



Short population report

HLA in Uros from Peru Titikaka Lake: Tiwanaku, Easter and Pacific Islanders

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ABSTRACT

Uros people live in floating reed islands in Titikaka Lake in front of Puno town (Peru). They could have started Tiwanaku culture and shared genes and culture with Pacific Islanders; it is particularly relevant the giant hat covered men statues found in both Tiwanaku at Titikaka Lake shore and Easter Island (3700 km far from Chile in Pacific Ocean). These giants monoliths are very similar one another and unique in America and Pacific Islands. The following HLA alleles are shared in a specifically high frequency between Uros and Pacific Islanders : HLA-A*24:02, HLA-B*35:05, HLA-B*48:01, HLA-DRB1*04:03, HLA-DRB1*08:02 and HLA-DRB1*09:01. Uros also have 3 unique HLA haplotypes: A*24:02-B*15:04 – DRB1*14:02-DQB1*03:01, A*68:01:02-B*35:05-DRB1*04:03-DQB1*03:02, A*24:02-B*48:01-DRB1*04:03-DQB1*03:02. Also Uros seem to be one of the most ancient population in Titikaka Lake that could have started Tiwanaku culture. Prehistoric contacts between Amerindians and Pacific Islanders are strongly suggested by genetic and cultural traits. It is not discarded that Uros could have come from Pacific Islands: Uros show melanic skin and are dolichocephalic; in contrast, surrounding Aymara people have a clear skin and are brachycephalic. The Kon-Tiki project led by Thor Heyerdahl showed that a simple sailing is possible between Peru and Polynesia Islands; also, the most ancient skull found in America is of black origin: Luzia, suggesting that first America peopling was also carried out by Black/coloured people.

Uros population are believed to be one of the most ancient populations that probably arrived either from Amazon Basin or from other original area to Altiplano highlands, where Titikaka Lake is placed (4000 m, 13,123 feet high). They could have gone up to these highlands because of a flood or water cataclysm (floods, tsunami) that may have occurred at Amazon Forest, or somewhere else (Pacific Sea Islands), about 10,000 years ago, at the end of last glaciation or in other ancient times. Uros consider themselves “before humans” and not “humans” [1], <http://www.tripsavvy.com/the-floating-islands-of-lake-titikaka-1637510>.

Different ethnicities have come to Titikaka Lake Altiplano after Uros, like Collas and Lupakas [2], see Fig. 1, Supplementary Material. Whether Uros started or implemented nearby Tiwanaku culture is not known. Tiwanaku town is placed in Bolivia part of Titikaka Lake. There are buildings and giants monoliths similar to those of Easter Island. Tiwanaku famous monoliths representing humans are “Monolito Ponce”, “Monolito Fraile” and “Monolito Bennett”. Also, “Puerta del Sol” (Sun Door) and Kalasasaya Temple are remarkable building features. This culture dating is much debated and, although it has been put

forward that it started around 2nd Century CE, this dating is controversial since a much more ancient features have been found, like those described by us between Alberite Dolmen (Southern Spain, 7000 BP) and Kalasasaya temple walls “ritual ear” artifacts at Tiwanaku [3]. This culture was substituted by Colla culture by 12th Century CE and all the area was later taken by Inca Empire and finally by Spaniards around 15–16th AD. [1].

Uros speak the almost extinct Uru language [4], and they now also speak Aymara and Spanish language. Their anthropology appearance is completely different from surrounding Aymara people. Uros show a much darker skin and are dolichocephalic, while Aymaras are usually brachycephalic [4]. In this respect, it has been suggested that Pacific Islanders were genetically and culturally related to Amerindians, particularly from South America [5]. This cultural relationship is most evident between Eastern Island “Moais” and Tiwanaku human statues, both of them being stone giants with ritual hats. E. Thorsby using HLA and other genetic markers suggested also prehistoric Amerindian/Easter Islanders contacts [5].

Uros have traditionally lived in “totora” (reeds) floating islands,

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where they yet have their “totora” homes (huts), and even small vegetable gardens, where potato and other plants are cultivated. Nowadays, about 42 Uros “totora” islands there exist. In the present study, 105 Uros living in Puno (Peru) Titikaka Lake waters have volunteered to give blood for the present work; they are blood donors that signed a written consent at Puno regional hospital Manuel Muñoz. Their three preceding generations of ancestors were settled down in the same place and lived in Uros floating islands (15° 50' S 70° 01' W) [4]. HLA class I high resolution (-A and -B) and class II (-DRB1 and -DQB1) typing was performed by using PCR-SSOP Luminex technique and ambiguities were resolved by direct DNA sequencing [6,7]. Statistical analysis was performed with Arlequin v3.0 [7].

Nine different HLA-A alleles and twenty eight different HLA-B alleles have been found in Uros. However, only the following HLA-A and HLA-B alleles have frequencies higher than 1% (A*02:01, A*24:02, A*31:01:02, A*68:01:02, B*15:01, B*15:04, B*35:04, B*35:05, B*39:01, B*48:01 and B*51:01) (Table 1 from Supplementary Material). Also, 18 different HLA-DRB1 alleles have been characterized, seven of which have frequencies higher than 1% (DRB1*03:02, DRB1*04:04, DRB1*04:03, DRB1*04:07, DRB1*08:02, DRB1*09:01, DRB1*14:02) (Table 1 from Supplementary Material). Eight different HLA-DQB1 alleles have been found, three of them (DQB1*03:01, DQB1*03:02, DQB1*04:02) add up to a frequency over 90% (Table 1 from Supplementary Material). The 10 most frequent extended HLA (A-B-DRB1-DQB1) found in Uros are depicted in Table 2 from Supplementary Material. The class II haplotype two loci HLA-DRB1*08:02-DQB1*04:02 haplotypes are present in three of the most frequent extended haplotypes (in combination with A*02:01-B*35:05, A*24:02-B*35:05 and A*02:01-B*35:01) and accounts for 23.5% of all haplotypes. HLA-DRB1*04:03-DQB1*03:02 is also present in three haplotypes (in combination with A*02:01-B*35:05, A*68:01:02-B*35:05 and A*24:02-B*48:01), representing 11.7% of all haplotypes. These haplotypes have been found in high frequency in other Amerindians [4] (except the specific ones for Uros), and three of them are exclusive for Uros: HLA-A*68:01:02-B*35:05-DRB1*04:03-DQB1*03:02, HLA-A*24:02-B*15:04-DRB1*14:02-DQB1*03:01 and HLA-A*24:02-B*48:01-DRB1*04:03-DQB1*03:02 (Supplementary Table 2 from Supplementary Material, see below; www.allelefrequencies.net [4,5,8]).

Mesoamerican and other Amerindians show low HLA-B*48:01 and HLA-DRB1*09:01 frequencies except for Amerindians that come from the Titikaka altiplano area [9,10]. We suggested that a direct contact with Asians or Pacific Islanders may have occurred with these Titikaka Lake original populations and has given rise to a very different culture, like the Tiwanaku culture. In fact, Uros from Titikaka Lake Altiplano may be related to Pacific Islanders because of the generalized specific high frequency of allele HLA-A*24:02 in Pacific Islanders [11–14], which is also present in very high frequency in Uros (0.281, Supplementary Table 1, Supplementary Material). Also, high frequency alleles shared by Pacific Islanders and Uros are found: HLA-B*35:05, HLA-B*48:01 (not present in Amerindian Titikaka Lake Aymaras and Quechuas), HLA-DRB1*04:03, HLA-DRB1*08:02 and HLA-DRB1*09:01. Haplotype data have been consulted in our own database and references [5,8].

Even though it is widely believed that Pacific Isles population had spreaded from southern China/Taiwan (5000 years BP), traveling through Melanesia (North and East Australia), Tonga and Samoa and, finally, arriving to Easter Island (1000 CE), there are various evidences that indicate some kind of relationship with South American Amerindians. These evidences include the fact that bottle gourd and sweet potato were cultivated in Easter Island and South America before Europeans arrived to Easter Island at the end of 18th century, linguistic and other cultural traits, see above and [5]. Thor Heyerdahl route

demonstrated in his project that from Callao (Peru) (from where he sailed the Kon-Tiki raft through the Pacific currents to the West) people from Tiwanaku area could actually had reached distant Pacific Islands, including Easter Island [15]. Finally, the most ancient American recorded skull seems to be of Black origins (Luzia) [16], which would support a bidirectional Polynesia-Melanesia/America prehistoric contacts.

All genotype data included in this paper is held in www.allelefrequencies.net and identifier number is 3564 [8].

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.humimm.2018.10.012>.

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