

Austronesian migrations: some insights from Bali.

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Bali is one of the stepping-stones in the land bridge that once connected the islands of Indonesia to the Asian mainland. Archaeological and fossil evidence suggest that the earliest inhabitants of Australia and Papua New Guinea crossed this bridge 40 to 60 thousand years ago. Dutch archaeologists of the 19th century envisaged continuous human occupation in Bali stretching back into the Pleistocene. More recent archaeological evidence indicates that Austronesian-speaking peoples settled on the coast of Indonesia (including Bali), Malaysia, southern Vietnam and the Philippines, before colonizing most of the inhabitable islands of the Pacific (Bellwood 1997). This has led to the consensus view among archaeologists that Austronesian-speaking peoples migrated to Indonesia between 4,500 and 3,000 years ago from southern China/Taiwan, and displaced an older population of Australoid hunter-gatherers. This view implies a southern Chinese or Taiwanese origin of Balinese genes. Rapid eastward migrations resulted in the spread of both the Austronesian language family and associated culture to coastal Melanesia and throughout Polynesia between 3,000 B.C. and 400 A.D. An alternative view posits an indigenous origin of Austronesian languages in Melanesia or Southeast Asia (Dyen 1962; Oppenheimer 1998), with much less population replacement by Neolithic farmers. Under this model, substantial genetic contributions from pre-Neolithic hunter-gatherers may be expected in contemporary Balinese.

A second set of questions pertains to the more recent history of Indonesia. In the period between the 3rd and 13th centuries A. D. dozens of Indic Kingdoms appeared across Southeast Asia, from the plains of Cambodia and Central Java to remote corners of Borneo and highland Burma. For more than fifty years prehistorians have debated whether the spread of Indian culture influence to the islands of Java and Bali was associated with a movement of people or simply cultural diffusion. R.C. Majumdar postulated wholesale colonization by Indian exiles, while J.C. van Leur argued that "Indianization" was wholly initiated by Southeast Asians who summoned Brahmins to visit their courts, creating merely a "thin and flaking glaze" of Indic language and customs. But until now there has been no evidence as to whether Indians actually visited the island.

Here, we examine genetic variation on the Y chromosomes of 551 Balinese men and 1,438 men from other parts of Indonesia, southeast Asia, South Asia, the Middle East, and Oceania to investigate the relative contributions of Austronesian farmers and pre-Neolithic hunter-gatherers to the contemporary Balinese paternal gene pool, and to test the hypothesis of recent paternal gene flow from the Indian subcontinent.