



Mitochondrial DNA analysis of human remains from the Yuansha site in Xinjiang, China

GAO ShiZhu^{1,3}, CUI YinQiu^{1,2}, YANG YiDai¹, DUAN RanHui¹, Idelisi ABUDURESULE⁴, Victor H. MAIR⁵, ZHU Hong¹ & ZHOU Hui^{1,2†}

¹Laboratory of Ancient DNA, Research Center for Chinese Frontier Archaeology, Jilin University, Changchun 130012, China;

²College of Life Science, Jilin University, Changchun 130023, China;

³School of Pharmaceutical Sciences, Jilin University, Changchun 130021, China;

⁴Xinjiang Cultural Relics and Archaeology Institute, Urumqi 830011, China;

⁵Chinese Language and Literature Department of East Asian Languages and Civilizations, University of Pennsylvania, USA

The Yuansha site is located in the center of the Taklimakan Desert of Xinjiang, in the southern Silk Road region. MtDNA was extracted from fifteen human remains excavated from the Yuansha site, dating back 2,000–2,500 years. Analysis of the phylogenetic tree and the multidimensional scaling (MDS) reveals that the Yuansha population has relatively close relationships with the modern populations of South Central Asia and Indus Valley, as well as with the ancient population of Chawuhu.

Yuansha site, ancient DNA, mtDNA, Xinjiang, Central Asia

Central Asia is a vast geographic area connecting East and West, comprising Uzbekistan, Tajikistan, Turkmenistan, Kirghizstan, and part of Kazakhstan, an area extending from the Pamir Plateau and the Hindu Kush, far into the region of Xinjiang, China. Population migrations took place continually in Central Asia throughout its history, and the inhabitants of this region were composed of admixed populations of various physical types, cultures, and languages^[1]. MtDNA analysis shows that modern populations in Central Asia occupy an intermediate phylogenetic position between European and Asian lineages, due to the admixture of already differentiated Western and Eastern matrilineages^[2–4]. However, the genetic traces left by earlier migration events sometimes are erased by later ones. If analysis is based only on modern data, it is hard to decipher the migration and admixture history of Central Asian populations. Ancient DNA study of Central Asia provides a powerful tool with which to reconstruct migration history and to understand the complex admixture in this region^[5–7]. MtDNA, because of its multiple copies, maternal in-

heritance, lack of recombinants, and relatively high rate of evolution, has been widely used to study population history, migration, and evolution, and especially to research the genetic structure of ancient human remains.

Xinjiang, located on the eastern edge of Central Asia, and traversed by the Silk Road, is an important area for the culture contact of East and West. Various ancient civilizations encountered each other in this region, including those of the Chinese, Indian, Persian, and Greek. Recently, the origin of the Tarim Basin population has come to be of great interest. At present, the archaeological evidence that supports the indigenous origin hypothesis is insufficient. It is widely acknowledged that three cultures from different regions contributed to the origin and development of the Tarim Basin civilization. One is nomadic culture from the Russo-Kazakh steppe,

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†Corresponding author (email: zhouhui@mail.jlu.edu.cn)

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north of the Tarim Basin, including the Bronze Age Afanasievo Culture, the Andronovo Culture, etc. Current archaeological data show that these cultures have played an important role in the earlier development of the Tarim Basin civilization^[8]. The second influence is Eastern culture, such as the Bronze Age Qiang Culture from the eastern part of Qinghai and Gansu, the Han Culture after the Silk Road was established, as well as, later, the cultures from Northeast and North Asia^[9] (for example, the westward movements of Xiongnu and Mongolia in the third and thirteenth centuries, AD, respectively). The third influence oases culture is from west of the Tarim Basin and north Central Asia in the Bronze Age, represented by Bactrian-Margiana Culture^[10]. However, it is generally believed by archaeologists that the contribution of the oases culture to the early development of the Tarim Basin civilization is relatively small. In 200 BC or earlier, due to the expansion of the Aryans and its effect on the population migrations, the oases culture bearers might have crossed the Pamir Plateau directly into the Tarim Basin, with a resulting impact on the agricultural civilization of that region^[11]. More archaeological evidence is needed to support this hypothesis. After the Silk Road was established, the cultural contacts between the Tarim Basin and western regions became more frequent. Based on physical anthropological data, Han^[12] contends that the population migrations in the Tarim Basin can be summarized into three periods. At present, the earliest

inhabitants (Gumugou, 2300—1430 BC) discovered in the Tarim Basin are classified as "Proto-European type", and attributed to Afanasievo and Andronovo populations. The second immigration period involved an "Eastern Mediterranean type" (or "Indo-Afghan type") population, which became the major residents of that region in the Eastern Han Dynasty. Han suggested that in 200-300BC or even earlier, a branch of the Mediterranean populations, traveling over the Pamir Plateau, and along the southern margin of the Tarim Basin, entered Xinjiang, penetrating far into the Lop Nur region. The third period occurred after the Silk Road had been established and involved a westward movement of the "Mongoloid type" from East and North Asia.

The Yuansha site is the oldest that has been discovered in the Taklimakan Desert to the present. The aim of this study is to investigate the genetic relationships between the Yuansha population and the present and ancient Eurasian populations, and to explore the origin and migration history of populations in the Tarim Basin as well as Central Asia.

1 Materials and methods

1.1 Sample collection

The Yuansha site is located in the center of the Taklimakan Desert, in the downstream of the Keriyan River, Xinjiang Province, northwestern China (Figure 1). Its

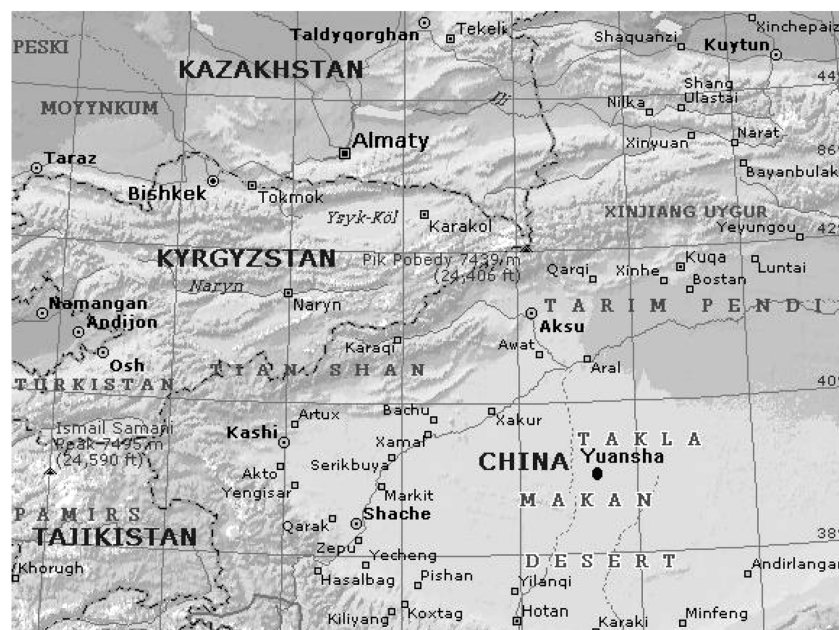


Figure 1 Location of the Yuansha site.