

The Yuan and Scientific Exchanges

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The Mongols principally craved foreign scientific and technological discoveries that had tangible results.

Leading demanding and often perilous lifestyles, the Mongols were concerned about their bodies. The herding life and later hunts and battles generated injuries or disabilities. As the Mongols conquered additional territory, some began to consume vast quantities of food and liquor, which led to ailments and an interest in foreign physicians. Chinggis Khan himself sought to prolong his life and appealed to the Daoist Changchun for prescriptions. Later Mongols consulted with foreign physicians and established the *Guanghuisi* to provide drugs and therapies. The culmination of these efforts was Hu Sihui's work *Yinshan zhengyao*, which consisted, in part, of recipes for a healthy diet.

The most important medical innovations from West Asia were medicinal drugs. In 1292, the Yuan established the *huihui yaowuyuan* in Dadu and Shangdu. Many of the drugs had been imported into China before the Yuan, but an increasing awareness and use of these medicines emerged during this era. Medicines for gastrointestinal disturbances constituted the largest number of such imports.

The Western and Central Asian impact on Chinese drugs and practices did not translate into transformation of the traditional Chinese medical system. The two approaches differed considerably, with the West Asian based on ancient Greek beliefs and the Chinese centered on the *yin/yang* and Five Elements theory. One change in the Yuan era was the higher status of physicians in China, partly due to the suspension of the civil service examinations, the traditional routes to official careers, and partly due to the elevated position of doctors. Some Confucian temples housed medical schools, offering doctors a higher status, and they also combined Chinese and Islamic training. At the same time the Mongols founded four medical schools in Daidu, which emphasized Persian style curricula

The Mongols' interest in the space they conquered followed their immediate concern for their bodies and their afflictions. If they planned to succeed in ruling this territory, they required considerable knowledge about this new space they had subjugated. They gathered the maps produced by the defeated enemy and used them for their own purposes.

Unlike China, the Islamic world had a long tradition of map-making and of cartography. The Chinese had not fashioned a world map before the Yuan dynasty, while Muslims had produced a number. In the thirteenth century Islamic world, Hamd Allāh Mustawfī al-Qazwīnī produced a geography which contained world maps. Although latitude and longitude coordinates had been found in earlier maps, he innovated in his use of a grid. A Chinese map included in *Yuan Jingshi dadian* resembles his map in its use of grids, its siting of places in latitude and longitude coordinates, and its general position and placement of specific locations. The question of influence remains unanswered: which preceded and influenced the other?

One answer may be the large number of Muslims who arrived in China and contributed their skills and knowledge of geography and cartography. Jamāl al-Dīn was the most renowned of these foreigners. In 1267, he presented Qubilai Khan with seven astronomical instruments, one of which was a wooden terrestrial globe. This extraordinary instrument was the first representation of the world as a globe and depicted seventy per cent of the earth as water, portrayed in green, and thirty per cent as land, drawn in white. Although it did not alter the Chinese perception of the world, it was divided into grids and, in particular, used longitude and latitude and may have introduced the latter conceptions to Chinese cartographers. In 1286, Jamāl al-Dīn started a project that resulted in the work known as *DaYuan da yitong zhi*. Neither its accounts nor its maps have survived, but the introduction strongly implies that it had sections

on foreign areas, especially the Islamic world.

The culmination of these extraordinary exchanges between the two cultures was the so-called Korean World Map or the *Honil gangli yeokdae gukdo jido*, which was completed in 1402. Drawing on Yuan dynasty maps, it depicts the coast of Africa and the contours of West Asia and locates a number of cities in the Islamic world. The creation, based on developments in the Yuan, of such so-called world maps even as far away as Korea was a major step in cartography.

The Mongols expressed great interest in the space beyond this world. They recognized that study of astronomy offered tangible information about the weather and the natural environment and viewed astrology as a guide to the future, and part of their interest in astronomy centered around divination.

Although a few West Asian astronomers had reached China before Qubilai's accession, most of the significant developments and support for astronomy occurred during Qubilai's reign. In 1271, Qubilai established an Institute of Muslim Astronomy, with Jamāl al-Dīn as its Superintendent. The Muslim Institute presented the *huihui li* (or Muslim calendar) to the Yuan court, but a calendar developed by the Chinese was embraced by the Mongol rulers.

The Yuan court must have been aware of the advanced status of astronomy in West Asia. Hülegü, Qubilai's brother, had established an observatory at Marāghah in Iran. The Yuan court, perhaps inspired by Marāghah, approved of the construction of observatories in Daidu and in Haocheng in Henan province.

The most important product of Yuan astronomy was the Season-Granting System (*shoushi li*). The calendar and the descriptions of and annotations on eclipses in the treatise were more accurate than in earlier Chinese writings.

Controversy over the Islamic influence on Yuan dynasty astronomy, including the calendar, persists. Yet the Yuan organized an Institute of Muslim Astronomy, which continued as a Bureau of Muslim Astronomy in the Ming dynasty. Why would it preserve these agencies if they had no function and did not play a role in the diffusion of Muslim knowledge into Chinese astronomy.

In sum, the Mongols facilitated Sino-Islamic scientific interchanges. Medicine, maps, and geographic knowledge, and astrology and astronomy were all influenced. However, the basic principles underlying Chinese science, theories, and therapies were not overturned. China accepted specific techniques, treatments, and knowledge from the Islamic world and chose, rather than accepting in toto, practices, ideas, and beliefs that fit in with or promoted China's economy or health.