chapter 22 has a reference to it. Nevertheless, the book is useful for researchers and policy makers dealing with the cold desert region.

Old flat top tree of Himalayan cedar growing near Tindi on rocky slope with very thin soil cover.

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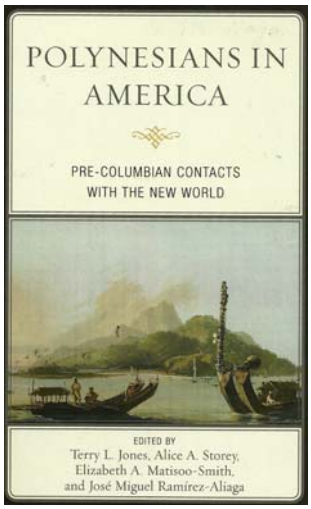

Polynesians in America. Pre-Columbian Contacts with the New World. Terry L. Jones, Alice A. Storey, Elizabeth A. Matisoo-Smith and José Miguel Ramírez-Aliaga (eds). AltaMira Press, A Division of Rowman and Littlefield Publishers, Inc., Lanham, MD, USA. 2011. 359 pp. Price not mentioned.

Pre-Columbian trans-Pacific interaction and diffusion had all but become an ignored topic in mainstream archaeology and anthropology in North America and Europe from the 1960s. This followed the emergence of the concept of techno-

logical advances in autochthonous terms and development of processual archaeology. During this period, most of the wild-eyed theories of Thor Heyerdahl – of the Kon-Tiki fame – were also proven incorrect. He had argued in the 1950s, in the face of accumulated scientific wisdom, that Polynesia was settled by American Indians. He had literally 'blitz-krieged' this idea at that time through a multimedia onslaught. Most highly regarded archaeologists like Gordon Childe had also dismissed transoceanic diffusion from the Pacific in the wake of the above developments.

Even while this process was developing, archaeologists in South America and the Pacific (mainly Australia and New Zealand), and to some extent in California, were steadily working from about the 1990s on the earlier leads obtained of Pre-Columbian diffusion and transfer: chicken in Chile, archaeological evidences in Polynesia for sweet potato, sewn boats, sails, fishing hooks, and so on. These developments steadily led to the making of several independent discoveries in five disparate areas – molecular biology, computer simulations on trans-Pacific sailings and landfalls, physical anthropology, archaeology and linguistics – and, all of them obtained unequivocal leads/evidences for pre-Columbian human contacts between Polynesia and the American Pacific coasts. All of the above discoveries could not be ascribed to drift sailing of people alone. These developments led to a meeting together of scholars working in these areas in 2007 in Sweden during the Seventh International Conference on Eastern Island and the Pacific. The idea of bringing out a comprehensive publication on the subject emerged in the meeting. The volume under review is the outcome of a pre-planned presentation made by the scholars working on linguistic, biological, mythological, nautical, chronological and physical anthropological aspects of Polynesian contacts. This was done during the annual meeting of the Society for American Archaeology in St Louis, in 2010.

This volume consists of 14 chapters. All the chapters have been designed and developed with care to produce a comprehensive picture of the Polynesian-American pre-Columbian contacts. All of them are exhaustive in their content also.

The Pacific Ocean is the largest sea in the world. It stretches 20,000 km across from Singapore in the west to Panama in the east. Other than the Indonesian and Philippine islands and New Guinea in the west, and Australia and New Zealand in the southwest, the Pacific Ocean is dotted by thousands of islands/island groups of generally small and variable size, whose numbers and size generally decrease as one travels from the west to east. The nearest islands to the American coast are the Easter Islands (Rapa Nui), which is itself 4,000 km from the nearest land, Peru. The Pacific Ocean islands are broadly grouped into Melanesia in the west, Micronesia in the north, and Polynesia covering rest of the islands. Ancestral Polynesians had expanded from the Philippines–eastern Indonesian region in the west during 1600–1000 BCE through Melanesia, and then steadily to the eastern and southern islands.

Earlier, arguments for Polynesian contact with the Americas had been advanced regularly during the 19th and early 20th centuries. Mythologies, cultural traditions, religious beliefs and limited linguistic data were the empirical evidences most heavily relied upon at that time (chapter 4). Then in the 1960s, strong linguistic evidences in the similarity of names for sweet potato were noted between the peoples of Quechera (Ecuador) and Polynesia. Incidentally, the agricultural economy of Polynesia consists of aroids, yams, coconut, breadfruit and sweet potato. Aquatic resources were their mainstay and these were supplemented with chicken, dog and pig meat. Cereals were unknown. Sweet potato is a New World domesticate.

Chapter 5 deals with artefacts – a wide range of items that have been considered as possible evidences for prehistoric landfalls by Polynesians in the Americas. They are items of the material culture that the scholars have not been able to dismiss as coincidences or products of independent invention/convergence, or drift sailings. They mainly consist of various kinds of fishhooks, harpoons, and importantly, sewn-plank canoes in the Chumash and Gabrielino ethnographic territory in southwest California. They are dated to 1500 cal BCE – 1000 cal CE. Those from Ecuador and south Chile are dated much older – ca. 3000 cal BCE. As for sewn-plank canoes, the only other place in the New World where this has been featured is the south Chile coast. All the other native North American watercraft were dugouts, balsa or log rafts and/or skin or bark canoes. The sewn-plank canoes and the implements and accessories used for their construction have been assigned to cal CE 625–700.

The occurrence of chicken in prehistoric Latin America – specifically, the 'Mapuche connection' – is dealt with in chapter 8. The Mapuchens live in south-central Chile. The recent carbon-dating of chicken bones obtained from the El-Arenal (Arauco, south-central Chile) to CE 1321–1427 has now provided the so-far elusive hard evidence for trans-Pacific contact between Polynesians and Mapuchens (chapter 6). These studies have brought out also numerous other objects of the period – massive obsidian flakes (volcanic glass) used in wood working (*mataa*), hand clubs (*clavas*, *patu toki*, and several others), and so on. Linguistic evidences also attest to their widespread use and exchange between Polynesia and Chile. The sewn–plank canoe that is used in the area is incidentally widely distributed and also used in Polynesia. The several instances of commensal plants and animals that occur in the Pacific Ocean and its eastern rim are surveyed in chapter 7. They include dogs, pigs, chickens, rats, jungle fowl, bottle gourd, coconuts, yams, breadfruit, taro and several others. They have been mentioned here for their widespread dispersal in the Pacific Ocean during the pre-European period, though not all of them made it to the Americas during this period. Incidentally, banana, another good candidate, does not find any mention here. Instances of sweet potato and bottle gourd have been the most widely discussed plants. Of these, the presence of sweet potato, an American cultivated plant in Polynesia, during the 10th and 11th centuries has been confirmed based on hard archaeological and linguistic evidences (chapters 9 and 10). The computer simulation studies of ocean currents and winds and also experimental seafaring (chapters 11 and 13) indicate that Polynesians could have made landfalls in several locations of the American coast, but most possibly in south Chile, Gulf of Guayaquil (Ecuador) and southern California. The Polynesian words for sweet potato *kumara* have been derived from the word *cumar* used by the Canari people of the Gulf of Guayaquil region. It has been shown also that this is the only area along the entire Pacific coast of the New World that uses the Pre-Columbian sails and sailing technology,

which are widely prevalent in Polynesia (chapter 9). The analyses of human biological evidences for Polynesian contacts with the Americas indicate that the contacts have been of only limited nature, which disproves Heyerdahl's propositions in the matter (chapter 11).

The first chapters set the stage for the theme and the last one summarizes and concludes the subject. The editors have remarkably succeeded in presenting a convincing and comprehensive case for multiple prehistoric Polynesian landfalls long before Christopher Columbus first landed in the New World, in Hispaniola (West Indies) in 1492. The editors have gone to a great length in planning and presenting the contents and in choosing the authors. As the authors have concluded (chapter 14), 'the most parsimonious explanation for the material, linguistic, biological, nautical, chronological, and physical anthropological evidence is that the Polynesians made Pre-Columbian landfalls in the New World in three likely locations of contact – southern Chile, Gulf of Guayaquil (Ecuador-Peru) and Santa Barbara Channel (south California) – between approximately cal 700 and 1350 CE. None of them altered the course of prehistory, but local populations in both Polynesia and the Americas received new technologies and domesticates that improved their subsistence practices and lives'.

These conclusions have been based on fresh discoveries using newest techniques along with re-evaluation of long-standing but often-ignored evidences. This is a definitive and comprehensive publication.

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