The astrolabe by 'Abd al-Karim in the British Museum is one of the most famous astrolabes in the world (figs 1–2). Its celebrity lies in the figural designs that represent the constellations on its rete and back, in the attractive use of the fashionable technique of inlaying silver and copper to decorate its brass body, and in its inscription, which gives the names of the artist and his patrons, the date the astrolabe was made, and (apparently) its place of manufacture. As a result it has long been recognized as an important documentary object, providing crucial evidence for Cairo as a scientific and artistic center under the Ayyubids. But the inscription is problematic. It consists of six lines of deeply engraved Kufic; the lower four lines, however, have been filled in with brass of almost the same color as the body of the astrolabe, making them difficult to see and impossible to reproduce except as a line drawing (figs. 3, 4). Disagreement about the meaning of this inscription has undermined its documentary importance. In this paper I will propose another reading for the date and the provenance of the astrolabe, suggest identities for the three patrons, and provide new information about its craftsman, 'Abd al-Karim. But in order to disentangle the different theories about the date, patrons, and provenance, I will first review the various interpretations of the inscription that have been proposed since the astrolabe was discovered by Augustus Wollaston Franks in Mr. Pratt’s Bond Street shop in 1855.

The astrolabe was first mentioned in print by Morley in 1856, a year after it had been acquired by the British Museum. As a historian of scientific instruments, he concentrated on a description of its scientific aspect. He did not give the inscription but stated that it was made for “al-Malik al-Ashraf, son of al-'Adil, and nephew of the great Salâh ad-Dîn, by 'Abd al-Karîm al-Misrî al-Usturlâbî in 633 (1235).” He observed that al-Ashraf ruled at Damascus from 626 to 635 (1228–37), but did not mention his previous period of rule in the Jazira. He gave neither the date nor the place of manufacture of the astrolabe.

Lane-Poole was the first to quote the Arabic inscription, in Art of the Saracens of Egypt, published in 1886. He translated it: “'Abd-El-Kerºm made it, the Cairene [Misry], the Astrolabist at Cairo, the [follower] of El-Melik El-Ashraf and El-Melik El-Muºizz, and of Shihâb-ed-dîn, in the year 633.” He identified al-Ashraf as the Ayyubid ruler of Diyar Bakr and al-Mu’izz as an unspecified “prince of Mesopotamia” in the first quarter of the thirteenth century AD. He went on to use the astrolabe as evidence that inlay work by Mesopotamian art...
ists was already being produced in Cairo in the early thirteenth century.⁴

In 1904 Van Berchem followed Lane-Poole in his reading of the inscription, although he changed sanā‘ahu (made it) to sanā‘at (work of) and added the last line ‘affā [sic] Allāh ‘anhu (forgiveness of God on him). But he attacked (with some relish) Lane-Poole’s identification of al-Ashraf as the Ayyubid Sultan Yusuf of Diyar Bakr and then of Damascus, and of al-Mu‘izz as a Mesopotamian prince. He emphasized the necessity of taking into account the assertion in the inscription that the astrolabe was made in Cairo by a Cairene. He claimed that al-malakº must be the description of reigning princes and identified them as the last Ayyubid sultan, al-Malik al-Ashraf Musa II, and the first Mamluk sultan, al-Malik al-Mu‘izz Aybak, who ruled together in Cairo from 648 to 650 (1250–52). He glossed over al-Shihábí, suggesting that it must designate an ancient owner or patron of the artist. He admitted that his interpretation did not agree with the given date of 633 (1235–36) but had no explanation for the discrepancy.⁵

Three years later, in 1907, Migeon in his Manuel d’Art islamique diplomatically mentioned both theories without taking sides.⁶
In 1932, in a telling demonstration of the divide that existed at that time between scholars of scientific instruments and scholars of Islamic culture, Gunther reprinted Morley’s postscript without comment or reference to later discussions, despite giving a bibliographical reference to Lane-Poole. But he also published a second astrolabe by ʿAbd al-Karim, in the Museum for the History of Science, Oxford, which is unequivocally dedicated to Sultan al-Malik al-Ashraf Musa and dated 625 (1227–28) (fig. 5).

When Barrett published the British Museum astrolabe in his *Islamic Metalwork in the British Museum* in 1949, he was aware of the Oxford astrolabe; so although he referred to another (unspecified) theory in a footnote to Van Berchem, he reverted to the original identification of al-Malik al-Ashraf as the Ayyubid ruler of Mesopotamia and Damascus. He could not identify the other two patrons. Like Lane-Poole he used the Cairo provenance as evidence for a school of inlaid metalwork in Egypt in the Ayyubid period. He pointed out that the astrolabe is the earliest example of inlaid metalwork to state specifically that it was made in Cairo, thereby putting its documentary importance for the history of inlay on a level similar to that of the Blacas ewer.9 Mayer’s *Islamic Astrolabists and Their Works*, published in 1956, was the first to publish a photograph of the inscription. Although he knew of the Oxford astrolabe, Mayer agreed with Van Berchem’s theory that the inscription refers to the last Ayyubid sultan and the first Mamluk sultan, as he knew of no Ayyubid sultan called al-Muʿizz. He bypassed the problem of the additional names and the contradictory date by claiming that the inscription had been tampered with and was therefore unreliable. The accompanying text implies that he had studied the astrolabe himself:

An examination of the original proves beyond doubt that the lower part of the signature, as a matter of fact anything except the first two lines, was erased and re-engraved and that, consequently, neither the date nor the titles of the two sultans can be relied upon.10

But the inscription has not been reengraved on the object, only in his photograph! Obviously he was not working from the original but from a photograph provided by a British Museum curator who, as the inscription is impossible to read in reproduction, had helpfully clarified it for him.

Mayer’s publication helped establish Van Berchem’s thesis even more firmly. As recently as 1985, Savage-Smith referred to “the fine astrolabes made by ʿAbd al-Karim who worked for the last Ayyubid and the first Mamluk ruler of Egypt.”11

It was not until 1991 that Van Berchem’s thesis was seriously reexamined. In the exhibition catalogue *Circa 1492: Art in the Age of Exploration*, Michael Rogers argued that it did not account for the additional patron, Shihab al-Din, and did not agree with the date of 633 (1235–36) that had been confirmed by the position of the stars on the astrolabe. He identified al-Ashraf firmly with al-Ashraf Musa I, for whom ʿAbd al-Karim had made the Oxford astrolabe. He observed that soubriquets like al-muʿizzī were not necessarily drawn only from Ayyubid and Mamluk throne names taken on accession and suggested that al-muʿizzī might be associated with another of al-Ashraf Musa’s titles, muʿizz al-islām (he who brings glory to Islam). He still could not account for the presence of al-shihābī, which was not the honorific title (laqab) of al-Ashraf Musa, and he suggested that it might refer to someone quite different and as yet unidentified.12

I first joined the fray in 1995 in an article on a series of candlesticks that appear to demonstrate that the inlay technique was not known to metalworkers in Cairo before 1269. The astrolabe, apparently made and inlaid in Cairo in 1235–36, more than thirty years ear-
lier, contradicted the evidence of the candlesticks, and so I took it off display to check the inscription more closely and discovered that Mayer’s photograph had been enhanced. In a short paragraph I mentioned this and questioned whether bi-Misr should be interpreted as “in Egypt,” as the titles and the style of the object made it more likely that ‘Abd al-Karim was working in Syria or the Jazira.13

In 1997 David King published a magnificent astrolabe in the Maritime Museum in Istanbul, which is also decorated with figural images and inlaid in silver. It was made for al-Mu’azzam ‘Isa in Damascus in 619 (1222–23) by a craftsman from the Syrian town of Baalbek and inlaid by another craftsman from Damascus. In his conclusion, King observed that the two astrolabes by ‘Abd al-Karim are in the same tradition as this one and suggested that they should also be attributed to Damascus.14

It is ironic that a documentary inscription has caused such controversy over this object’s date, place of manufacture, and patron. According to the theories discussed above, the date is either 633 (1235–36) or totally wrong and to be ignored; the patrons might include two Mamluk Sultans or one or two Ayyubid rulers, but the third remains untraced; and the provenance should be Cairo, but could be Jazira or Damascus. At the risk of adding to the confusion, I take this opportunity to reexamine the problematic inscription.

The upper two lines are deeply engraved and have not been filled in with brass, so they remain clear to read (figs. 3 and 4):

Line 1. sanâ‘at ‘Abd al-Karîm (work of ‘Abd al-Karîm)
Line 2. al-mârîbî (?) al-asturlabî (the metal worker [?] and the astrolabist)15

The first word of the second line has previously been read as al-Misrî (the Egyptian/Cairene). Al-Misrî is the sort of familiar nisba that we all fall upon with relief when confronted by a tricky inscription, but an inlaid brass ewer in the Museum of Turkish and Islamic Art in Istanbul suggests that we should be open to a different reading of this word.16 Made in 627 (1229), two years later than the Oxford astrolabe by ‘Abd al-Karîm, it is signed min sanâ‘at Iyâs ghulâm ‘Abd al-Karîm b. al-Turâbî al-Mawsîlî (from the work of Iyas, apprentice to ‘Abd al-Karîm son of al-Turabi al-Mawsili) (fig. 6). Surely this must be a reference to the same ‘Abd al-Karîm who made the Oxford and British Museum astrolabes? ‘Abd al-Karîm was not a common name at this period, and so it would be an extraordinary coincidence to have two metalworkers with this name running different metal workshops at exactly the same time. Moreover Iyas’s inscription begins min sanâ‘at (from the manufacture of). Min sanâ‘at or sanâ‘at are usually used to introduce signatures on scientific instruments; inscriptions on vessels generally introduce their makers with ‘amal (work of) or naqsh (decoration by).17 The only other example known to me, the Aron incense burner signed sanâ‘at Mahmûd b. Khûtûlh al-Mawsîlî, is by a craftsman whom we know to have also made scientific instruments, including the geomantic table dated 639 (1241–42) in the British Museum.18 This contemporary comparison strongly suggests that Iyas was being trained by someone used to signing scientific instruments—such as ‘Abd al-Karîm the astrolabist.

According to the inscription on the ewer, the father of ‘Abd al-Karîm was called al-Turâbî. This was a nisba used by some inhabitants of the city of Merv in East Iran, according to al-Sam`âni.19 The Mongol invasions of Iran may have encouraged al-Turâbî and his family to move to Mosul where he (or his son) adopted a sec-

Fig. 6. Drawing of the maker’s inscription on an inlaid brass ewer. The Museum for Turkish and Islamic Arts, Istanbul. (After D. S. Rice, “An Unpublished ‘Mosul’ Ewer,” fig. 1, p. 229)
ond nisba, al-Mawsili. But if that is the case, ‘Abd al-Karim the astrolabist cannot have been Egyptian, and we have to find another meaning for the nisba in the inscription on the two astrolabes.

As there are already two geographical nisbas associated with ‘Abd al-Karim—al-Turabi and al-Mawsili—the word in question probably does not refer to a place. Moreover it is strangely positioned before the profession of the maker; usually the nisba, indicating the geographical origin of a craftsman, comes right at the end of his name and after his profession.20 Diacritical marks are not used in this part of the inscription, so it is possible that the sād is a dād, and that there is a letter before the final yā’ (compare the bā’-yā’ at the end of asturlābi). Perhaps it derives from daraba (to beat), the term used on the Bobrinski bucket to introduce its maker: al-midrabi signifies one who beats, strikes, or hits violently. According to al-Kindi, al-madrīb was the technical name of the cutting edge of the sword blade, no doubt because it was forged (hammered at high heat).21 Could the word be al-midrabi or al-madrīb, and is ‘Abd al-Karim listing his double talents as metalworker and astrolabist? There is a tendency to assume a high level of specialization by medieval craftsmen, but the two astrolabes themselves—the British Museum one of brass and the Oxford one of high-tin bronze, both with sheet-metal inlays—demonstrate that ‘Abd al-Karim and his workshop were working with a variety of materials (high-tin bronze, brass, gold, silver, and copper) and techniques (casting, hammering, and forging), and the Istanbul ewer demonstrates that they were capable of producing inlaid brass vessels as well as astrolabes.22

The date obviously affects the identification of the patrons listed in lines 3 and 4, and so I move next to lines 5 and 6 (fig. 4):

Line 5. fit sanat kh-l-¥ hijriyyat (in the year kh-l-¥ [638] of the Hijra)23
Line 6. ‘afā Allāh ‘anhu (forgiveness of God on him)

The date is in abjad. The khā’ with a dot above (600) and the lām (30) are clear. The last letter has previously always been read as jīm (3), perhaps because a mark on the brass was interpreted as a diacritical mark. This gave the date 633 (1235–36). But the method for distinguishing the abjad jīm (3) from hā’ (8) at this period was not by means of a dot beneath the letter jīm but by its lack of a final curving flourish. Both jīm and hā’ may be seen in the list of abjad letters in contemporary
copies of al-Jazari’s Al-Jami’ bayn al-‘ilm wa ‘l-anal al-nâfî fi ‘l-sinâ‘at al-bihayl (fig. 7). Abjad numbers written on the plates from the astrolabe follow the same convention. Therefore this last letter is definitely hâ’, and the date for the astrolabe must be corrected from 633 (1236) to 638 (1240–41).

The first two lines of the filled-in part of the inscription read (fig. 4):


Line 4. al-Malîkî Mu‘izzî Shihâbî (al-Malik, al-Mu‘izz, and Shihab [al-Din])

The erased lower four lines of the inscription have always been read as a continuation of the first two lines. But the inscription, although all of one date, consists of two distinct parts: the first two lines, which have no diacritical points, and the last four lines, which do have them. Another indication that the inscription should not be read as a single unit is the shadda over the first word of both parts. Traditionally a shadda indicates that a letter is mihmal (without diacritical points), but this is obviously unnecessary in the second part of the inscription, which has all diacritical points clearly marked. A shadda was also used at this period to indicate the beginning of an inscription, and here it probably has the function of marking the start of the second section.24

The first word of this second section has always been read bi-Mîsr: “in Egypt/Cairo.” But there are several problems with this reading. The first is the awkward and grammatically incorrect position of the word between the names of the craftsman and the employers to whom he owed his allegiance. “In Cairo” makes no sense here; the location of manufacture should have followed the names of the patrons and precede the date, and there is no obvious reason why it could not have done that. Its position implies that the three patrons qualify this word rather than the craftsman, especially if the inscription is read with a pause as suggested above. The ya’ endings of the titles indicate a stronger form than a genitive. When appended to a name, titles with this ending indicate that the individual is in the service of that person. Sometimes similar titles are appended to a building or department (for example a treasury or library) to indicate that it is in the possession of the person named. But it would be highly unusual for a city to be described as in the service or possession of an individual ruler—let alone three, one of whom was already dead (see below). In any case, there are no individu-
Mahmud, the Artuqid ruler of Amid and Hisn Kayfa; and Shihab al-Din, who was atabek in Aleppo. His power base in the Jazira was considerable, yet in 626 (1229) he exchanged his Jaziran territories for Damascus, having been seduced by the charms of that city. Thereafter he based himself at Damascus until his death in 635 (1237).  

Al-Ashraf was a peripatetic ruler moving from city to city, so it is difficult to know where ʿAbd al-Karim’s workshop was located in 625 (1227–28) when he made the Oxford astrolabe for him. It could have been any one of the cities under his control: Harran, his capital and a center for the manufacture of astrolabes in the early Islamic period; Sinjar, one of his favorite cities, where he was residing in the first half of 625; or Mayyafariqin, with its ready sources of copper, which produced both coins and inlaid brass vessels. (We will later return to Mayyafariqin as the likely location of ʿAbd al-Karim’s workshop.) Al-Ashraf could even have commissioned the astrolabe in Damascus, where other high-quality astrolabes with precious metal inlays and figural decoration were being produced at this time. Although it was made the year before he formally exchanged his territories in the Jazira for Damascus (and its inscription, which refers to him extravagantly as the ruler of Iran, Armenia, and Iraq but does not mention Syria or Damascus, confirms that), he spent much of the second half of 625 (1228) staying in Damascus with its ruler al-Nasir Dawud, who was his nephew.

There are two possible contenders with the regnal title al-Malik al-Muʿizz. The first is al-Malik al-Muʿizz Artuqshah, the Artuqid ruler of Kharput from 620 (1223) until his defeat by the Seljuq Sultan Kayqubad in 631 (1234). Artuqshah owned at least one other metal object bearing his name: the Blacas mirror, which is now in the David collection. But Kharput was little more than a gigantic fortress on the frontier of Artuqid territory, and it is hard to believe that either the mirror or the astrolabe would have been made there. Also al-Muʿizz was a political opponent of al-Ashraf, and so ʿAbd al-Karim would not have included them both together in his inscription.

A more likely candidate is a younger brother of al-Ashraf, al-Malik al-Muʿizz Mujir al-Din Yaʿqub. Like other Ayyubid princes he carried a royal title, al-Malik al-Muʿizz, that did not necessarily reflect political authority, and I have found no evidence of him as an independent ruler. However, he was a loyal supporter of al-Ashraf, because when Akhlat was attacked by the Khwarazmshah leader Jalal al-Din in 625 (1228), while al-Ashraf was in Syria, he and another brother, al-Malik al-Amjad, defended the city on al-Ashraf’s behalf. The siege lasted nearly two years before the defense failed and the brothers were taken captive along with al-Ashraf’s Georgian wife in 627 (April 1230). They were not released until the autumn of that year, when al-Ashraf and Jalal al-Din agreed upon their freedom as part of a peace treaty. At some point thereafter, al-Muʿizz moved to Damascus, because he is mentioned helping al-Kamil, and then al-Salih, defend that city after the death of al-Ashraf (635/1237). He was later buried there. As an ally of al-Ashraf and without his own principality to rule, al-Malik al-Muʿizz frequented the cities of his older brother in the Jazira and in Damascus and would have had ample opportunity to commission work from ʿAbd al-Karim.

The last employer does not have a royal title, and Shihab al-Din is a common name. However, we can limit the field considerably, firstly because he must have been a person of considerable wealth and power. Although relatively minor individuals commissioned scientific instruments for their own use and these were often engraved with their names, the implication of this inscription is that Shihab al-Din had ʿAbd al-Karim in his service, which means that he probably had his own court. Second, we have a ten-year span in which to seek him. Assuming a chronological order in the listing of his employers, ʿAbd al-Karim was working for al-Ashraf in 625 (1227–28), then for al-Muʿizz; therefore he cannot have been working for Shihab al-Din before 627 (1229–30) at the very earliest. Obviously he was in his employ in or before 638 (1240–41), the date of the British Museum astrolabe. So we are seeking a powerful individual with a courtly setup who was active between 627 and 638 (1229–41), in or around the territories previously ruled by al-Ashraf in the Jazira or Syria.

Two individuals stand out. The first is Shihab al-Din Tughril, who was regent to al-Malik al-ʿAziz of Aleppo from 613 (1216) until 629 (1232), when his ward attained his majority, and who died two years later in 631 (1233). Shihab al-Din was an ally of al-Ashraf and was responsible for an alliance between him and his master al-Malik al-ʿAziz that would have facilitated the transfer of ʿAbd al-Karim’s services from one to the other. Individuals did carry his name as a nisba: for example, the Jami’ Sharifzada was built by Anaz Abi ʿAbdallah al-Shihabi in 615 (1218–19). He was also a known patron of metalwork: a ewer in the Freer Gallery was made for him in 629 (1232) by Qasim b. Ali, ghuṭām (apprentice) of Ibrahim b. Mawaliyya al-
Mawsili.\textsuperscript{42} But Shihab al-Din was noted for his piety, and it has been suggested that this is the reason the Freer ewer is without figural decoration, in which case he is unlikely to have employed an astrolabist who specialized in figural depictions. A larger obstacle is the date of his death, 631 (1233), seven years before the manufacture of the British Museum astrolabe in 638 (1240–41), because Shihab al-Din was almost certainly the current employer of ‘Abd al-Karim.

A more likely possibility is another younger brother of al-Malik al-Ashraf: al-Malik al-Muzaffar Shihab al-Din Ghazi. In 608 (1211–12) he was given Edessa (Urfa) and Saruj by his father, al-‘Adil. During this period he built a magnificent new gate for Edessa; known as the Harran Gate it bears stonecarvings of a man and a lion on either side of the entrance. In 617 (1220–21) he exchanged these cities with his brother al-Ashraf and received Mayyafariqin and Akhlat instead. The brothers were so close that al-Ashraf, who had no children, appointed him his heir and his viceroy in Armenia. Brotherly patience was tested in 618 (1221–22) when al-Ashraf went south to help al-Kamil and Shihab al-Din took part in a revolt against him. As a result, Shihab al-Din Ghazi was disinherited in 620 (1223) and limited to Mayyafariqin. Despite this rebellion, the brothers remained allies, and Shihab al-Din Ghazi was with al-Ashraf in 626 (1228) when he went to negotiate for Damascus with the head of the family, al-Kamil.\textsuperscript{43} Shihab al-Din Ghazi continued as ruler of Mayyafariqin until his death in 645 (1247).\textsuperscript{44} His long and relatively stable period of rule saw him actively investing in the infrastructure of Mayyafariqin: building a madrasa, enlarging the mosque, and improving the fortifications around the walled city.\textsuperscript{45} He regularly minted coins in the city and was also a keen patron of metalwork.\textsuperscript{46} An inlaid brass dish formerly in the Harari collection is inscribed with his name and titles.\textsuperscript{47} A spectacular inlaid basin in the British Museum is inscribed with the name of Shihab al-Din Ghazi and were probably locally made, perhaps in the same workshop as the two astrolabes by ‘Abd al-Karim and the ewer by his apprentice Iyas (fig. 6).

There is a problem with this identification: Shihab al-Din is the only patron listed on the astrolabe by his laqab rather than his regnal title, al-Malik al-Muzaffar, which he used on his coins and architectural inscriptions. This problem may not be insuperable, however, as the inscription on the Harari dish also omits it. The inscription reads:

\textit{‘Izz li-mawdūnä al-malik al-‘ālim al-‘ādil al-mu‘ayyad al-muzaffar al-mansūr al-mujīhid al-murāhit Shihāb al-Duray wá ‘Din Shāh Arman (King of Armenia) nāṣīr amīr al-mu‘minin.}\textsuperscript{48}

Even more telling, the historian Ibn Shaddad (writing in the third quarter of the thirteenth century) refers to him as Shihab al-Din Ghazi although he calls his sons by their royal titles, which suggests that this is how he was known locally.\textsuperscript{49} A parallel example of this is Badr al-Din Lu‘lu’ of Mosul, who was rarely referred to as al-Malik al-Rahim except on his coins and architectural inscriptions, and whose employees used his laqab as a \textit{nisba}—al-Badri or al-Maliki al-Badri—rather than his regnal title.\textsuperscript{50}

Like al-Mu‘izz, Shihab al-Din Ghazi could have employed ‘Abd al-Karim wherever he was based within the territories of his older brother and overlord, al-Ashraf. But this identification does raise the possibility that the location of ‘Abd al-Karim’s workshop was within the city of Mayyafariqin, where Shihab al-Din Ghazi was based most of his adult life. Mayyafariqin was an important metalworking center. New sources of copper were found just north of the city in the mid-twelfth century and were actively mined from then on. Probably as a result of the proximity of the metal supply, Mayyafariqin had a reputation for heavy cast objects; a large chain was ordered by the caliph at the end of the twelfth century.\textsuperscript{51} The door of the fort of Mayyafariqin was of solid brass, according to Ibn Shaddad.\textsuperscript{52} Coins were minted in the city. Two inlaid vessels bear the name of Shihab al-Din Ghazi and were probably locally made, perhaps in the same workshop as the two astrolabes by ‘Abd al-Karim and the ewer by his apprentice Iyas (fig. 6).

Al-Jazari’s treatise on the manufacture of automata, written between 595 and 597 (1198–1200) in the neighboring city of Amid, presupposes considerable metalworking skills in the area, including cast doors, sheet-metal vessels, and inlaid decoration.\textsuperscript{53} It comprises a variety of clocks and other timekeeping devices. The first and grandest clock features personifications of the zodiac arranged around a circle (fig. 9) that can be directly compared, in position and detail, to those on the back of the British Museum astrolabe (fig. 2). The designs are in mirror image, suggesting the use of transfers. Al-Jazari’s treatise was copied in some quantity at the Artuqid court in the early thirteenth century; copies were probably made as diplomatic gifts.\textsuperscript{54} One may well have been given to al-Ashraf, who was allied with the patron of al-Jazari, al-Salih Mahmud, at this time.\textsuperscript{55}

If my identification of the three patrons is correct, a direct parallel can be drawn between the careers of al-Jazari and ‘Abd al-Karim. Al-Jazari seems to have had “tenure” as inventor and metalworker at the Artuqid
court in Amid, moving from the employ of Nur al-Din Muhammad to his son Qutb al-Din Sökmen and then to another son, Nasir al-Din Mahmud. He lists these different family patrons in the introduction to his treatise. 'Abd al-Karim may also have been employed by three members of a family, in his case three Ayyubid brothers, over a period of at least thirteen years. Perhaps the highly unusual list of three different patrons on the astrolabe, including one who had died, is a direct parallel, albeit in a different medium and a more abbreviated form, to al-Jazari’s account in the introduction to his treatise of the family members who had employed him.\textsuperscript{56}

In summary, the fundamental problem of this inscription is that there are no individuals with the titles al-Malik al-Ashraf or al-Malik al-Mu'izz in Egypt in or before 638. Van Berchem evaded the issue by suggesting that the date is wrong and should be ignored. Mayer, believing that the inscription had been re-engraved at a later date, confirmed that there could be errors in the inscription. But although faint and difficult to reproduce, the inscription is actually quite clear, and despite being filled with brass, the forms of the letters have not been tampered with. It is surely unlikely that a deeply engraved documentary inscription on a scientific instrument would contain errors of a factual nature. A more obvious solution is that our interpretation of the inscription is at fault. The reading of the titles is indisputable and their identification with three

\begin{figure}
\centering
\includegraphics[width=\textwidth]{basin.png}
\caption{Basin, brass inlaid with silver and copper, with the name of al-Nasir Yusuf II (r. Aleppo 634–58 [1237–60], Damascus 648–58 [1250–60]) added on top of the name of al-Malik al-Muzaffar Shihab al-Din Ghazi. Mayyafariqin, 617–642 or 645 (1220–1244 or 1247). H. 21 cm, diam. 41 cm. Museum of Fine Arts, Boston, 50.3627, Gift of Mrs. Edward Jackson Holmes.}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{design.png}
\end{figure}
Ayyubid brothers, all active in the Jazira, highly likely. The new reading of the date as 638 (1240–41), confirmed by *abjad* letters used elsewhere on the instrument, does not affect the issue. The crux of the problem has to be the word at the beginning of line 3: *bmãr*. It cannot mean “in Cairo.” That is confirmed by its strange position between the names of the craftsman and his employers and the unusual omission of *al-mahrûsa*. Until a parallel use of this word is discovered, its interpretation, and the interpretation of the craftsman’s *nisba*, which may be related to it, will remain speculative.

The final puzzle of this inscription is why two-thirds of it was so carefully obliterated. I emphasize that this is not an inscription inlaid for decorative effect (as described by past scholars). There is no doubt that the intention was to eradicate it; brass of the same color as the body of the vessel was inlaid into the deeply engraved channels of the inscription, the edges of which had been made jagged both to hold the inlay in place and to blur its outlines. When first done, this part of the inscription must have been quite invisible; the only reason that we can see it at all now is that the brass inlay, made from a separate batch of metal, has discolored in a slightly different way than has the body of the astrolabe (fig. 3).

The motive for erasing these four lines must have been to obscure the names of the patrons of the craftsman. If the date had been the problem, only the last two lines would have been erased. Reasons for hiding the identity of the patrons depend on whether this concealment was done by *ʿAbd al-Karim* himself or by order of Shihab al-Din or a later owner.

*ʿAbd al-Karim* could possibly have been using the astrolabe as an example of his work while seeking employment. That might explain why the patrons are listed so briefly, without a proper dedicatory inscription: the astrolabe was not made for any of them but was intended as a sort of medieval *curriculum vitae*. Perhaps when he engraved the inscription, *ʿAbd al-Karim* was hoping for employment with another member of the Ayyubid family and thought that including his past Ayyubid patrons would be an advantage. When that failed he obscured the names so that he could seek employment with the Seljuqs or Mongols, both enemies of his past masters.

Appealing as that theory is, the true explanation is probably more mundane. There are many examples of medieval metalwork with altered inscriptions; usually such alteration occurs because an object was to be given to somebody else by the owner or sold to someone new by the craftsman because the original patron had defaulted or died. In this case it seems most likely that the astrolabe was to be a recycled diplomatic gift and the donor wished to disguise its second-hand status. The middle of the thirteenth century was a period of great instability in the Jazira, with incessant rounds of diplomacy that must all have required high-level gifts. Shihab al-Din Ghazi and his son al-Kamil Muhammad, who succeeded him as ruler of Mayyafariqin in 642 or 645 (1244 or 1247), were constantly threatened with invasion by the Seljuqs and Mongols. One of the most serious threats was in 638, the year that the astrolabe was made, when a Mongol Embassy demanded the surrender of Mayyafariqin. Shihab al-Din Ghazi persuaded them to desist, but who knows what bribes he had to present to the Mongols in order to save his city?

The Boston basin is one example of an object that was recycled at this time (fig. 8). It was originally made for Shihab al-Din Ghazi and bore his name and titles in the bold inscription running around the inside and outside. Later the pertinent parts of the inscription were adapted for al-Nasir Yusuf II (r. 634–58 [1237–60] in Aleppo and 648–58 [1250–60] in Damascus), but now that the inlays have fallen out one can see the original engraved lines of his regnal title—al-Muzaffar—beneath the added al-Nasir, and his name—Shihab al-Din Ghazi—in the final section of both inscriptions. The basin was probably one of the gifts that al-Kamil Muhammad took with him when he went to Damascus in 656 (1258) in order to forge an alliance with al-Nasir Yusuf against the Mongols.

Al-Kamil Muhammad also sent embassies to the Mongols in vain but ultimately useless attempts to halt their invasion of his territory. In 650 (summer 1252) he sent his brother to petition Batu, the Mongol ruler of southern Russia and the Caucasus, to intervene and stop the invasion by the Seljuqs or Mongols, both enemies of his past masters.

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THE INSRIPTION ON THE ASTROLABE BY 'ABD AL-KARIM

NOTES

Author’s note: An early version of this paper was presented at a conference entitled “Zangids and Ayyubids: Art and Patronage in Syria and the Jazira,” on November 18, 1998 at the School of Oriental and African Studies, London.

1. British Museum, Department of Oriental Antiquities 1855.7–9.1.
2. There is no history of the astrolabe before 1855, but “P.G.4.”, engraved just below the throne on the front, must refer to an earlier European owner, presumably the same individual who had the months and zodiac identified with engraved Latin abbreviations. “P.G.” could be Pascual de Gayangos (1899–97), the Spanish historian who wrote on Islamic Spain and translated al-Maqari for the Royal Asiatic Society. His large and varied collection was given to the Real Academia de la Historia, Madrid, by his heirs in 1898. It included at least two Arab astrolabes (Franco Garcia, “Astrolabio,” Boletín de la Real Academia de la Historia [1955]: 298–311, figs. 1–6).
3. The unusual abbreviation of Latin October to “OCTU” (rather than “OCTO”) may be after the Spanish “Octubre.” Other contenders are Petrus Gyllius, the French physician who was in Istanbul in the early sixteenth century (although the engraving is probably too modern for the sixteenth century), or the French draftsman Philibert Joseph Girault de Prangey (1804–92), who traveled throughout the Middle East for his Monumentos arabe de Egypte, de Syrie, et d’Asie-Musulmane dessinés et mesurés de 1842 à 1845 (Paris, 1846–55). My thanks to Stephen Verneot for his help in tracking down the owner of these initials.
5. S. Lane Poole, The Art of the Saracens in Egypt (London, 1886), p. 177.
9. Gunther, Astrolabes, p. 233 and pls. LIII–LIV. This astrolabe should have been better known, as it was exhibited in Paris in 1900 and published by L. Evans, “Some European and Oriental Astrolabes,” The Archaeological Journal 68 (1911): 227.
15. Istanbul, The Maritime Museum, no. 264: D. King, “The Monumental Syrian Astrolabe in the Maritime Museum, Istanbul,” in Aydın Sayılı Özel Sayısı, part two of a three-part special issue of Etdem (Ankara, 1996–97), pp. 729–35 and 10 pls. I am grateful to Professor King for sending me the typescript of this article after discussing the group with me in 1994, when both our articles were already in press.
20. For example, the near contemporary Malcolm globe in the British Museum, dated 674 (1275–76), which is signed by Muhammad b. Hilal al-munaqīm (the astronomer) al-Mawsili (of Mosul). See Mayer, Astrolabists, for numerous other examples. There are exceptions, however, including the Istanbul astrolabe dated 619 (1222–23), which is signed by ‘Abd al-Rahman b. Sinan al-Bal‘abaki al-Najjar: see King, “Syrian Astrolabe.”
22. Analysis of the Oxford astrolabe was by Susan La Niece of the British Museum Research Laboratory, in association with Silke Ackermann of the British Museum; they plan to publish their results. There were close links between scientists and metalworkers. Shuja‘ b. Man‘a al-Mawsili, who made the Blacas ewer in Mosul, was from a family of mathematicians. Al-Jazari was both inventor and maker of automata and apparently was well used to all metalworking techniques. The inlayer of the Istanbul astrolabe is also known to have made three astrolabes (King, “Syrian Astrolabe,” n. 10). Mayer (Astrolabists, p. 21) points out that astrolabists had to have a thorough knowledge of metalworking techniques. He also lists nisbes that indi-
cate links between astrolabists and metalworkers.

23. Curiously, the Oxford astrolabe by 'Abd al-Karim includes the definite article for al-hijriyya, but the British Museum astrolabe does not. The lack of the definite article is a feature of other scientific instruments made in Syria and the Jazira in the thirteenth century, and so this may be evidence of 'Abd al-Karim taking time to adapt to local custom.


25. An undated early note in the archives of the Department of Oriental Antiquities in the British Museum omits all but the top of the șadd and the ʼāyn, as if the rest was not visible at that time.


27. Thomas Leisten has told me that he has come across “Misr” on a Harari collection item, but the British Museum astrolabe 764/1362–63, lists him without his own territory.


29. Al-Ashraf had a strong interest in science, astronomy, and astrol- ogy: the inscription on the Oxford astrolabe makes it clear that he himself ordered it. He consulted astrologers before setting time.


32. Humphreys, From Saladin to the Mongols, pp. 196, 219–26, 216.


34. Al-Ashraf arrived in Damascus in August 1228 and stayed until November of that year, when he went to negotiate with al- Kamil at Tall al-Ajul and stayed with him two months: Humphreys, From Saladin to the Mongols, pp. 73, 219, 226.


36. Humphreys, From Saladin to the Mongols, pp. 73, 219, 226.


38. “Every prince of the blood carried a title al-malik; such titles implied nothing whatever as to political authority”: Humphreys, From Saladin to the Mongols, p. 308. Ibn Wasil, Mufarrīj al-aʿlām min al-ahdhāʾ, ed. G. Shayañ, 2. “Ashur, and H. Rabi” (Cairo, 1953– ), vol. 3, p. 274, lists him without his own territory.

39. Al-Malik al-Muʿizz was buried in the Madrasa al-ʿAdiliyya in Damascus in the days of Salāḥ al-Dīn Yūsuf (1250–60), according to Ibn Wasil, Mufarrīj, vol. 3, p. 220.

ence, Oxford, no. 2900: see Mayer, *Astrolabists*, pl. XI. It has the craftsman’s inscription engraved over another, erased, inscription that included the name of the patron. The newer inscription includes the signature of the craftsman, which suggests that he was responsible for the erasure. There are many examples of Mamluk metalwork being recycled for a new owner, including several objects that were reengraved with the names of the Rasulid Sultans of the Yemen, presumably because these objects were diplomatic gifts.

61. The famous observatory was founded at Maragha in 657 (1259), only seven years after this embassy.