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# The Case for Science Diplomacy in Mongol Eurasia

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**Abstract**

This paper considers the concept of science diplomacy in the context of Eurasian history with a particular focus on the period of the Mongol Empire in the 13th century. The Mongol Empire held sway over much of Eurasia and thus participated in diplomatic activity within and outside of Mongol domains. Scientists and intellectuals routinely headed diplomatic embassies sent and received by the Mongol Empire. Diplomats were valued for their knowledge and skills and served as interlocutors and translators for the Mongol Khans. These scientist-diplomats were key figures in the court and were essential in facilitating exchanges, building connections and fostering relations. As polyglots and polymaths they were able to operate in a multi-cultural environment. They were part of the complex framework of the Mongol Empire that brought to bear a kind of Eurasian development model that relied on expertise, knowledge and resources that could be utilised across the empire. Set within this context, the paper describes the creation of a politico-science complex in Mongol Eurasia with a special emphasis on the relationship between the Mongol Khans and their partners, chief among them were scientists and intellectuals. The Mongol Empire as an empire built upon exchanges summarises how scientific exchanges were both a product of and a driver for diplomatic relations in this period. Thus, the historical connection between diplomacy and science in Eurasia is a necessary component in understanding the modern notion of science diplomacy beyond a European context and applied more globally both in terms of time and space.

**Keywords**

Science diplomacy, Mongol empire, silk road, international relations, foreign policy, science, Eurasian history

## Introduction

The 13th century is oftentimes considered the beginning of an apocalyptic time with the advent of Chinggis Khan and the Mongol hordes into the heart of Eurasia. The high level of science and intellectual development in Central Asia, the Middle East and northern and southern China is overwhelmingly believed to have stalled, stopped and even destroyed as a result of Mongol conquest and expansion. This picture of destruction is at odds with the scientific, intellectual and cultural effervescence that came about as a result of Mongol rule. The Mongol Empire connected large swathes of the Eurasian territory, especially the ancient civilizations of China and the Islamic world (the Middle East, Central Asia and even included parts of the subcontinent) and established connections with neighbours stretching into Europe. At its peak, the Mongol Empire encompassed most of the known world and brought different civilizations and peoples under one political system (May & Hope 2022). Apart from an empire of conquest, the Mongol Empire was an empire chiefly built upon exchanges (Kotkin, 2007). These exchanges included circulation and

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movement of scientists and intellectuals at a heretofore unseen scale.

Diplomacy was an integral part of the Mongol Empire's repertoire in contact with other empires and societies. In the initial stages of empire building the Mongol Khans followed the traditional modes of sending embassies to neighbours. Nomadic empires before the Mongols, like the Kok Turks, the Uyghurs, the Qara Khitai and the Kyrgyz, among others, sent embassies to the Chinese courts to pay allegiance and negotiate trade relationships (Drompp, 2015). There were diplomatic embassies sent to the Central Asian empires as well, for example, the Khwarezmian Empire. Embassies were sent for political and formal purposes, such as for seeking alliances, submission and military help along with building trade relations, announcing and sharing information regarding elections and the demise of khans. In times of conflict, embassies could be sent to ask for exchange of prisoners and embassies usually preceded a declaration of hostilities. Diplomatic embassies were headed by a number of high level officials including military commanders, Mongol princes and, importantly, scientists.

It is important to mention that science in the medieval period cannot be considered a separate discipline but rather denoted learning and knowledge in a broader context. The disciplinary division between the physical sciences and social sciences was a much later introduction. Thus, science here refers to all kinds of knowledge related to the understanding of the natural world: flora, fauna and societies. The aspects of the sciences that seem most relevant here are the essential nature of curiosity and thirst for knowledge to discover, explain and study the world. As a result, in the pre-modern era the sciences included the study of the physical and social world. Consequently, science encompassed astronomy, religion, philosophy, medicine, geography, zoology and other aspects of the study of the natural world including the study and development of agriculture; religious divination; and historical writing. Patronage for the sciences was intertwined with the making and governance of empire. The needs of empire spurred interactions and certain scientific pursuits were privileged, for example, cartography and medicine, since these were fields of study were important and necessary for the expansion of the empire. Furthermore, the Mongol Empire, a multi-ethnic empire, with Chinese, Muslim and Christian intellectuals and practitioners together in Mongol courts, led to its own kind of scientific revolution. Post-Mongol empires, for example, the Timurids in Central Asia and later on the Safavid (Iran), the Mughal (India) and the Ottoman (Turkey) Empires, continued to promote and operationalise the sciences in the same vein. In summary, the Mongol Empire can be attributed with initiating 'the long intellectual, cultural, and religio-political processes that paved the way for the establishment of the territorial regional empires of the Safavids, Ottomans, and Mughals'. (Pfeiffer, 2014, p. 3).

With this in mind, this paper seeks to challenge the notion of science diplomacy as a modern concept rooted in international relations in the post 9/11 era. Consequently, the paper starts with a section on science diplomacy in the modern era, followed by a description of the Mongol Empire and its role in driving scientific activity. The following section on Mongol institutions that enabled scientific exchanges to take place and a note on sources that touch on the importance of diplomats and diplomatic embassies in Mongol Eurasia provides the context within which the science diplomcy in the Mongol era took hold. Subsequently, the paper is divided along the main attributes of science diplomacy today, namely into sections on science in diplomacy, science for diplomacy and diplomacy for science. The conclusion summarises how the Mongol Empire's political-economic complex relied on and utilised science diplomacy in building relationships: commercial, social and political, with neighbouring polities. Overall the paper contributes to expanding the understanding of science diplomacy in a Eurasian context in order to show how the sciences have played an important role in initiating and maintaining diplomatic relations over the longue durée of history.

## Science Diplomacy

In modern international relations scholarship science diplomacy chiefly refers to three aspects, science in diplomacy, science for diplomacy and diplomacy for science. In principle, 'science diplomacy [has] developed at the intersection of research policy and foreign affairs as a complex interplay of government, academia, and other societal actors'. (Faehnrich, 2017, p. 688; The Royal Society/AAAS Meeting, 2010; Ruffini, 2020). Modern conceptions of science diplomacy point to the belief that when all other kinds of traditional diplomacy fail, science, due to it being ideology-free, can help build bridges and nurture relationships between nation states that don't get along. Over time the term science diplomacy has evolved and expanded to describe 'ways in which institutions promote collaborative scientific initiatives to strengthen their foreign relations…' often through funding scientific projects (Turchetti, 2021, pp. 544–545); as a form of one-upmanship for certain nation states to exercise their superiority; and an international relations paradigm that privileges American and European sciences. Furthermore, scholars like Ruffini have argued that competition and not cooperation is at the heart of science diplomacy. He claims that the concept of traditional science diplomacy fails to take into account national interests and the subsequent zero-sum nature of such diplomatic exchanges (Ruffini, 2020). National interests are driven by state actors seeking advantages. The

realist school of thought of international relations sees competition and not collaboration as the natural order of nations (Mearsheimer, 2018). Thus, science diplomacy on the one hand is meant to mitigate conflict but on the other hand is used by nation states to reinforce hegemony. The narrowing of science diplomacy as a means to mitigate tense situations between countries and emphasising the objective nature of science as the cornerstone of relations limits the understanding of the sciences and of diplomatic relations (Ruffini, 2020, p. 4; Ruffini, 2017).

Literature on science diplomacy includes studies considering and analysing the use of science in diplomatic and foreign policy fields, however, the role of scholars from within academia and why they choose to be 'used' as informal science diplomats is less known (Fähnrich, 2017, p. 689). Only a handful of studies consider historical approaches to locate science diplomacy before the modern concept of science diplomacy was coined in the United States. More recently, science diplomacy has been marshalled to overcome 21st century problems like climate change, natural disasters and other global problems. In this context, science diplomacy is viewed as a tool to engender cooperation between nation states in order to address global challenges (Fedoroff, 2009) while 'reinforce[ing] specific [European] knowledge and worldviews'. (Turchetti et al., 2020, p. 333) Scientific cooperation on single issues and/or global challenges without addressing inherent differences between nation states fail to acknowledge that scientists as a matter of course serve as diplomats in their everyday activities. To remedy this narrow understanding of science diplomacy, the paper seeks to showcase how science diplomacy is in no shape or form new (Vaughan & Neureiter, 2012). Historically, scientists have played a pivotal role in expanding and maintaining relations, for example, diplomatic embassies between the Mongol Empire and their neighbours were often headed by scientists and intellectuals.

Another key limitation in the current literature on science diplomacy is the cultural bias of the primacy of the United States and the Anglo–Saxon international order as the starting point of utilising science in overcoming differences (National Research Council, Committee on Global Science Policy Science Diplomacy, 2012). Consequently, the modern conception of science diplomacy severely limits the scope and reach of science and/or diplomacy to a mainly post World War 2 international order and prioritises the role of the United States within it (Turchetti et al., 2020, p. 325). In the literature on science diplomacy, authors in the United States, both state and academic, take precedence. In the aftermath of 9/11, figures like Vaughan Turekian, former Chief International Officer at the American Association for the Advancement of Science, and Norman Neureiter, former science and technology adviser to the United States Secretary of the Department of State, defined science diplomacy specifically with policy directives of the United States of America and its interactions with countries it didn't get along with, namely, at that time, countries in the Islamic world (Ruffini, 2020, p. 3). Following this, a number of practitioners from the United States State Department constructed the idea of a new era of science diplomacy which was then retrospectively used to understand Cold War relations with the Soviet Union as well. In this instance, science diplomacy was then seen as a key instrument in overcoming ideological differences between nation states and otherwise at odds with each other, like the United States and the Soviet Union, who continued to have relations (scientific collaborations and technology trasnfers) even at the height of the Cold War (Laumulin, 2019; Skolnikoff, 1993). Similarly, Eurasian history is awash with examples of science diplomacy as a means to both build relations and overcome differences.

This paper aims to broaden the understanding of science diplomacy in a particular historical context. It explores the role and use of scholars, academics, researchers and scientists within the policy field in Eurasia. In particular, it focuses on history and instances of the role of science in premodern times articulating a specifically non-European perspective. It endeavours to create a picture of diplomatic relations and the role of certain actors (khans and scientists) within Eurasian nomadic empires who overcame borders- religious, civilizational and social- within the context of the Mongol World Empire in the 13th century. By doing so this paper proposes to consider the historical trajectory of scientific relations within the Eurasian context and move the conversation on science diplomacy beyond the assumed dependency on European history and the place of modernity and enlightenment within European society in the colonial period and beyond. The following section makes a case for the Mongol Empire as a place where scientists and science occupied an important role in directing diplomatic practice in the 13th century.

## The Mongol Empire as Driver of Diplomacy and Scientific Inquiry

The Mongol Empire stretched from China to Korea in the east to the shores of Western Europe. It included modern day China, Russia, the Middle East, all of Central Asia and the Caucasus. Mongol Khans ruled over large swathes of territory and peoples beginning in 1206 when Chinggis Khan founded the Mongol Empire. They held sway over some of the most scientifically advanced cultures and political entities at the time, for example, the Chinese, Islamic, Turkic and Persianate societies. Mongol control over Eurasian cultures translated into control of resources and knowledge of almost the entire old world (Abu-Lughod, 1991). The nature of the empire was flexible and

accommodating, as per steppe tradition, and marshalled the vast resources of Eurasia in the making of the world's largest contiguous land empire (Kalra, 2020; Togan, 1998). Scientists and intellectuals were key resources and the Mongol Khans had unlimited access to them in this period. Mongol agency lay primarily in connecting Eurasia, be it for the empire, communication, trade, and as it happened for knowledge. The development of the sciences especially which coincided with world conquest attracted concentrated patronage. The infrastructure created for the army and traders to navigate these vast lands were equally utilised by intellectuals (scientific and religious) and led to numerous exchanges (Biran et al., 2020). These exchanges in scientific thought led to new technologies (Park, 2021) and goods that were then exploited for producing wealth for the Mongol Khans and elites, while at the same time providing public goods for the rest of the population. Based on the information from contemporary sources, it is possible to see instances of science diplomacy in Mongol Eurasia. Other than Mongol Khans sending embassies beyond the Mongol realm, the period after 1260 saw the division of the empire into four Khanates: the Yuan (China), the Ilkhanate (Middle East), Golden Horde (Russia and surrounding regions) and the Chaghataids–Ogedeids (Central Asia). The Khanates while being independent entities also continued to adhere to Chinggisid principles and retained allegiance to the idea of a united Mongol Empire. In this context, diplomatic embassies in the Mongol Empire were essential not only beyond Mongol domains but were equally essential within the Empire in maintaining inter-Khanate relationships. As a result, the Mongol Eurasian space served as both the motor and the engine for exchanges, especially knowledge, across the Eurasian realm.

The Mongol Khans primarily spurred scientific activity by bringing scholars from different scientific cultures together in close contact by creating a comprehensive political entity that connected heretofore disparate regions. Following a similar argument as one made about the reasons for scientific advancement in the Islamic world (Brentjes & Morrison, 2010) as a 'consequence of an unprecedented bringing together of different peoples in a single religious community than as something that was intrinsic to the religion of Islam at that time'. (Bulliet, 2010, p. 216), the development of Eurasian sciences beginning in the 13$^{th}$ century can also be attributed to the construction of a multi-ethnic and multi-civilizational Mongol Empire. The Mongols brought together societies with their own distinct repositories of scientific knowledge of the natural world. This is not to say that there wasn't interaction before, however, the depth and patronage given by khans and elites (ministers, traders, religious figures, princesses and such) to scientists in Eurasia was hitherto unprecedented. The nature of the Mongol Empire was multi-lingual and one of the outcomes of creating this interactive space was an increase in translations of texts from Chinese to Persian and vice a versa along with in other languages which proved instrumental in cross pollination of ideas in fields such as agriculture, medicine and astronomy. These attitudes continued in successive empires, for example, in Mughal India Persian texts were translated into Sanskrit and vice a versa that survive till date and provide scientific information allong with a vivid picture of inter-ethnic, -lingual and -civilizational societal tapestry in Eurasia (Robinson, 2007).

The Mongol Eurasian space that encompassed the Silk Road(s) came to represent the highpoint for commercial interactions and prosperity that led to an overall increase in exchanges of all varieties: people, goods and ideas. With Mongol infrastructure that ranged from physical security on the Silk Road(s) to the construction of storage facilities and greater sources of private and state finance available, the Mongol Khans invigorated the demand for scineitific exchanges that could be used for mass production and service far flung courts and populations more easily (Kalra, 2020). In order to create a favourable environment that could accommodate the disparateness and richness of Eurasian societies, Mongol Khans relied on diplomatic envoys to negotiate relationships with neighbouring polities. Chief among these diplomats were scientists who not only served as translators of this expansive space but also utilised diplomatic embassies as a means to collect scientific data and exchange ideas in the fields of astronomy, agriculture, medicine and engineering among others. In order to fully understand how the Mongol Empire provided the basis for such exchanges, the next section briefly considers the most important institutions which helped pave the way for the flourishing of scientific exchanges in this period.

## Mongol Institutions and Diplomatic Practice

The creation of a Pax Mongolica that enabled movement and circulation of goods, peoples and ideas, was most keenly felt in scientific ideas and technologies which travelled across swathes of the Eurasian territory. Mongol institutions and infrastructure marshalled and mobilised peoples along the breadth of Eurasia to create a superhighway for ideas and technologies. The census as early as the 1230s classified scientists among the populations that became part of the Mongol Empire (Biran et al., 2020, p. 9). The presence of these skilled professionals was as much for the sake of creating wealth as their contribution in the making of a vibrant and sophisticated court for the khans (Manz, 1991). Mongol demands and affinities propelled the development and interaction, specifically, of what we now refer to as scientific disciplines, namely medicine, divination, astronomy and cartography (Biran et al., 2020, p. 10). The role of polyglots in the Mongol Empire meant that those

closest to the khan were often scientists, traders and political advisors simultaneously. Specific institutions like *keshiq* (royal bodyguard), the office of *darugachi* (governors/representatives of the Khan) and *ortaq* (merchant partners to the Khan), created the space within which intellectuals operated (Di Cosmo, 2010). Importantly, the Mongol penchant for moving people and resources proved most useful in creating 'unparalleled opportunities for technical and artistic interchange'. (Allsen, 1997, p. 101).

The Mongol Khans, as heirs to the long tradition of Inner Asian nomadic empires, were well versed in diplomatic etiquette that relied on scientists and educated personnel to build and maintain relations with neighbouring societies. Consequently, the Khans employed polymaths as 'envoys on behalf of the khan, due to their knowledge of numerous tongues and their skills as cultural brokers'. (Biran et al., 2020, p. 18) These actors were advisors to the Khans and the princes who ruled the Eurasian realm as a politically coherent unit. Thus, Mongol Eurasia became an amenable space for disparate civilizations and knowledge systems which came into increased contact during this period. The creation of new knowledge through the process of connecting different knowledge systems that came with their own sets of principles, methodologies and styles of scientific pursuit was an outcome of the Mongol Empire which was a multi-ethnic and multi-civilizational empire. Generally, the Mongols were able to draw on 'a long standing nomadic tradition for their ideology and political symbolism…propagating them on a vast, imperial scale' (Allsen, 1997, p. 102).

Another feature of the Mongol Empire that deserves attention is the investment in trade that contributed to wealth creation in this period. Diplomatic embassies were used foremost in the promotion of trade, while physical infrastructure, like the *jam* system (postal network), storage facilities, hostels, safe-houses and such, was put in place to facilitate those exchanges. These facilities proved useful in the transmission and dissemination of goods and promoted scientific exchanges as well. Scientists used these amenities as well since they were heads of diplomatic missions and as they represented the bulk of religious travellers in this period. Traversing the length of Mongol Eurasia was made easier via this physical network that connected historical and new intellectual hubs like Tabriz, Baghdad, Samarkand, Maghara and Bukhara (Pfieffer, 2014, p. 5). Furthermore, diplomatic etiquette in the Mongol Empire meant that envoys represented the khan and generally contributed to the prestige of the court and thus had to be knowledgeable along with being personable. The Mongol Khans often employed particular figures who served them in a number of capacities. These figures were seen as loyal and trustworthy and were in the service of the khan to ensure their interests in a far flung empire like that of the Mongols (Rachewiltz et al., 1993). As a result, scientists were prized and were routinely sent on diplomatic missions to facilitate relations. The next section provides a short note on historical sources that attest to the place of scientists and the sciences in Mongol diplomatic practices.

## A Note on Sources and Literature Review

Historical sources regarding diplomatic embassies and diplomats are available in a number of languages. Historical sources from the four khanates (Yuan, Ilkhanate, Golden Horde, Chaghataids), spread as they were across Eurasia, relate information on diplomatic correspondence and etiquette in a number of contemporary sources like the Yuanshi (Chinese) and Jami al Tawarikh (Persian). There are also chancery documents and letters sent by Mongol Khans, fragments of Uyghur and Turfan documents (Biran, 2008; Dai, 2021) and papal letters and decrees. In addition, there are also accounts and travelogues written by Franciscan friars and missionaries (Cordier, 2010) like William of Rubruck (Jackson et al., 1990), Plano (Vaughan & Neureiter, 2012) di Carpini (Carpini et al., 1903; Giovanni, 1996), along with biographies and writings of emissaries like Rabban Sawma (Budge et al., 2014). These coupled with historical manuscripts written before and just after the Mongol period referencing the broader Eurasian diplomatic etiquette saddling the sedentary and nomadic customs paint a vivid picture of diplomats and diplomatic embassies in Eurasia in this period.

Alongside these, there are works in modern scholarship that provide a fuller picture of the role of the Mongols as cultural, scientific and economic brokers. The place of diplomats within the Mongol schematic of the Silk Road(s) and Eurasia has been examined through studies on trade and economic relations. Diplomatic embassies were often used for fostering economic and trade relations that provided the impetus for other kinds of exchanges, like scientific knowledge. More recently, studies on the Silk Road(s) have made leaps and bounds in understanding information flows along this historic land route. Works on knowledge production and Mongol Khans as cultural brokers along the Eurasian Silk Road(s) have paved the way for understanding processes at work that continued to have reverberations in subsequent empires. Studies on cultural and economic relations under the Mongols Khans by authors like Allsen (2001), Amitai and Biran (2005), Biran et al. (2020), Pfeiffer (2014), Levi (2020), Maĭorov and Hautala (2021), Bauden et al. (2019), Fiaschetti (2020), Buell (2020) and May and Hope (2022), among others continue to provide the basis for the examination of the Mongol Empire as more than a military war machine. The next section considers the three aspects of modern science diplomacy and applies it to the Mongol period, beginning with scientists in diplomatic service to the Khans.

## Science (Scientists) in Diplomacy

Embassies routinely included scholars and 'groups whose literacy, knowledge of accounts, communication networks, and ideological influence proved most useful'. (Allsen, 1997, p. 31) In time as the Mongol Khans sent embassies to empires farther than their immediate neighbours, envoys with knowledge of and access to different societies and cultures came to be valued even more. In particular, emissaries were meant to increase the prestige of the embassy and this was achieved by choosing skilful people who would have been considered intelligent, practised in their use of words and letters, in addition to being handsome, brave, likeable and personable. Polyglots and polymaths were highly prized and contributed to understanding and bringing back information which would subsequently be useful to the Khans. A historic text entitled, Kutadgu Bilig gives a description of qualities and characteristics of diplomats that include intelligence, scholarly attributes of being able to read and write, linguistic skills, well-educated along with being handsome and 'versed in poetry and sciences such as astronomy and mathematics'. (Biran, 2008, p. 380; Yusuf Khass Hajib Dankoff translation of Kutadgu Bilig, 1983).

Science in diplomacy was thus achieved via personnel closest to the Mongol Khans. Mongol Khans chose polyglots and polymaths as advisors, ministers and governors. These individuals performed a number of different duties for the Mongol Khans. Offices of *darugachi*, *keshiq* and *baurchi*, were often filled by the same personnel. Many of the emissaries had been members of the Khan's royal guard (*keshiq*) and continued to be in important official positions as they enjoyed the confidence and patronage of the khan. This reflects the nomadic character of the Mongol Eurasian Empire which relied on loyalty to the khan as one of the most important attributes of an official (Biran et al., 2020; Kalra, 2020). The list of diplomats and envoys who were scientists and intellectuals include famous figures, like Rashid al Din, Jamal al Din (Thackston et al., 2012), Nasr al Din Tusi, Li Dachi, Isa Kelemechi, Fu Mengzhi, Yang Tingbi and Ni Kesun (Lu, 2015; Biran et al., 2020). They were proficient in astronomy, medicine and history, while also serving as ministers in the government. Scientists and doctors also often accompanied the khans during conquest and military exercises as they were an integral part of the khan's retinue with intimate knowledge of and access to the person of the khan (Shinno, 2007).

The tradition of sending highly qualified government personnel who were well respected was thus common. For example, Shi Tianlun, formerly in the royal guard and a judge in Mongke's (r. 1251–1259) court was sent to Qaidu (de facto Khan of the Chaghatai Khanate) in the second half of the 13th century. Qubilai Qa'an (r. 1264-1294) sent Xiban, a well-respected Uyghur, a member of the royal bodyguard, prime minister and Qaidu's father's teacher to Ogedeid-Chaghataid Central Asia. Quabilai Qa'an also sent a Naiman named Tie Lian to Qaidu and the Golden Horde. Tie Lian was respected for his wisdom and family connections which included his grandfather who had previously been the teacher of Batu Khan (r. 1227-1255, Khan of the Golden Horde) in his early years (Biran, 2008, p. 382). Another famous figure is Isa Kelemechi. He was born in Azerbaijan or Armenia and was sent on diplomatic missions by both the Yuan and the Il-khanate. He was an intellectual and a government official (diplomat and minister). His illustrious career has been described by Hondong Kim (Biran et al., 2020, pp. 255–269) from having an important position in the Khan's *keshiq* to establishing a number of Yuan offices and ministries in the fields of medicine (Schottenhammer, 2018) and astronomy. In the first instance Isa was sent to the Ilkhanate by Quabilai Qa'an in 1283 and the mission to Europe was on the behest of the Ilkhan Arghun with a letter to the pope in 1285 (Kim, 2020, p. 260).

Similarly, Fu Mengzhi was a Daoist, Chinese physician and an amateur astronomer in Hulegu's court (Ilkhante) who accompanied him to Iran and Iraq in 1254. He is referred to as the 'sage of Cathay' (Isahaya, 2020, p. 241). Another figure, Rabban Sauma also deserves special mention. He was a scientist and was knowledgeable of Christian societies and languages. He headed a diplomatic embassy sent by Arghun (r. 1284–1291) to the West to seek help against the Mamluk Empire (1250-1517). An intellectual, traveller and fluent in many languages, he was an ideal candidate to carry out the khan's missives in this important embassy. He was respected by the Onggud community, Nestorians and also the Persianate community. He was fluent in the Turkic language, Chinese, Syriac and possibly even Mongolian. Rabban Sauma also represents the first ambassador to go west and interact with a European monarch (Rossabi, 2010, pp. 100–101; Rossabi, 2018). These instances together represent the important role played by diplomats who were scientists and were prized for being knowledgeable and thus important in establishing diplomatic relations both within the Mongol Empire and outside. The next section considers examples of how science and scientific interactions helped pave the ground for understanding between societies. The sciences provided information and knowledge about societies: geographical, social and economic, that enabled governance and fostered international relations in this era.

## Science for Diplomacy

Mongol Eurasia was a space occupied largely by scientists especially in the diplomatic arena as has been described above. These scholarly exchanges were a part of the emphasis on connecting Eurasia in fundamental ways as a consequence of Mongol conquest. Examples of inter-

civilizational, -ethnic and -religious exchanges as a result of Mongol dominance in Eurasia point to a vibrant interactive environment. Mongol Eurasia came to denote intellectual pluralism which was celebrated for its own sake and along with religious pluralism allowed the ruling Khans to co-opt subjects in a far flung empire (Biran et al., 2020, 6). The Mongols were resourceful in the mobilisation of talent and created an environment where different cultures and peoples interacted as a normal happenstance. It is important to point out that inter-civilizational and inter-religious scientific development as understood in modern science diplomacy focuses on examples of scientific collaborations. Joint publications and collaborative projects are the most important indicators of successful science diplomacy today. However, this is severely limiting and fails to take into account the multiple ways in which scientists interacting with each other and sharing a physical space in and of itself contributes to understanding and helps build relations between different political entities, empires and/or nation states.

The Mongol approach relied on flexibility and adaptability in all things related to governance and culture. These proved to be essential in governing a large and complex place like Eurasia. Since this space was populated by diverse cultures and peoples, the Mongol Empire brought everyone within it closer together. The ancient civilizations of China, the Islamic world and Central Asians were brought together resulting in the creation of a unique environment. Scientists from across Eurasian societies found each other in the courts of the Mongol Khans that led to discussions, debates and exchange of ideas. This singular happenstance spurred scientific activity and broadened understandings between polities paving the way for diplomatic relations within the Mongol Empire. Additionally, Mongol courts attracted scholars and intellectuals from around the world. Examples of intellectual figures moving between the Golden Horde and the Mamluk realm, like Jalāl al-Dīn Ahmad b. Muhammad al-Khujandī al-Akhawī, show the remarkable resilience of Muslim networks in the Mongol era within and beyond the borders of the Mongol Empire (Amir, 2020). Franciscan friars like William of Rubruck travelled to the court of Ogedei Khan (r. 1229-1241) as early as the 1230s and found that people of different religions, cultures and ethnicities lived in Karakorum. Openness at court translated into the creation of a multi-ethnic empire that could accommodate different cultures and drove the sciences and intellectual exchanges to mitigate conflicts while bolstering diplomatic relations.

Scientists who were diplomats contributed hugely to the dissemination of knowledge of societies helping the Mongol Empire to translate and accommodate different cultures. They brought information on map marking, geography, topography along with details of cultural aspects of societies which appear in travelogues that include detailed descriptions of their journeys. This information helped the Mongols understand how to conduct diplomatic relations with their neighbours. For example, the Chaghataid Khans sent Muslim scholars as heads of embassies to the Ilkhanate, while embassies sent to Papal States were headed by Dominican friars. Similarly, Rabban Sawma's account of his travels are a rich source of information of the Ilkhanate and their relationship with neighbouring Christian polities (Budge et al., 2014; Chang, 2020); and the collaboration between Fu Mengzhi and Nasr al Din Tusi, a famous astronomer and a scientist patronised by Hulegu, was one of the few instances of a collaborative project in the modern sense and stands out as an example of the closeness of the Yuan and the Ilkhanate courts (Isahaya, 2020, p. 241; See Kalra, 2018b). The next section considers the last aspect of how diplomacy enabled the development of the sciences.

## Diplomacy for Science

The Eurasian cultural space can be defined as a repository of actions, values, behaviours, attitudes, priorities and interests which evolved from centuries of interactions. This shared space has been described by Canfield as an 'ecumene' which he applies to the Turko–Persian world of the geographies in the Eurasian region (Canfield, 1991). These meanings began taking shape in earnest in the Mongol Empire. The creation of a connected space, politically, militarily and intellectually, via the establishment of a Mongol Empire in the 13$^{th}$ century has been referred to as the first example of proto-globalisation (Abu-Lughod, 1991). By connecting the entire known old world, the Mongol Khans with their partners (merchants and intellectuals) built an interconnected and interdependent world order. The sheer number of people travelling through Mongol Silk Road(s) created a rich repository of sources including manuscripts, travelogues, accounts, poetry, treatises and the like.

Diplomatic embassies enabled manifold scientific endeavours in this period. The study of the Mongol Empire 'offers insights into the Eurasian world of the Mongol Empire which was rife with interactions and was the hub of numerous scientific technologies and cultural ideas in time and space'. (Kalra, 2021; Park, 2021) For example, embassies between the Yuan and the Ilkhanate produced a number of collaborative projects in the sciences and helped direct technological flows (Park, 2012). Chinese and Muslim scholars were in Mongol courts together that led to translations of books from Chinese to Persian and vice versa that continue to be used by scholars today (Kalra, 2018a). This process was especially aided by paper and publishing technologies that were in use in China and allowed for large scale copying of manuscripts in places like Rab i Rashidi, a town built by Rashid al Din that housed calligraphers and copyists in the Ilkhanate (Allsen, 2001). Instances of

interactions between Chinese, Nestorian and Islamic physicians abound both as a result of travelling in diplomatic embassies and as part of the Mongol retinue (Rossabi, 2013). Overall mobility in the Mongol Empire was made easier and led to a number of scholars and intellectuals to travel to Mongol courts. Examples include figures like Jamal ad-Din Muḥammad ibn Ṭāhir ibn Muḥammad al-Zaydī al-Bukhārī (Chinese name Zhamaluding) who was a 13th century astronomer, originally from Bukhara who entered the service of Qubilai Qa'an around the 1250s. He set up an Islamic Astronomical Bureau in Beijing which operated in parallel with the traditional Chinese astronomical bureau. Following Jamal al Din's works on astronomical charts, the Chinese scholar Guo Shijing made seven instruments for astronomical observations between 1271 and 1279. These instruments made their way into Greek astronomy too. In addition, the Hui Bureau of Astronomy in Xanadu (China) had regular exchanges with the Maragha Observatory in Iran (Isahaya, 2020).

Beyond the instances of the Yuan and the Ilkhanate there were also scientific interactions between the Golden Horde and the Ilkhanate, Central Asian Mongols and their neighbours, but also with empires further afield. The Mongols sent embassies to the Mamluk Empire (Bauden et al., 2019 & Behrens-Abouseif, 2014) and the Delhi Sultanate (Jackson, 2009), as well as European kingdoms including the Papal states (Jackson, 2018). All of these embassies were headed by scientists and intellectuals. In terms of mitigating conflicts which is considered an important aspect of modern day science diplomacy these instances indicate a similar role played by scientists in the Mongol era (Arom, 2020). This is clearly evident in the relationship between the Mamluk Empire and the Golden Horde where a ritualised form of diplomacy was undertaken in order to navigate different societies and traditions in order to ensure exchanges (Favereau, 2018, pp. 323). Both the Mongols and the Mamluks relied heavily on qualified personnel who were respected and were thus in a position to negotiate and promote diplomatic relations (Behrens-Abouseif, 2014). In principle, these instances indicate how diplomatic relations cut across empires and proved beneficial for expanding knowledge networks in this period. Furthermore, as the Mongol Empire expanded it also aided and proved instrumental in the spread of new techniques through interactions with different societies. Paper, porcelain, spices, precious jewellery, ship building techniques, agricultural instruments and distillation processes made up the numerous exchanges that were made possible by the Mongol Empire (See Ho, 1988; Park, 2012). None of this would have been possible to the extent that was seen without Mongol agency and the creation of a political entity like the Mongol Empire. An increase in the number of diplomatic embassies meant an expansion of opportunities that were available for scientific advancement and technology transfers. Thus, Mongol diplomatic embassies became drivers of science in the pre-modern era and performed a similar function to that of science diplomacy in the 21st century.

## Conclusion

The Mongol Eurasian space was the known old world and was thus home to some of the most ancient and advanced civilizations (Chinese, Islamic, Indic, Persianate and Turkic/Nomadic) at the time. By bringing them in closer contact and providing the infrastructure for ever more mobility across the expanse of Eurasia, the Mongol Khans were able to perform the role of cultural and scientific brokers. In addition, as outsiders and/or actors who did not have personal investiture in knowledge originating from any particular civilization (Chinese, Islamic, Christian or Indic) they patronised a variety of knowledge systems. Their personal interests did indeed play a role but the expansive nature of Eurasia and the locations which the khans ruled proved to be favourable for borrowings of all kinds (Allsen, 1997, p. 102). Open courts and tolerant attitudes to religions meant that they could overcome traditional limitations in knowledge exchanges (Kalra, 2022). This is not to say that the knowledge exchange did not happen before, there is ample evidence to show that there was a high level of knowledge exchange along maritime routes between the Southern Sung and the Islamic world, however, other regions like Northern China or more inland cultures had fewer opportunities to be exposed to such knowledge exchanges before the establishment of the Mongol Empire. The sheer volume of such exchanges underwent a *phase change*, to borrow a scientific term that indicates a change in matter from one state to another (solid, liquid, gas and/or plasma) (Haines & Saxena, 2018).

Geography, medicine, astronomy, agriculture as well as knowledge about societies and the natural world were expanded in this era. The Mongol Khans were interested in particular sciences which aided and helped conquest and economic activity. The creation of a politically coherent Eurasian space brought scientists and intellectuals into close contact. The sciences helped understand other societies and expand the knowledge of the world. The goal was not necessarily scientific collaborations; however, that is just one aspect of science diplomacy even in the modern era. This does not contradict science diplomacy in Mongol Eurasia but points to a nuanced use of intellectuals in diplomacy and conversely also shows that in a time where much of the world was still being discovered and codified, the Mongols and their scientific advisors played a profound role in its formation. It is important to point out that the, 'Mongols held difference more effective and worthwhile than integration'.

(Isahaya, 2020, pp. 248–249) This meant that the interactions between different knowledge systems was not an impediment, rather it was a catalyst for knowledge production. This is similar to what has been described as intercalation with regards to the place of Central Asian societies over centuries that 'found themselves adjacent to numerous others and yet continued to retain their inherent properties to respond efficiently to increasingly complex environments' (Kalra, 2022; Kalra & Saxena, 2021).

To return to the concept of science diplomacy in modern times, the three key aspects are science in diplomacy, science for diplomacy and diplomacy for science. All these can be seen operating within Mongol Eurasia in the 13th century and continued to operate in subsequent khanates all the way through to the 20th century. There is much in common in terms of how the Mongol Khans utilised knowledge (sciences) to overcome and mitigate conflict, economically prosper and understand different societies. Mongol Khans sent diplomatic embassies within the Mongol Empire and outside Mongol domains to friendly and rival empires on a regular and consistent basis. Intellectuals and merchants with knowledge of societies proved to be skilful cultural brokers. The concept of science diplomacy thus needs to expand in both space and time and in the context of historical developments in non-European settings like Eurasia.

The place of science diplomacy in both scholastic and policy spheres in Eurasia today requires understanding of the history of science and diplomacy in this region. By adding the historical context of science diplomacy in Eurasia to the current body of work on science diplomacy, the trend in science diplomacy proffered by Ruffini et al. that science diplomacy is not always, if ever, neutral, and is aligned with specific actors and interests, can be understood in different settings (Ruffini, 2020, p. 4). In this context, further study in the way the Mongols, and Mongols as proxy for Turkic–Persianate–Islamicate-Mongol (Canfield, 1991) Eurasian empires, chose to expand the knowledge of science in the pre-modern era is essential. The study of science diplomacy within the Mongol Empire and Eurasia is yet another piece of the puzzle of how societies in the past and outside of Europe have functioned and interacted with each other. Eurasia represents 1/3rd of the world's population and needs to be understood for its own sake in line with its particular historical trajectory. The immediate past of the region can be counterbalanced with a longer historical lens which incorporates the history of Eurasia rife with examples of cooperation and interactions cutting across political, social, economic, and religious differences.

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## References

Abu-Lughod, J. L. (1991). *Before European hegemony: The world system A.D. 1250–1350*: Oxford University Press.

Allsen, T. T. (1997). *Commodity and exchange in the Mongol empire : A cultural history of islamic textiles*. Cambridge University Press.

Allsen, T. T. (2001). *Culture and conquest in Mongol Eurasia (cambridge studies in islamic civilization)*. Cambridge University Press.

Amir, O. (2020). 'Islamic learning on the Silk roads: The Career of Jalāl al-Dīn al-Akhawī. In: M. Biran (Ed.). *Along the Silk roads in Mongol Eurasia: Generals, merchants, and intellectuals*: University of California Press, pp. 290–314.

Amitai, R., & Biran, M. (2005). *Mongols, turks, and others. Eurasian nomads and the sedentary world (Brill's inner Asian library (v. 11)*. Brill.

Arom, N. (2020). In-ger "and" "outer" diplomacy - ilkhanid contacts with the Mongols and the outside world, 1260-1282. *Eurasian Studies (Cambridge, England)*, *17*(2), 286–309. https://doi.org/10.1163/24685623-12340077

Bauden, D., Bauden, F., & Dekkiche, M. (2019). Mamluk Cairo, a crossroads for embassies: Studies on diplomacy and diplomatics (islamic history and civilization : Studies and texts, volume 161).

Behrens-Abouseif, D. (2014). Practising diplomacy in the Mamluk Sultanate. In *Gifts and material culture in the medieval Islamic world*. Bloomsbury Publishing.

Biran, M. (2008). Diplomacy and chancellery practices in the chagataid khanate: Some preliminary remarks. *Oriente Moderno*, *88*(2), 369–393. https://doi.org/10.1163/22138617-08802010

Biran, M., Brack, F., & FiaschettiBrack, J. (2020). *Along the silk roads in Mongol Eurasia: Generals, merchants, and intellectuals*. University of California Press.

Brentjes, S., & Morrison, R. (2010). The sciences in Islamic societies (750–1800) In R. Irwin (Ed.), *The new cambridge history of Islam (The new cambridge history of Islam)* (pp. 564–639). Cambridge University Press.

Budge, M., Wallis, E. A., & Morgan, D. (2014). *Monks of Kublai Khan, Emperor of China: Medieval travels from China through central Asia to persia and beyond* (1st ed.). University of Oregon.

Buell, P. (2020). *Crossroads of cuisine: The eurasian heartland, the silk roads and food. Crossroads - history of interactions across the silk routes, volume 2)*.

Bulliet, R. (2010). Muslim societies and the natural world. In R. Irwin (Ed.), *The new cambridge history of Islam (The new cambridge history of Islam)* (pp. 209–222). Cambridge University Press.

Canfield, R. L. (1991). *Turko-Persia in historical perspective (School of American Research advanced seminar series)*. Cambridge University Press.

Carpini, H., Beazley, R., & Lambarde, D. (1903). *The texts and versions of John de Plano Carpini and William de Rubruquis: As printed for the first time by Hakluyt in 1598, together with some shorter pieces*. Printed for the Hakluyt Society.

Chang, N. (2020). Contacts between the Mongols and the Latin west in the thirteenth century— seen from rabban Sawma's westward mission. *Cambridge Journal of China Studies*, *15*(1), 58–67. https://doi.org/10.17863/CAM.64485

Cordier, H. (2010). *Missionary friars– rashiduddin– pegolotti– marignolli (New ed., Cathay and the way thither: Being a collection of medieval notices of China; Vol. 3)*. Ashgate.

Dai, M. (2021). Vérmárton 2019. Old Uyghur documents concerning the postal system of the Mongol empire [berliner turfantexte XLIII]. *Acta Orientalia Academiae Scientiarum Hungaricae*, *74*(1), 163–169. https://doi.org/10.1556/062.2021.00008

Di Cosmo, N. (2009). Black Sea emporia and the Mongol empire: A reassessment of the Pax Mongolica. *Journal of the Economic and Social History of the Orient*, *53*(1–2), 83–108. https://doi.org/10.1163/002249910x12573963244241

Drompp, M. (2015). Tang China in multi-polar Asia: A history of diplomacy and war, written by wang zhenping, 2013. *T'oung Pao*, *101*(1–3), 253–258. https://doi.org/10.1163/15685322-10113p09

Faehnrich, B. (2017). Science diplomacy: Investigating the perspective of scholars on politics–science collaboration in international affairs. *Public Understanding of Science (Bristol, England)*, *26*(6), 688–703. https://doi.org/10.1177/0963662515616552

Favereau, M. (2018). Chapter 7 the golden horde and the Mamluks: the Birth of a Diplomatic Set-Up (660–5/1261–7). In *Mamluk cairo, a Crossroads for Embassies*. Brill.

Fedoroff, N. (2009). Science diplomacy in the 21st century. *Cell*, *136*(1), 9–11. https://doi.org/10.1016/j.cell.2008.12.030

Fiaschetti, F. (2020). Diplomacy in the age of Mongol globalization: An introduction. *Eurasian Studies*, *17*(2), 175–181. https://doi.org/10.1163/24685623-12340071

Giovanni. (1996). *The story of the Mongols whom we call the Tartars = Historia Mongalorum quos nos Tartaros appellamus*. Mass.

Haines, C. R. S., & Saxena, S. S. (2018). Emergence of novel phenomena on the border of low dimensional spin and charge order. *The European Physical Journal B*, *91*(9), 196. https://doi.org/10.1140/epjb/e2018-90358-3

Ho, C. (1988). *Minnan blue-and-white wares: An archaeological survey of kiln sites of the 16th-19th centuries in southern Fujian, China (BAR international series ; 428)*. BAR.

Isahaya, Y. (2020). 12. Fu Mengzhi: "The sage of Cathay" in mongol iran and astral sciences along the silk roads. In M. Biran (Ed.), *Along the Silk roads in Mongol Eurasia* (pp. 238–254). University of California Press. https://doi.org/10.1525/9780520970786-016

Jackson, P. (2018) *The Mongols and the islamic world : From conquest to conversion*. Yale University Press.

Jackson, P., Morgan, D., & Society, H. (1990). *The mission of William of Rubruck: His journey to the court of the great khan Mongke* (pp. 1253–1255). Hakluyt Society.

Kalra, P. (2018a) *The silk Road and the political economy of the Mongol empire/prajakti Kalra*. (1st ed.). Routledge Studies on the Chinese Economy. Web.

Kalra, P. (2018b). *'Silk Road and the political economy of the Mongol empire: Yuan and ilkhanid exchanges in the 13th century' conference proceedings, "silk Road traveller's texts from the 13th-14th centuries: Bibliography and research"*. Zhejiang Normal University.

Kalra, P. (2020). *Pax Mongolica: Trade and traders in the Mongol empire. Oxford research encyclopedia of asian history.* Oxford University Press. https://oxfordre.com/asianhistory/view/10.1093/acrefore/9780190277727.001.0001/acrefore-9780190277727-e-493

Kalra, P. (2021). A global history. Cambridge: Cambridge university press, 2021. *Korean Journal of the History of Science*, *43*(2), 505–509. https://www.kci.go.kr/kciportal/ci/sereArticleSearch/ciSereArtiView.kci?sereArticleSearchBean.artiId=ART002750420

Kalra, P. (2022). Locating central Eurasia's inherent resilience. *Cambridge Review of International Affairs*, *35*(2), 235–255. https://doi.org/10.1080/09557571.2021.1993136

Kalra, P., & Saxena, S. S. (2021). Globalizing local understanding of fragility in Eurasia. *Journal of Eurasian Studies*, *12*(2), 103–112. https://doi.org/10.1177/18793665211044839

Kim, H. (2020) Īsa Kelemechi: A translator turned envoy between Asia and Europe.' In: M. Biran (Ed.) *Along the Silk roads in Mongol Eurasia: Generals, merchants, and intellectuals*. University of California Press, pp. 255–269. https://doi.org/10.1525/9780520970786-017

Kotkin, S. (2007). Mongol commonwealth?: Exchange and governance across the post-mongol space. *Kritika (Bloomington, Ind.)*, *8*(3), 487–531. https://doi.org/10.1353/kri.2007.0040

Laumulin, C. (2019). *Science and social policy: Underpinning of Soviet industrial paradigms*. (Doctoral Thesis). University of Cambridge.

Levi, S. (2020). *The bukharian crisis: A connected history of 18th-century central Asia*. University of Pittsburgh Press.

Lu, Y. (2015). *A history of Chinese science and technology.* Shanghai Jiao Tong University Press.

Maĭorov, A., & Hautala, R. (2021). The routledge handbook of the Mongols and central-eastern Europe: Political, economic, and

cultural relations. In A. V. Maiorov & R. Hautala. (1st ed.). Routledge.

Manz, B. (1991). *The rise and rule of tamerlane (cambridge studies in islamic civilisation)*. Cambridge University Press.

May, T., & Hope, M. (2022). *The Mongol world/edited by Timothy May and Michael Hope*. (1st ed.). The routledge Worlds.

Mearsheimer, J. (2018). The great delusion: Liberal dreams and international realities. Stimson lectures, Yale University.

National Research Council, Committee on Global Science Policy Science Diplomacy. (2012). *US and international perspectives on global science policy and science diplomacy report of a workshop*. National Academies Press.

Park, H. (2012). Interpreting the mongol world: Chinese understanding of the islamic world, 1260–1368. In *Mapping the Chinese and islamic worlds: Cross-cultural exchange in premodern Asia* (pp. 91–123). Cambridge University Press.

Park, H. (2021). *Soju: A global history (Asian connections (Series))*. Cambridge University Press.

Pfeiffer, J. (2014). *Politics, patronage, and the transmission of knowledge in 13th-15th century tabriz*. Brill.

Rachewiltz, I. (1993). *In the service of the Khan: Eminent personalities of the early Mongol-Yuan period (1200–1300)*. Cambridge University Press.

Robinson, F. (2007). The mughal dynasties. *History Today*, *57*(6), 22–29.

Rossabi, M. (2010). *Voyager from Xanadu: Rabban Sauma and the first journey from China to the West*. University of California Press.

Rossabi, M. (2013). *Eurasian influences on yuan China*. ISEAS Publishing.

Rossabi, M. (2018). Introduction. In *Eurasian influences on yuan China*. ISEAS Publishing.

Ruffini, P. (2017). *Science and diplomacy: A new dimension of international relations/pierre-bruno Ruffini*. Springer.

Ruffini, P. (2020). Conceptualizing science diplomacy in the practitioner-driven literature: A critical review. *Humanities and Social Sciences Communications*, *7*(1), 124. https://doi.org/10.1057/s41599-020-00609-5

Schottenhammer, A. (2018). Huihui medicine and medicinal drugs in yuan China. In *Eurasian influences on yuan China* (pp. 75–102). ISEAS–Yusof Ishak Institute Singapore.

Shinno, R. (2007). Medical schools and the temples of the three progenitors in yuan China: A case of cross-cultural interactions. *Harvard Journal of Asiatic Studies 67, No*, *1*, 89–133.

Skolnikoff, E. (1993). Science, technology, and the evolution of international politics. In *Core Textbook*. The Elusive Transformation.

Thackston, K. M., Haydar, M., Rashid al-Din, T., & Thackston, W. M. (2012). *Classical writings of the medieval islamic world: Persian histories of the Mongol dynasties*. IB Tauris.

The Royal Society, The American Association for the Advancement of Science. (AAAS) (2010). *New frontiers in science diplomacy*. The Royal Society.

Togan, I. (1998). Flexibility and limitation in steppe formations. In *The kerait khanate and Chinggis khan (ottoman empire and its heritage (v. 15))*. Brill.

Turchetti, S. (2021). Trading global catastrophes: NATO's science diplomacy and nuclear winter. *Journal of Contemporary History*, *56*(3), 543–562. https://doi.org/10.1177/0022009421993915

Turchetti, S., Adamson, M., Rispoli, G., Olšáková, D., & Robinson, S. (2020). Introduction: Just needham to nixon? On writing the history of science diplomacy. *Historical Studies in the Natural Sciences*, *50*(4), 323–339. https://doi.org/10.1525/hsns.2020.50.4.323

Vaughan, T., & Neureiter, N. (2012). *Science and Diplomacy: The past as prologue*. http://www.sciencediplomacy.org/editorial/2012/science-and-diplomacy

Yusuf Khass Hajib, Yusuf, khass-hajib, 11th cent, Yusuf Khass Hajib, & Dankoff, Robert. (1983). *Wisdom of royal glory (Kutadgu Bilig): A turko-islamic mirror for princes*. University of Chicago Press.