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The Newsletter of Dar al-Athar al-Islamiyyah (DAI) is intended to share the wealth and beauty of Islamic culture contained within the extensive and comprehensive Al-Sabah collection of Islamic art, ranging from Early Islam to the 18th century, and the variety of scholarly and artistic activities associated with the collection.

The collection itself is organized according to both historical period and geographical region, and the reference library and the publications of the Dar are closely related to the collection.

The Dar has sponsored archaeological excavations in Bahnas, Upper Egypt that date to the Fatimid period and, before the invasion, the art school associated with the Dar promoted skills in the various artistic genres that are represented in the collection. At present, our annual lecture series has been revived and is a focal point for historians and other specialists, featuring talks by prominent international scholars on various topics of Islamic art, archaeology and architecture.

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Islamic Art in War and Peace: A Kuwaiti Experience

A definite sign that the Dar is back! Sheikha Hussah Sabah al-Salim al-Sabah, the Director of Dar al-Athar al-Islamiyyah, travelled to London, Oaxaca (Mexico) and Beirut, in October 1996, to attend conferences and deliver lectures.

The DAI Director began her October 1996 activities with a lecture in London on Islamic Art in War and Peace: a Kuwaiti Experience. This was delivered at the Kuwaiti Embassy, as part of a Cultural Season organized by Professor Ibrahim al-Rifa'i, the Cultural Counsellor and Head of the Cultural Office at the Embassy. The lecture was attended by a gathering of Arab diplomats in London, headed by the Ambassador of the State of Kuwait Khalid al-Duwaizan, and a number of experts on Islamic art.

As the title indicates, the lecture was concerned not only with art, but was also rich in history, both of certain Islamic works of art, and of Kuwait during the ordeal of Iraqi occupation. Sheikha Hussah spoke about the history of Dar al-Athar al-Islamiyyah, and how it developed from a private family collection of works of art and became a scholarly institution to study and appreciate the achievements of a civilization. Like Kuwait and its people in general, the Dar suffered losses and destruction from the Iraqi invasion and occupation in 1990-91. Many of its art treasures were looted and taken to the Iraqi National Museum. Sheikha Hussah backed up her lecture with color slides showing how, after the defeat of the invaders, many of the treasures were returned to a Kuwaiti team, under the supervision of the United Nations.

However, sixty of the art treasures were not returned. In the case of one of these, a jewelled dagger from the reign of the Mughal Emperor Jahangir (early 17th century), there was a happy ending: it turned up in an auction at Sotheby's in London, was identified and returned to Dar al-Athar al-Islamiyyah's collection. But other works of art have not yet been traced and are still missing.

Ninth World Congress of the Friends of Museums

On the recommendation of Ms. Anne Van Devanter Townsend, the President of the Trust for Museum Exhibitions in Washington DC, an invitation was extended to the Director of Dar al-Athar al-Islamiyyah to attend the Ninth World Congress of the Friends of Museums held in Oaxaca from 21 to 25 October 1996, under the patronage of the President of Mexico. Sheikha Hussah al-Sabah joined the World Federation of Friends of Museums as a Benefactor Member more than three months before the Congress was held.

Activities in the Congress included an opening address by Carlos Fuentes on Mexico and its culture, round table discussions on various aspects related to museums and the role that Associations of Friends of Museums can play, with much emphasis on modern technology and museums in the future, as well as an exhibition of Nine Contemporary Oaxacan Painters. Eminent organizers of the Congress and participants in it included Ms. Carla Bossi Comelli, Secretary-General of the World Federation of Friends of Museums (WFFM), Ms. Margarita Valero, Assistant to the WFFM, Ms. Marie Therese Hermand de Arango, President of the Asociacion de Amigos, Mexico, and Ms. Beatriz Russek.

Artistic Genesis in Wood and Stone

In Beirut, the Director of Dar al-Athar al-Islamiyyah delivered a lecture on Artistic Genesis in Wood and Stone: Examples from Dar al-Athar al-Islamiyyah, at the invitation of the American University of Beirut (AUB). It was attended by a distinguished audience.

Sheikha Hussah spoke about how the Al-Sabah collection grew up, and how it was given as a loan to the National Museum to house it. She spoke about the losses which the collection suffered from the Iraqi invasion in August 1990. Most of the collection was lost, and a fine example of artistic work in stone was destroyed by vandalism: a pair of 14th century wooden doors from Morocco which had once been the focal point.
The Visit by the Director of the DAI to the United Arab Emirates

The Director of Dar al-Atwar al-Islamiyyah, Sheikh Hussah Sabah al-Salam al-Sabah, delivered a lecture at the Centre for Documentation and Research of Abu Dhabi’s Cultural Foundation. The distinguished people who attended the lecture included HH Sheikh Abdullah ibn Zayid al Nahayan, Minister of Information, Mr. Mohammad Ahmad as-Suali, Dr. Frauke Heard-Bey of the Centre for Documentation and Research, her husband David G. Heard OBE of the Abu Dhabi Petroleum Co. Ltd., Ms. Hoda Al-Khameese Kanoo, Paula al-Askari, Dr. Wolfgang Lanz of the Austrian Embassy, and Mr. J.F. Walker, Counsellor at the British Embassy in Abu Dhabi.

Sheikhess Hussah spoke in detail about some notable cultural casualties of the Iraqi invasion: three emeralds from the Mughal Empire. She began by discussing a distinctive feature that was "the essence of spirituality" of Mughal culture and inspired many of its works of art: the desire to create something like Paradise on Earth. On the northern and southern arches of a hall in Mughal Emperor Shah Jehan's palace in Delhi was inscribed the sentence: "If there is a Paradise on the face of the Earth, it is here, here, here". Taking as a guide the passages from the Holy Qur'an that describe Paradise as a garden with shaded rivers, Mughal art took scenes of greenery and natural beauty as its ideal. Green is also the colour of emeralds, and the Mughals developed an enthusiasm for this type of gem. The age of the Mughal Empire coincided with the Spanish colonizers’ exploitation of the emerald mines in Colombia, which produced the finest quality emeralds, and the Mughal Court became a leading customer of these mines. European jewel merchants used to sell it Colombian emeralds, and buy Indian diamonds which were in demand in Europe. As Sheikhess Hussah explained, the first emeralds mined in Colombia in the 16th and 17th centuries were very large, but as the mining proceeded down from the surface, the gems became smaller. Most of the emeralds bought by the Mughals were large, from the earlier mining operations. Dar al-Atwar al-Islamiyyah had three particularly fine Mughal emeralds before the Iraqi invasion.

The beautifully engraved hexagonal Bibi Emerald, weighing 234 carats, dating from the time of the Mughal Emperor Akbar (ca. 1585 AD). The Kidney-Shaped Emerald, weighing 109.7 carats, with a spreading poppy pattern engraved on it. This dates back to the Emperor Jahangir (1625 AD). The Throne Verse Emerald, weighing 73.2 carats, with the famous Throne Verse from the Holy Qur'an inscribed on it in naskhi script. This emerald is valued particularly for both its quality as a gem, and the fine script on it, which is expertly proportioned to accord its hexagonal shape.

They were among the items looted by the invaders that have not been returned, and it is still not known what has happened to them.
The Adoption of Islamic Ornamentation
In Western Art

The significance of Islamic influences in Europe in the early medieval period

Abridged from a lecture by Dr. Karin Ådahl

RELATIONS between the Islamic world and Europe have interested me since I began my studies in Islamic art, particularly the influences which reached as far as the Nordic countries. In my book, Oriental influences in Sweden (1990), a survey of contacts and influences over more than a thousand years from the Viking period until the early 20th century, I made an analysis of objects brought to Sweden by diplomats or transferred through Europe in different contexts until they finally arrived in the North.

A language of forms could be traced, threading through many media, including metal-work, textiles, manuscripts and miniatures, which imitated and reinterpreted Islamic ornaments and calligraphic borders. These were sometimes used as complete patterns but more often only as fragments.

The term "Islamic ornamentation" in this context signifies a vocabulary of decorative forms used in art and architecture in the Islamic world, particularly in the Mediterranean region and the Near East. The ornament can be one specific element, like a geometric star shape, the split leaf or a Kufic Arabic letter, or complete patterns like the arabesque, interacing geometric ornaments and borders of inscriptions.

In art and architecture ornamentation is essential in distinguishing period and cultural style. Applied decoration carries a significant identity which can be used to emphasize or imitate a style. The styles and expressions of Islamic art spread with Islam into Europe through Spain and further north into France, and from Sicily into Italy.

The influence of Islamic art and the styles which were created as a consequence in Spain and in Sicily are well known and identified.

Further expansion of this influence, the routes along which it was transmitted, and how it was integrated into a foreign context is less known.

The evaluation of the influences can be made from quantitative aspects or regarding quality and the degree of consciousness by the artist of the Islamic identity of the given ornaments which were used.

Spain

Although Muslim influence mainly dominated the southern part of Spain, there was a considerable impact on architecture and the arts also in northern Spain, and mosques were built as far north as Catalonia, for example in Zaragoza and in Lerida.

The dominating ornamental forms were the arabesque, built mainly from a vegetal, growing, symmetrical form where the split leaf constitutes the main element, single or juxtaposed, sometimes with elongated tendrils; furthermore the geometric star patterns and finally Kufic and, later, curvise inscriptions were used in combination with these ornamental decorations or as independent ornaments also carrying a literary message, usually from the Qur'an. Inscriptions could
also be used in an abstract form which only gave an allusion to real script.

**Medieval Period in France**

In the 8th century Muslims advanced into France as far as Lyon. Islamic influence in the arts, and also in decorative elements in architecture, spread from Spain into France through trade, war, and pilgrimages to Santiago de Compostela, and by artists moving between different regions. It can be traced in different media, in architecture, in objects of precious value, in textiles and in the decorative use of ornaments borrowed from the rich Islamic vocabulary of forms observed in manuscript illumination and book covers.

The Andalusian architectural style had by the 11th century been adopted in the Mozarabic style in the north of Spain. The many encounters during raids from France into Spain brought the French into immediate contact with this architecture and possibly also with the Mudéjar style. The French also brought booty into France and possibly artisans as captives.

The influence in architecture was mainly expressed in Andalusi features in structural and decorative elements in ecclesiastical buildings. In the arts, influences were transferred through objects which were brought from Islamic countries, mainly textiles and portable objects like caskets of ivory and metal, or travelling along trails of influences in a constant process of receiving, merging and transforming.

Several elements of Islamic origin can be observed in French Romanesque architecture, e.g., in the lobed arches, a feature found in Western Islamic art in the 10th-century addition in the Mezquita in Cordova. Such features appear in the cathedrals of Le Puy (Haute Loire) and Moissac (Tarn et Garonne) and reappear, with the help of many intermediaries, as far north as in Romanesque architecture in the island of Gotland in Sweden. This fact poses many questions as to the transmission of influences. Another element which could be observed is the roll corbel which was spread as far north as Paris.

To this could be added the striped, red and white arches which appear, for example, in Vezelay. This is a characteristic feature of Umayyad or possibly pre-Islamic origin in Spain but found in the oldest 8th-century part of the Mezquita in Cordova.

The decorative elements appear as rosettes and foliage and most important as calligraphic inscriptions and decorative borders apparently based on stylized Kufic letters. (St.-Sever, Mourens, Saint-Pierre de Rhèdes)

The wooden doors in Auvergne where Arabic script has been used both in its original form, as in Vezelay, and in mock calligraphic borders as pure decoration, as in Moissac are of significant interest in this context. The most characteristic decorative ornament, the arabesque and the split leaf, appear as patterns or in parts as single decorative elements.

**Sicily and the Italian peninsula, particularly Apulia**

Islamic influence in Italy is of a twofold character: the Islamic art in Sicily which was created under Muslim rulers and closely related to its Islamic origins, and the more distant influence in south Italy which spread north from there. While in Sicily architecture and its decoration were of major importance, the Islamic influence in mainland Italy passed through other media, mainly as decorative elements in architecture, and ornaments or calligraphic inscriptions in the arts. Figurative components in reliefs and textiles for example, which may

![Image of architectural details](image-url)

Influential elements can also be studied through the different artistic media:

- architecture
- structural forms in arches, vaults and domes
- decorative elements
- repertoire of ornaments in Romanesque churches
- portable objects
- textiles and embroideries
- illuminated manuscripts

A distinction should be made between:

a. decorative ornaments: geometric patterns and arabesques in complete repeated patterns or used as single, detached elements.

b. calligraphic borders, i.e., inscriptions which can be read, and mock Arabic or Kufic borders.

c. borders and patterns which imitate Arabic script in a completely stylized, abstract manner, making only an allusion to the original model. To those who are not familiar with the characters of the Arabic script these purely ornamental borders may be difficult to interpret as originating in script.

d. repeated patterns, for example of medallions including representations of animals, real or mythological.
express an Islamic influence, however, are of a character which is difficult to attribute with sufficient security to an Islamic or Byzantine origin. This category will be analyzed separately.

When the Norman rulers invaded Sicily in the late 11th century, many Muslims remained in the island and the new patrons soon acquired a taste for sophisticated Islamic art. Muslim cultural influence remained strong, and Muslim architects and artisans were kept to work for the new masters. The cathedrals in Palermo and in Cefalu bear witness to the mixture of styles but also to a strong influence from Fatimid art and figural representation.

Muslim influence spread into the south of the Italian peninsula, mainly Apulia. It can be traced through Italy to Lombardy and from there further into northern Europe.

Eastern cultural relations and influence through Russia

An early Islamic influence in Russia, from the 9th century until the 11th century, was primarily from the eastern Islamic countries and mainly Iran. The Rus, travelling in their boats along the Russian rivers, carried objects further north as far as Scandinavia, mainly Sweden.

The objects brought back appear to have been surprisingly few, but traces of influences can still be noticed in Viking dress and in ornamental borders applied to dresses and other garments. Viking travels ceased in the 11th century with the arrival of Christianity in Scandinavia and the Islamic impact was limited to a short period with influences which are difficult to interpret. Objects appear to have been brought mainly for utility reasons, while stylistic influences were part of a process of imitation of the refinement of Oriental cultures.

Anatol Ivanov has written about the influence in medieval Russia that the contacts between the Old Russian empire with its capital in Kiev and Islamic countries were not direct or frequent. The findings of Islamic objects from the 10th to the 13th centuries on that territory are few. Therefore we cannot expect an important influence of Islamic ornamentation. The art of the Old Russian empire was under strong influence of Byzantine art, because Russia accepted Christianity from Byzantium. The Mongol invasion in the
Eastern origins and were in close interaction for centuries. The preference for certain motifs and the composition of patterns, however, particularly in the repetition, as well as the rendering of details such as in plant-theme ornaments, could make a distinction between different styles possible, although not always evident.

Near Eastern, Islamic characteristics in the south of Sweden, particularly in the cathedral of Lund, are related to a possible transmission of influences from Lombardy through Germany, while features in the small parish churches in Gotland can be connected with influences from Romanesque churches in France, originating in Spain.

The textile patterns with animals in medallions of an obvious oriental origin, appearing in the thirteenth century and spread over Sweden from Scania in the south to Jämtland in the north, are of paramount importance.

Time and space

Relations between the Muslim world and Europe can be divided chronologically from the early relations of the 8th and 9th centuries to the period of Romanesque, Gothic and Renaissance art, where influences converged from different origins and through different media. Factors of influence could also be examined geographically, different styles and expressions identified, chronologically and geographically, and consequently, a more precise map of influences can be established.

The patron and the artist - the role of the individual

The identity of the artists in Italy or France who provided the Islamic ornaments, patterns or calligraphic borders is not known. The possibility cannot be excluded, however, that there were Muslim architects and artists, or artisans, working in Italy together with local workers. It must be assumed, however, that Italian artists used a foreign repertoire of ornaments and patterns.

In France it seems more likely that the artists who used these foreign elements in their decoration of architecture or artifacts were Christian artists who had picked up foreign influences as an aesthetic improvement and integrated these influences into an already well-known context. These patterns easily adapted to other forms of ornamental decoration and were appreciated mainly for the aesthetic values of Islamic art.

Germany, England and Scandinavia

Different media were the vehicles for the transfer of Islamic motifs from France and northern Italy into northern Europe, and "Oriental" influences in religious art, as well as secular applied arts, can be found as far north as Scandinavia. There the extent of the Islamic impact on the arts is an interesting matter of dispute.

European scholars, and in particular Swedish art historians, with an Occidental and Christian perspective, have looked on Oriental influences in medieval Scandinavian architecture and art as of mainly Byzantine origin. Nevertheless, this has been challenged by scholars such as Johnny Roosval, who noted a Near Eastern, Seljuk origin for the polylobed arch found in churches in Gotland.

The relation between Byzantine and Islamic ornamental decoration is close also in this context, since they both developed from the same Near
THE Hermitage possesses a rich collection of Islamic bronzes, and one of the best, if not the best, collection of Safavid ceramics. Its collection of Persian painting was previously considered insignificant, but, after serious study, it is evident that there are many Persian paintings of high artistic workmanship in the Hermitage, as well as minor pieces with interesting iconography.

In a recent publication I suggested a somewhat new approach to the problem of periodization of Persian painting. Periodization by dynasties, sometimes in a more detailed way by the reigns of individual rulers, with further internal division by schools of court painters, labelled with the names of capital cities, prevails in previous research. This is fully justified: painting in Persia was always the principal form of representational art, evolving as a court art under the direct patronage of rulers. Yet, at one and the same time there existed different types of painting in Persia (wall-painting, book-illustrations, miniatures and drawings on single sheets, lacquers, enamels, oil-painting etc.). In each period a specific genre would dominate, coming to express the aesthetic norms of its time and alter opinion on the artistic image and the painter's skill. Monumental painting in pre-Mongol and Mongol Iran was eclipsed in the 15th to the first half of the 16th century by the art of the book and book illustration. From the mid-16th to the late 17th century the predominant form of representational art was miniatures, drawings on single sheets and the associated art of composing albums (murāqqa'at), followed by painting in oils on canvas, a technique borrowed from Europe, in the 18th and 19th centuries.

A manuscript of the Khamsa of Nizami from the Hermitage collection is generally recognized as one of the masterpieces of the art of the illustrated Timurid book. It was copied in 1335/1431 at Herat by calligrapher Mahmud for Sultan Shahrukh (1405-1447).

This securely documented poetical manuscript created for Shahrukh shakes the universal opinion that this ruler was fond of only historical works and that he supported in his atelier a specific archaic historical style, looking back to the early 14th century book-illustrations. On the contrary, this Khamsa is a classical work, its illustrations reflecting the characteristics of the fully developed Timurid painting of the first half of the 15th century.

This manuscript of 38 miniatures brilliantly reflects the emotional resonance and content of each of Nizami's poems. Miniatures illustrating the poem "Seven Beauties" are among the most beautiful. An interesting feature is how exactly they correspond to Nizami's text. In these miniatures, representing Bahram Gur in the Red, Yellow and White Pavilions, the composition is always the same, but the interiors are beautifully worked out in their ornamentation and in the aspect of color combinations.

A remarkable feature of this manuscript is the unity of the text with the illuminations and illustrations. The text is written in three columns, one of them narrow and written diagonally. The painter uses this peculiarity of the text layout in a very original manner. For example, in the illustrations of the seven pavilions, the diagonally written text makes the interior more spatial.

Some miniatures in this manuscript are not original creations. "Shirin sees the portrait of Khusrav", "Farhad carries Shirin and her horse", and "Battle of the clans" proved to be repeated from the famous Shiraz Anthology, dated 1410, kept in the British Library. Although the masters often repeated compositions from older manuscripts, it was not expected to find repetitions in a royal manuscript, creat-
ed for Shahrukh. In another manuscript of royal quality, the famous Shahnama, created for Baysunghur in 1430, three miniatures also had earlier prototypes.

Traditionally the repetitions are explained in scholarly literature by the movements of artists, manuscripts or libraries from one court to another, or by the existence in the royal workshops of albums with sketches and stencils. It explains only how such repetitions could appear, but does not explain why. Certainly it could not be that the masters wanted to simplify their work, or to complete it quicker, as might be appropriate for commercial manuscripts.

Further examination revealed that many compositions in this Khamsa manuscript were original creations. It became clear that the repetitions were not plagiarism and were not accidental, but rather an aesthetic norm. In each royal manuscript there had to be repetitions of the works by the older masters. It was like paying homage to the famous predecessors. Only on this background of showing respect to tradition could the painter, the Timurid master, try his skill in creating new treatments of classical subjects and in the depiction of new themes, which might themselves be repeated in future works. This remarkable system maintained tradition and at the same time guaranteed constant renovation. One never finds two Persian illustrated manuscripts that have absolutely the same set of subjects and compositions, even among commercial manuscripts. This observation about the nature of repetition of compositions helps me to understand better the miniatures and drawings on single sheets.

From the mid-16th to the late 17th century, paintings and drawings on single sheets and compilation and decoration of albums (muraqqa) become the main type of painting at Persian courts. The muraqqa became a sort of picture gallery in miniature scale with specimens of calligraphy and paintings in beautifully illuminated frames and borders, and had become the object the rulers desired. The illustrated manuscript had lost its status and returned to its initial function - mere illustrations for books. Unfortunately the majority of albums, created in Persia in 16th-17th centuries, have been dispersed and their leaves are scattered among world collections, which makes the study of the art of muraqqa especially difficult.

The Hermitage possesses a good collection of miniatures and drawings on single sheets - 144 in all - and a muraqqa, assembled and adorned at the end of the 18th century. The most famous among these materials are three works of Riza-i Abbasi, the celebrated artist of the late 16th-early 17th centuries. They belong to various periods of his activity and illustrate different facets of his talent. "Youth Holding a Bottle", one of his earliest works, "Girl in a Fur Hat", dated 1011/1602-3, and "A Convivial Party", executed in 1020/1612, a complex composition with many figures, displayed on two pages. These works show well this master's concern for creating vivid concrete images and scenes which give the impression of having been drawn directly from nature, with many precisely observed details. The works of his pupils and successors from the Hermitage collection show how well they assimilated their master's technique of free broad drawing and his love of playing with bright colors. Creating their own versions, they evidently wanted people to recognize the work of Riza-i Abbasi. This is the phenomenon of repetitions, as mentioned earlier, in connection with manuscripts.

The three paintings by Riza-i Abbasi from the Hermitage collection were also many times repeated. It is well known that in Persian painting of the 16th-17th centuries themes are relatively few in number, and there are usually many variations on them. Examining chains of variations of these and other motifs reveals the importance of each link. The comparison of many versions helps to date a certain work, to attribute it to an art style or to an artist. Sometimes it also helps to understand the subject better.

For example, in the 16th century the motif of the prisoner was very popular. I have noted about 15 versions of this subject, and when collected in this way, they divide into two groups: in one, the prisoners are shown wearing a felt hat; in the other they wear a turban. Evidently they represent two different traditions. The Hermitage "Prisoner" belongs to the first group. It is mounted on an album folio and on its mounting there are two inscriptions in Persian and in old Russian, and these inscriptions show that the traditional identification of the represented personage as Murad Aq-koyunlu had already existed in the 18th century. In 1603 Shah Ismail I, the founder of the Safavid dynasty, defeated this Turkman ruler. The importance of this victory over the most powerful rival of the Safavids explains the popularity of this subject in Safavid painting. It would be interesting to know who could be repre-
sented as a prisoner wearing a turban.

Studying the sequences of repetitions of the same image, it is evident that there are mirror versions among them. For example, prisoners sometimes face to the left or sometimes to the right. It is generally believed that the masters must have used tracings and the direction of the image depended on how the master placed the tracing. It must be said, however, that it was not accidental. The miniatures and drawings on separate sheets were created to be placed in albums, they depended on each other and had to obey the principle of mirror symmetry, one of the rules they had to follow working on the albums. On opening the albums, the personages depicted on the two facing miniatures look at each other, and, in the album in the Hermitage, there are openings with identical images on facing pages, one of them in mirror reverse. Possibly the repetitions from the works by the old masters, included in the albums, were done in the process of working on them.

The paintings and drawings by the great masters, repeated many times, became widely known everywhere throughout the Muslim world. The compositions, when the originals had been lost, were preserved in copies. This was an invaluable role of repetitions, comparable to the role of engravings in Europe. Besides that, it seems to me the role of qalam and of the practice of repetition in the processes of interaction of different schools, masters' styles etc., has not yet been properly understood. The albums usually included works by masters of different countries, and the works by foreign masters were especially often copied. Interrelation and interchange of ideas, themes and devices took place constantly and most effectively through repetition.

In literature foreign influence in the works of the Persian artists of the 17th century is usually connected with artists' travels. Of particular interest, therefore, is a portrait of an Indian prince from the Hermitage collection (undoubtedly copied from an Indian miniature), signed by Baha ud-Din Gilani and dated 1661/1662-1 with a note that it was done in Isfahan.

There are many works in the collection which demonstrate the main trends in Persian painting in the second half of the 17th century and shed new light on the problem of growing foreign influence, principally from Europe and India. In "Monkey riding a bear" by Muhammad Ali, a 17th century master, the technique resembles European grisaille in its usage of the tonalities of the same color.

Directly relevant to the topic of foreign influence, both European and Indian, are the miniatures of Shaykh Abbasî, "Woman in Indian Dress," dated 1694/1682-3 and "Woman Holding a Cup and a Decanter," by his son Ali Nasî of 1692/1681. Stiffness and formalized rigidity in the representation of the figures, pronounced chiaroscuro and modelled volume anticipate the style and technique of the following period.

In the 18th-19th centuries painting in oils on canvas, a technique borrowed from Europe, takes precedence. It established canons in the artistic life of the country and exerted influence not only on other forms of painting, but also on applied arts. This miniature by the painter Bahram Naqshbandi represents Nadir Shah Afshar (his name and titles as well as the name of the artist are written in cartouches) as a heroic monumental figure. Free broad strokes of brush in this miniature show the exploration of the techniques of oil-painting. This work is not of a very high artis-
tic workmanship, but it is interesting because it is dated 1156/1743-44, and this is the only known dated lifetime portrait of Nadir Shah (1736-47).

The best paintings of the 18th century in the Hermitage collection are in lacquer technique. Especially interesting is a casket, dated 1190/1776-77, decorated with many figured compositions, divided into two parts, as if symbolizing two worlds - Muslim and Christian - living in peace. The subject obviously reflected the ideas and general feeling of the time of the reign of Karim Khan Zand (1752-79). The complexity and masterfulness of the composition suggests that this miniature on a casket is a copy of large canvas, perhaps adorning one of Karim Khan Zand’s palaces. The monumental paintings of Chihil Sutun, the famous Isfahan palace, were copied many times on various lacquer boxes and lacquer panels. Perhaps in the 18th-19th centuries not only miniatures but especially lacquers popularized the subjects of court painting, increasing the effect of royal propaganda.

Two miniatures of the 18th century, showing flowers, evidently formed an opening in an album. One of them is signed by Muhammad Mahdi. On a textile, also from the Hermitage collection, which is decorated with flowers in the same style, there is an inscription, "work of Muhammad Mahdi". This suggests that possibly when the name of the master is written on a textile, it is not the man who made the textile who is named, but the man who designed the pattern.

Finally, the collection of oil paintings in the Hermitage. There are 15 paintings by the Persian masters of the 19th century, painted in the Qajar style. Two portraits of Fath 'Ali Shah (1797-1834), the most famous and picturesque king of the Qajar dynasty, painted by his chief artist Mirh Ali, are the masterpieces of 19th century Persian painting. On one of them, dated 1224/1809-10, Fath 'Ali Shah is standing, holding a scepter in his hand. There is a long inscription on this portrait, written by Mirh Ali, which says that Fath 'Ali Shah, the king, saw the portrait and accepted it without corrections. This suggests that the painter presented a new type of royal portrait, later to become canonical. The second portrait of 1229/1813-14 is more traditional, here Fath 'Ali Shah is sitting on a very beautiful carpet. This picture shows the talent of the master as colorist; the combination of the red robe and the yellow crown with the cold blues of the landscape is very effective. These royal portraits as well as some paintings showing beauties represent in the best way the Qajar metropolitan court style, with its flat treatment of space and forms and use of bright local color.
The science of geology, is largely historical and deeply concerned with happenings in the distant past. In a sense, geologists are historians who write on blank pages about ancient times. Like the pages in a long and complicated history book, the history of any ancient relic is concealed in its source, in what we call the geological events and changes that lie in the past. The book, however, is not complete; many pages, especially in the earlier chapters, are missing, warped, torn or smudged. The idea of the book remains to allow each of these stories to be told.

The concept that the best way to understand the past is to study the present gradually developed with the idea that the present is the key to the past. Geologists begin on this premise, evaluating the present situation in order to show how it is related to the ancient, It is the past, the process which sustains physical and biological features of the earth, that has created the present.

It is not the earth, or any of it, that changes, but rather the whole of nature: the physical and chemical layers of the universe have always been the same. Here the environment grows, and it is possible to reveal the history of the earth.

The history of an ancient river has been traced by geologists studying the discoveries of today. This long-term project, concerning Wadi al-Batin, was undertaken by a group of geologists at Kuwait University. The project began in 1975, investigating the origins, evolution, history, geology and geomorphology of Wadi al-Batin.

Wadi al-Batin is one of the main geologic and geomorphic features in the State of Kuwait. It extends almost 1200 kilometres, from Saudi Arabia, to the northeast where it ends in Kuwait.

Geologists study geophysical features, which are the biological remains, to decode the forces of the past. The process is the key. Geologically speaking, geomorphic features around us, in desert environments, in arid sites, or in humid environments, are indications which are studied by geologists to reawaken the past, to gain a historical point of view which they can evaluate and understand, and to gain solutions and clues to the geological situations of today.

In this study, one of the most important things we considered was Bedouin settlements in the desert environment. These people live by moving between limited and scarce water sources in a remote, very arid and harsh environment. We attempted to evaluate the movements of these people to these unique sites.

Another important factor that we examined was climatic change. Studying the features of the desert environment, we studied how it would have been affected by huge amounts of rainfall. This rainfall occurred during the Diluvial Period. This period is reflected in North America and North Europe by the appearance of huge glaciers, in what is known as an Ice Age. Relevant to that Ice Age, in this part of the world, Arabia, there was an abundance of rainfall, and this is the area I will be discussing today. This rainfall created huge rivers, and these rivers had an effect on the geology. What was Arabia like at that time?

This period began more than five thousand years ago. Huge amounts of rain created huge water deposits which created a huge amount of wadis and channels. Then, a climatic change occurred, bringing aridity, a lack of rainfall, and huge gulls of desert spread across the peninsula, leaving sand accumulations in its wake. A relationship between these wet and dry periods is inherent in the desert.

Wadi al-Batin starts from the southwest corner of Kuwait, in Saudi Arabia, and it extends northeast, forming a natural boundary between Iraq and Kuwait. The deposits of the wadi’s silt, in Kuwait, extend back into Saudi Arabia. Based on tectonic information, the length of the wadi is about 120 km, in Kuwait, and 900 to 1000 km in Saudi Arabia. The tip of the wadi seems to peter out thus, in Kuwait, having a maximum depth of about 20 to 25 metres. The depth of the wadi at its end in Saudi Arabia is about 180 to 200 metres. This means that the starting point of the wadi is very narrow and very deep, and its end, in Kuwait, is very wide and very shallow.

The silt deposits here, in Kuwait, reveal something of the features of the wadi itself. Very soft material, or broken down harder materials, can be found in the Kuwaiti section. At the start of the wadi, the water was carrying deposits from the mountains and volcanic eruptions, some of which were dropped midway along its length between Iraq and Saudi Arabia, some of it was carried farther to Kuwait, resulting in cemented rock and peb-
bles of granite and basalt.

The theory was that Wadi al-Batin is a continuation, starting around Buraydah and Unayzah, of Wadi al-Rimah in Saudi Arabia. It became necessary to identify the source of the materials deposited at the mouth of the wadi, with more remote features. This would result in finding the capacity, content and discharge activity of the water which was running in the wadi. The flats lying in the desert were studied, as was the rubble sheet and its orientation, to discover what was disgorged by the water.

The study of the main wadi enabled the determination of the capacity of the wadi and the rate of the wadi. Also studied was the cover sheet of the wadi in the flat low lying areas. These studies were conducted in 1978.

Satellite images show deposits. Changes are in evidence as the wadi widens, as it is basically the river channel. The satellite image also shows the spread of the deposits. The Wadi is filled with these deposits. A blue shadow on the satellite image reveals where water deposits are, and these two deposits, more or less, cover the lowest part at the wadi's lower features. These point to where the deposit is, and where the deepest part of the wadi is.

The challenge was to define the wadi channel. Now, the last satellite images, which were in 1991-92, gave quite a few of the lost sections. Wadi al-Batin, which is the remnants of our river, has huge water deposits. Most of the gravel quarries in Kuwait are taken at these points. The gravel is located where the greatest amount of water was deposited.

This situation is similar to that in the western deserts of Egypt. The oases you find in this part of Egypt, like the ones in Kuwait, were once inundated by water. In both cases, much water collected in these fracture systems. Now, most of the water has been drained through these fractures and joints systems, which are where geologists identify water sources. Recently, most of the water sources in Arabia came from oases or wadis, but it is believed that there are huge amounts of water in these fracture zones. There is a fracture system similar to this in India, as well.

To find an ancient river, in any humid or arid environment, one should look for gravel and pebbles which are indicative of a water flow.

This feature is found in a wadi system. In this picture of the tip of Wadi al-Batin, the gravel is between 50 and 55 metres thick, water was carried through this narrow channel of the river. The most important clue, to geologists, for the presence of water is huge gravel deposits, which may be covered by waves of climes or debris which the wind deposits. The height of the gravel indicates the height of the water level that brought it in.

Another major point, which is a conclusion from many of the search labors, is that the existence of soil deposits at the mouth of the wadi indicates water tables from certain time periods. Qualities and chemical compositions in the silt are indicative of materials from sources higher up along the wadi system; materials from other fractures, porous and variable rock. In the case of Wadi al-Batin, these are of central Arabia, and the clues are in the soil deposits, which contain traces of soils found in that environment. Variations in this composition indicate water tables from certain time periods. This is a fundamental and necessary condition to document water in any age.

There are many types of rocks, colored, whitish, that are typical fluvial deposits. Some of them reflect very arid environments, especially materials found in higher strata. Some of them indicate materials that were brought in from deep channels which were diverted into the main channel. By collecting and studying materials from all of these channels, certain types of geological features can be identified.

These are called fractures. They sometimes start deep in the soil and travel down to the bedrock, which gives one of the two types of features found in the deposits.

The deposits in Wadi al-Batin show that they drained from a region of one hundred thousand square metres, which is a very large catchment area. A catchment area is the area drained by a river or body of water. Wadi al-Batin's sediments contain materials found in Wadi al-Rimah, today, where the water collected from the rainfall during North America and Europe's glacial episode, in these diluvial chambers. Specific chemical characteristics of the water levels in Wadi al-Batin are the same as those found in the Central Arabian Peninsula, indicating that the continuation of Wadi al-

Fissures and cracks in the wadi give clues to where the river may be today. Below these natural tunnels, at greater depths, perhaps 400 metres or more may lie the ancient river.

These Landsat photographs suggest the presence of underground water today deep below the surface of the dry riverbed.
Rimah ends up in Wadi al-Batin. Where do they begin? Where did the water go? Why is it necessary to understand the water tables?

The evidence shows that the major source of the water flow in Wadi al-Batin came from the central Arabian peninsula's Wadi al-Rimah. There are exposed rocks in Kuwait, but it has been discovered that there are more than 2000 rocks that are highly identifiable with the deposits from the other side of the peninsula. These rocks were deposited here, on the other side of the peninsula, by fresh water. How do we know that these were deposited by fresh water? Because there are huge amounts of stones from higher elevations gathered in the wadi channel, which would have been caused by fast running water.

The catchment area of the major Wadi, which begins in central Arabia, is more than a hundred square kilometres. In this catchment area, the rain water collected, and then the flow carried it towards the north-eastern part of Arabian Peninsula.

The major catchment area was Wadi al-Rimah in Saudi Arabia. It is a gorge between al-Midhnab, or Unayzah and Buraydah, in Saudi Arabia. This is where the river began, then flowed to the northeastern part of the desert and entered Kuwait where it deposited the majority of its detritus in the domestic channel of the river and the spread of its delta.

It was hypothesized that the Wadi al-Rimah was the most important site for the source of the water, samples of the soils and stones found in the major channel of the wadi were taken for comparison. This was also done in Wadi al-Batin. The soils from what was suspected to be the major catchment area were also studied.

Comparisons between the various catchment sites and the deposits in the major channel of the Wadi al-Batin were made. Finding matches in soil types, and ruling out other areas that did not support the finds from the delta area, enabled the plotting out of the actual catchment area that disgorge into Wadi al-Batin.

These categories of stones and soils were discovered to contribute greatly to the development of the delta area. These were deposited in layers by the water, and provide an idea of the previous top surface geology of the area which is now desert around Wadi al-Rimah and Wadi al-Batin.

Why did the water travel in this direction? Fractures were found, and it is in these fractures that the water accumulated. The wadis indicate the location of these fractures. By using LANDSAT images from a Russian satellite it was possible to identify the major wadis and the major fractures.

The satellite images facilitated narrowing the search, revealing the presence of water, indicating diurnal deposits. Likely candidates to have been part of the catchment area, and samples matching this area, are found even today, on the top surface here in Kuwait.

Where has the water gone? Some clues exist. Much of the water found in Kuwait is brackish water, that is water that is slightly salty, and there are fluval deposits covering the fractures. The fractures travel through the limestone into the subsurface of the peninsula. In some places these fractures travel down about 200 metres, in other areas 400 and 500 metres, and these fractures are covered by loose materials from other geological formations. These fracture systems tend to be very deep, and usually these are two layers, one going up, one going down. A lot of water seeped down into these fractures, and fractures are a choice location to look for water in a desert environment.

A cross section of the subsurface of the area around Wadi al-Batin shows the major channels in the subsurface. These are very deep fractures, 600 metres down. It is likely that there are water reserves at this depth in Kuwait.

The major channel of Wadi al-Batin widens and takes the shape of a fan deposit. The blue color on the satellite image indicates water beneath the surface.

Concerning settlements and Bedouins, most are around an area which is a wadi area, which collects water in the rainy period, or the wet season. These wadis contain information about the chemical composition of the rock, like halites, or siltates, or calcinates. Every bit of chemical information tells where the water goes, where it is, and what will be the color of it on the satellite images.

These are the fractures that run alongside, and into, Wadi al-Batin. These indicate the fracture direction and joint system in the wadi itself and these are the evidence that geologists use when choosing a site on which to dig for water.

Satellite images can be used to track the development of sand dunes across a period of time. The time periods covered in this case are from 1985, 1989, 1992, and 1994. The development of the dunes has been enlarging and the number of dunes has increased. The movement of the dunes reveals some features of the land and covers others, and the impact of this on the environment is as yet unknown. Yet this is evidence of dune migration. The dunes have covered most of the desert environment, and cover most of the Wadi al-Batin but, and this is very important, the appearance of the dunes changes as they cross the site of the major wadi channel. Perhaps this is due to the presence of water in the environment.

In conclusion, by using pictures of the various wadi systems and information left by the water sheet of a diluvial environment, an interpretation of this evidence substantiates the rediscovery of an ancient river that once flowed through Wadi al-Batin. The environment of this river covers a distance of about 850 kilometres, stretching back into the Arabian Peninsula. There is immense potential for finding additional groundwater in some of the fracture zones, such as those as we have in Wadi al-Batin in Kuwait. And, this is perhaps the most important conclusion, there is a potential for the discovery of prehistoric human settlements along the bank of this riverbed channel, especially along the middle section of this river, in central Saudi Arabia.
Arab Seafaring in the Eastern Mediterranean
The Red Sea and the Indian Ocean in Medieval Times

Abridged from a lecture by Prof. Vassilios Christides

IN the tenth century AD the greatest political powers were
the Byzantine Empire and the Arabo-Islamic states. Patriarch
Nicolaus Mysticus (10th c.) compared these two global
powers with the sun and the moon shining in the world.
Both the Byzantines and the Arabs understood the para-
mount importance of naval power and paid special atten-
tion to its development. The Byzantines, of course, had
behind them a long tradition of seafaring going back to
Homer's times. The Arabs, on the other hand, did not have
a single ship in the Mediterranean in pre-Islamic times, but
they had an impressive, centuries-old background of navi-
gation in the Red Sea and the Indian Ocean.

The speed with which the Arabs launched formidable
fleets in the Mediterranean following their early conquests
was astonishing, but it can easily be explained by their
acquisition of the Byzantine shipyards in Egypt, and with
them the skilled labor of the Copts. But in spite of the Arabs'
first spectacular maritime achievements between the middle
of the seventh and the ninth centuries, careful scrutiny of
their naval activities shows that they went through an ago-
nizing period of slowly-growing naval preparedness before
reaching the stage of self-reliance.

The acquisition of up-to-date naval technology and spe-
cialized, highly-trained personnel demanded great efforts
and a good deal of time in those days. Such efforts can be
compared to those needed in modern times to achieve air
preparedness with today's advanced technology and pilot
training. It is to be noted that two great specialists in navi-
gation, Qudama ibn Ja'far and Emperor Leo VI (10th c.), advised their admirals not to commit any large naval force to a serious engagement unless they had clear numerical supremacy, but instead to employ hit-and-run tactics with smaller units. Losses of heavy ships, like losses of advanced aircraft today, were difficult and costly to replace.

The rivalry between the Arabo-Islamic and Byzantine states for maritime supremacy was not restricted to naval battles, for the two sides were constantly competing to keep ahead in naval technology and their naval intelligence services were ever on the alert to achieve this aim. Leo VI declares in his naval treatise that his instructions to the navy are laconic because he is afraid that foreign intelligence may use his information. His suspicion was not unfounded. Ibn al-Manqali, writing in the fourteenth century and making use of a translation of Leo VI's treatise, mockingly remarks in one passage that the emperor Leo VI in his book advised the Byzantines how to engage successfully in naval battles against the Arabs, but he adds that he knew more than Leo. Of course, the great advances made by the Arabs in the sciences, especially physics and chemistry, helped them to make rapid progress in navigation.

For a proper understanding of the various types of medieval Arab and Byzantine ships in the Mediterranean, it is absolutely necessary to study Arabic in conjunction with Byzantine sources, in addition to the rest of the evidence.

By the middle of the ninth century there was little difference between Arab and Byzantine vessels, whether warships or merchantmen, and that only in a few minor details. The average warship - the Byzantine dromon or the Arab shini - was a lateen-rigged three-masted vessel (with actually only one big mast), about 36-40 meters long, with a main castle in the middle of the ship and a smaller forecastle. It carried a main siphon for fire-throwing in the bows and occasionally supplementary heirosiphones (portable siphons). Medieval drawings are sketchy but often useful, as for example a ninth-century Byzantine illumination of a ship with lateen sail (Fig. 1). Other depictions of ships in the Byzantine manuscript of Skylitzes clearly show the use of double rows of oarsmen (Fig. 2) and the use of liquid fire (Fig. 3). A depiction of an Arab warship in an Arab papyrus of the thirteenth century reveals the abandonment of the ram in medieval times (Fig. 4).

Unfortunately, no satisfactory reconstruction of such ships has been made by modern scholars. E. Eichhoff's drawing, for example, has many faults. Somewhat better is the reconstruction of the dromon in the Nautical Museum of Greece, but the depiction of its siphon is not correct (Fig. 5).

Extensive research is still needed to fill the gaps in our knowledge of Arabo-Byzantine naval technology. In particular, more thorough work is needed on the Arabic sources. I have shown in some of my previous works how the Arabic translation of certain passages from Leo VI has helped us to understand the exact positions of the castles in the warships of his time (10th c.). I have also pointed out that Ibn al-

Manqali reveals the existence of medical personnel in the warships, confirmed by the evidence of underwater archaeology. Another important piece of information can be added here: Arabic sources mention that warships carried lifeboats on board. Roman, Arabic and Byzantine sources, pictorial as well as literary, frequently record the existence of a small boat towed astern of a bigger one. For example, the Al-Fihristic mosaic of the fourth century depicts a boat with one sail, of the type called a myparon, and a smaller one with oars only (Fig. 6); and in the Arabic iconography a similar small craft is shown being towed astern of a warship. Of particular interest is the depiction of a lifeboat hanging over the stern rudder in a model exhibited in the Arab Museum of Kuwait (Fig. 7). Nevertheless, the existence of lifeboats on board is mentioned only in Arabic literary sources, which state that small lifeboats were carried aboard warships of the gharab type. They were called sandalun, most probably because of their sandal-like shape.

Among other sources, Arabic poetry offers some very valuable information. For example, two verses by the poet Abu'l Hasan Ali, known as Ibn Sa'ati, tell us that Arab warships of the gharab type were black with white sails, a fact which is confirmed by other Arab poets.

To turn our attention to the Red Sea and the Indian Ocean, the first point to be noted is that the navigators and ships of those waters were different from those of the Mediterranean. However, there were no Chinese walls separating those seas, as asserted by certain authors. Even in Roman times there were sailors from the Red Sea serving in the Roman navy (sabaei ex litore rubro).

Arabic sources, such as Ma'asudi, Kitab al-Tawbii, confirm this information. They report that Yemeni tribes moved to Syria and that one Yemeni, Junada ibn Abi Umayya al-Azzi, became a famous admiral.

In ancient and medieval times there was a conspicuous difference between the sail-powered merchant ships and armed warships propelled mainly by oars (triks, dromon, shini). Warships escorted merchantmen to protect them against attack, or were used in naval engagements.

No such strict division seems to have existed, at least in pre-Islamic times, in the Red Sea and the Indian Ocean. Instead, the merchant ships were armed against the pirates who infested those seas. The size of the crews and the number of soldiers carried by those merchant ships is not known. Obviously it would depend on the size of the ship and the country it came from. The most impressive figure mentioned in connection with Indian Ocean ships is one that appears in the description of the gigantic Chinese junks, which were also conspicuous for their distinctive construction. According to the fourteenth-century Arab author Ibn Battuta, the total complement of those huge junks with their three tenders was 1,000 men, of whom 600 were seamen and 400 marines.
Arabic sources mention that warships carried lifeboats on board. Roman, Arabic and Byzantine sources, pictorial as well as literary, frequently record the existence of a small boat towed astern of a bigger one.

Late in the fourteenth century the need to protect pilgrims and merchants crossing the Red Sea from Aqyhab to Jeddah obliged the Egyptian authorities to keep a permanent but very small squadron of warships in the area. Qalqashandi reports that this flotilla initially consisted of five ships but was later reduced to three. The wall of Qos was the commandant of the special department responsible for this small unit [Qalqashandi, Subh al-A‘sha].

The most typical Arab ship of the Indian Ocean seems to be the type, frequently described, that is depicted in the manuscript of Haniri dating from AD 1237 (Fig. 8). Its main features were the overhanging long-ruddering stern, the conspicuous windows of the passengers’ cabins and the stern rudder. The lookout box, common also in the Mediterranean, was more necessary in the stormy waters of the Indian Ocean. The Haniri ship represents an old pre-Islamic tradition which has continued for centuries down to our time. The Fateh al-Khair, now anchored in the port of Kuwait, is a living witness to the linear development and the end of this long tradition [Y. Al-Hijji, Fateh al-Khair].

In pre-Islamic times, ships of the Haniri type were made without nails, as recorded by both Greek and Arabic sources. The first time nailed ships were used by the Arabs was in AD 712 by Ibn Hajjaj in his expedition against Deyboul. But the old type of stitched ships also continued to coexist; they are mentioned even in the time of Marco Polo.

Some sketchy drawings of the commonest types of ships appear in a series of exquisite, subtly colored Persian miniatures dating from the early Islamic period until the middle of the sixteenth century. Here again we see the features mentioned above, as well as the prominent and luxurious pavilion of the ship’s owner or master and the lookout box (Figs. 9, 10). The carriage of animals by sea was a popular topic in Islamic art, evocative of Noah’s Ark, but the relevant miniatures tell us very little of technical interest concerning the ways in which they were transported. Byzantine sources report that the horse-carrying ships were able to approach enemy land, and let the horses disembark while carrying the horsemen on their back. Arabic sources, for example Ibn al-Mangali, Al-Ahkam al-Mulukiyah, complete our information, adding that there were heavy locked doors in the back of the ship which opened as the ships approached the land. A vague appearance of this practice is found in a Persian miniature where the depicted horsemen disembark from their ships (Fig. 11). We have to wait until much later, until the Mughal period in fact, to find miniatures which are not only of impressive artistic merit but also depict useful technical details. The Mughal emperor Akbar commiss-
One of the miniatures in this work shows a ship carrying elephants on a clearly visible platform.

Asbaha in Yemen at the turn of the sixth century are conventional. Ethiopian drawings of ships representing the pre-Islamic Ethiopian naval tradition, which lasted into much later times, offer some more glimpses emphasizing the two main features, namely the snout-like stern and the well-protected cabins of the merchants travelling as passengers.

In pre-Islamic times most Red Sea and Indian Ocean ships were built of Malabar teak in the shipyards of Bahrain (H. Amin, “Bahrain in the Seventh Century,” in Bahrain through the Ages, the History, eds. Abdullah ibn Khalid al-Khalifa and M. Ricci), though we are informed by the Byzantine hagiographic work known as the Martyrium of Arethas that some were built in Ethiopia. A number of such ships were also constructed at Clyisma, near modern Suez, in Roman and Byzantine times. The Greek papyri of Apollo Arno, written in the early Islamic period, refer to intensive shipbuilding activity at Clyisma, but the town's importance gradually diminished in the Islamic period.

To end this discussion, it must be repeated that only the combined use of all available Arabic and Greek sources and the cooperation of specialists in both fields can lead to firm conclusions concerning navigation in Early Medieval times. The famous geographer Idrisi (ca. 1162) in order to complete his “mapa mundi,” offers the best example of such coordination using Greek and Arabic material and recruiting an international team of collaborators.
The Culmination of Islamic Mathematical Geography World-Maps for Finding the Direction and Distance to Makkah

Abridged from a lecture by Dr. David King

In 1989 a most remarkable historical object came to light (see Fig. 1). At first glance one sees a brass circular plate some 22.5 cm in diameter, with inscriptions in Persian carefully engraved in elegant cartouches and a complicated mathematical grid. In fact, we are dealing with a map of the world. Some 150 localities are marked on it, with their longitudes and latitudes carefully indicated to a fraction of a degree. Makkah is at the center of the map, and using the diametrical rule, one can read the sacred direction (qibla) to Makkah of any locality from the scales around the map and its distance to Makkah in farsaks along the rule. Thanks to the ingenious grid, these are - to all intents and purposes - given accurately, so that the map provides a graphical solution to a complicated problem of mathematical geography that had occupied Muslim scientists since the 9th century.

The world-map is at once medieval - in the sense firstly that it is the Ptolemaic world that is featured on it, and secondly that the underlying size of the earth is Ptolemaic - and modern - in the sense that the grid is of a sophistication that knows no parallel in cartography before the 20th century.

It is known that Muslim scholars from the 9th century onwards prepared maps of the world using coordinate grids, usually though not always with square or rectangular grids. Cities were marked on them, their positions being taken from the tables in astronomical handbooks. Testimony to a lively interest in mathematical geography over many centuries is provided by more than 150 different sets of geographical tables that are known from Islamic sources. Before 1989 it was thought that not one of these sophisticated Islamic world-maps had survived; in other words, not one of the Islamic world-maps known in the manuscript sources has a properly-drawn grid with cities from one end of the Islamic world to the other properly marked on it.

Now all of a sudden we have an example of such a map. Although it is rather late in the history of Islamic cartography, it gives a better idea of the kind of maps that were prepared during the period 800-1500 than any other surviving Islamic maps.

The source of the geographical data on the Iranian world-map has been identified. It is a monumental geographical table with some 250 entries that appears to have been compiled in Kish near Samarqand shortly after the observations of Ulugh Beg, that is, say, around 1450. In addition to the longitudes and latitudes of these localities, the

Fig. 1: The first Iranian world-map, rediscovered in 1989. (Photo courtesy of the owner.)
unnamed compiler(s) presented the qiblas and distances to Makkah of each locality, given in degrees, minutes and seconds (!) and in the main accurately computed. The information in this table, somewhat simplified, underlies the geographical gazetteers that are a distinctive feature of Iranian astrologers after ca. 1650. It also underlies the positions of the localities on the Iranian world-map. Now this is neither signed nor dated, and the question whether the cartouches are Timurid, Safavid or post-Safavid is one for art historians. No comparably-decorated objects are known either amongst Iranian brassware in general or amongst Iranian astronomical instruments in particular. An attachment for a sundial has been removed from the main part of the instrument but is mentioned in one of the inscriptions; likewise all that remains of a magnetic compass is the casing, set into the base.

Now a second Iranian world-map similar to the first surfaced in 1995 (see Fig. 2). Engraved and decorated similarly to the first on a plate exactly the same size as the first, and with virtually identical calligraphy, it is less finely worked and less elegantly finished. But this second world-map is complete with a sundial, and the compass with its needle shaped like a bird and its glass cover is still intact. It is signed simply "made by Muhammad Husayn" ('amal-i M.H.), and the man named was, at least in 1995, unknown to the modern literature on Islamic instrumentation (see further below).

A slightly different selection of 150 localities is found on this second map, all, however, from the same ultimate source. Detailed analysis of the positions of the localities on each map and comparison with the coordinates given in the Timurid table has established that the two maps are copies of two earlier maps. Different from each other, but ultimately derived from an original map incorporating more geographical data than is featured on either of the two surviving copies, the maps from which these copies were made already had several divergences from the Timurid geographical table. On each of the copies there are localities that have jumped, say, 2° in longitude or latitude from where they should be (that is, from one side of a box on the 2°x2° grid to the other), and there are several new errors on each copy. The grids on the copies, which consist of a family of vertical lines which get closer together the further one goes from the central meridian, and a family of arcs of circles which get closer together the further one goes from Makkah along the central meridian, could have been simply copied from the grids on earlier maps. The grid on the original map, however, would have had to have been constructed by a complicated geometrical procedure.

The sundial on the second Iranian world-map is of a European variety commonly used in the 18th and 19th centuries (the "universal inclining sundial"), but first found on German instruments of the late 16th century. The sundial is particularly crudely finished, but no other such sundials made in Iran are known (see further below). The numeral forms on the hour-scale of the sundial are highly stylized adaptations of the Persian forms of the Arabic numerals, such as are found on clocks and watches made by Europeans for the Persian and Turkish markets. European clock- and watch-makers were resident in Isfahan already in the first half of the 17th century.

The universal sundials were added to the Iranian world-maps to give the resulting instruments a double universal function. The compilation of tables and the design of instruments serving all latitudes was an activity in which Muslim astronomers were involved from the 9th to the 16th century. But the makers can hardly have been oblivious to the fact that such sundials, ideal though they might be for telling the time of day in hours and determining midday, are quite useless for determining the time of the most important of the prayers in Islam, the 'asr.

The maker of the second newly-discovered world-map cannot at first accounting be identical with the Muhammad Husayn who was the son of the Safavid mathematician Muhammad Baqir Yazdi and was a specialist on astrolabes: that Muhammad Husayn was active in Isfahan ca. 1660, which is uncomfortably early for this second instrument (and in conflict with the hypothesis of a Khurasani provenance). On the other hand, no other individuals with this albeit very common Persian double-name are known to
the history of instrumentation. It is not inconceivable that this is an early work by the maker of the first world map, made before he had completely mastered the techniques, in which case "the" Muhammad Husayn is not only the maker of the second map, but the maker of both maps. This would account for all of their similarities as well as their differences in aspect. It would also mean that both instruments were made in Isfahan, and that the Khuraskanian influence, if such it is, relates to the original from which both instruments were indirectly copied.

The more significant problem remains: who conceived the cartographic grid that provided a graphic solution to a problem that occupied Muslim astronomers from the 9th century onwards? There is not a trace of any mention of such a device in the known scientific literature of the Muslims. Science in Iran in Safavid times was, as far as we know, virtually without innovation from within; in Qajar times it was entirely so. In the 17th century European cartography was not that advanced that a solution such as this could have been conceived (for example by the Capuchin Raphael du Mans who was resident in Isfahan and reportedly gifted in mathematics). From a mathematical point of view it is conceivable that in the 18th or 19th century a European could have devised such a grid, but then one would expect some trace, however slight, of European influence on the grids themselves, and there is none. Also one would expect that some report of this achievement would have trickled back to Europe; again none is known.

In fact the cartographic grid is itself entirely medieval in concept and bears all the hallmarks of being an entirely Islamic production. The basic mathematics is illustrated in Fig. 3.

Now the mathematics underlying the grid was fully within the capability of certain exceptional Muslim scholars who devoted time and attention to the qibla-problem in the 9th, 10th and 11th centuries and thereafter at least until the 15th century. Not only did they produce a variety of solutions based on geometry and trigonometry, they also compiled tables displaying the qibla as an angle to the local meridian for each degree of longitude and latitude within the Islamic commonwealth; it was not their fault that they were not always consulted when it came to the orientation of mosques. Al-Biruni (fl. Central Asia ca. 1025) is known to have discussed a cartographic mapping preserving direction and distance to a central point, and Habash al-Hasib (fl. Baghdad and Damascus ca. 850) actually designed an astrolabe based on such a projection (called the "melon" astrolabe (al-asturlab al-mubattakh)), since the ecliptic is no longer circular as on the standard astrolabe. In both cases the center of the projection was the north pole, and the preparation of a mapping centered on a general point such as the Safavid and Qajar periods, rests on such weak foundations. Now, however, every aspect of the two world-maps has been subjected to a detailed investigation, and a publication is forthcoming. Their very existence raises a multiplicity of questions, many of which are still unanswered. What is not in doubt is that we are dealing with one of the most exciting episodes in the history of cartography and mathematical geography.
European Celestial Globes of the 17th and 18th Centuries with Arabic Inscriptions

Abbreviated from a lecture by Paul Kunitzsch

Astronomers and globe historians may well ask why European celestial globes of the seventeenth and eighteenth centuries should carry inscriptions in Arabic. There will have been - and still are - but very few, if any, Western astronomers and star gazers with knowledge of this Oriental language. The reasons behind the introduction of original Arabic material on astronomical instruments of the time will have been mainly historical and epistemological.

The development of astronomy in the West took a new beginning in the Middle Ages through the influx of Arabic material. Both ancient Greek works in Arabic translation and original works of Arabic authors were translated into Latin in great number. In those Latin translations Arabic technical terms and many star names were retained, in more or less corrupted transliteration. A great many of them lived on even into our days: the terms zenith, nadir and azimuth and star names such as Aldebaran, Rigil, Betelgeuse etc. are still common to astronomers and star amateurs. The Arabic contribution had thus been established as a constituent element in the formation of astronomy as well as several other sciences.

In Renaissance times, humanist scholars were trying to trace all sciences back to their roots, i.e. studying the works of the ancients in their original languages, Greek and Latin. Some of them also tried, in the same way, to establish the original forms of the distorted, Latinized, Arabic vocabulary found in some sciences such as astronomy. Thus it came about that globe makers of that time followed the same tendency, and in order to present the most up-to-date and most authentic material available, added Arabic names in the original Arabic script to their globes. We shall see soon in detail how each of them proceeded in this.

The globe makers here concerned are four, in chronological order: W.J. Blaeu, J.A. Colom, V. Coronelli and G. Adams.

1. WILLEM JANSZOOON BLAEU (1571-1638)

Among the types of celestial globes made by Blaeu it is the globe of Q 68 cm (1616; the globes controlled by me represent Van der Krogt’s “State 3”, ca. 1630, with the star positions for 1640) which carries the names of the 48 classical, Ptolemaic, constellations in Latin, in Greek, in transliterated Arabic and in original Arabic script. Blaeu does not mention the source from which he had collected the original Arabic forms. In his book, *Institutio astrometrica de usu Globorum & Sphaerarum Caelestinalium ac Terrarum* (Amsterdam 1634), there is a chapter (Paris I, Lib. I, ch. 5, pp. 20-27) on the constellations and their names, but neither the original Arabic names nor a source for them are mentioned. However when looking at the Arabic names on the globe, it becomes clear from which source Blaeu had derived them. In 1600 two books were published in Leiden both of which presented Arabic constellation and star names in the original Arabic script: one by the famous French scholar Joseph Scaliger (1540-1609), *Marcv Manili Astronomica* (this being the 2nd edition of the work, containing a special chapter on the Arabic names; in the 1st edition, Paris 1579, this chapter was still absent); the other by the young Dutch scholar Hugo Grotius (1583-1645) who later become most renowned as a juristconsult and statesman, *Syntagma Anteaeorum* (Grotius already knew Scaliger’s book and discussed many of the names proposed by him). Both Scaliger and Grotius did not use original Arabic sources; they tried somehow to guess or conjecture the Arabic forms possibly hidden behind the vulgarized Latin transliteration of the constellation and star names. Thus many of the names printed in their two books are “ghost names” never used in reality by Arabic astronomers - quite apart from many linguistic shortcomings in both of them due to the still insufficient knowledge of the Arabic language in Europe at that time. A comparison of the Arabic names on Blaeu’s globe with those in the two books shows that most of Blaeu’s forms are taken from Grotius and some only from Scaliger. The 13 new southern constellations (cf. *Institutio*, op. cit. above, pp. 25 f.) are not given Arabic names, neither in the books nor on Blaeu’s globe.

II. JACOB AERTSZ COLOM (1600 - 1674)

Of Colom it is known that his celestial globe, Q 34 cm, ca. 1635, is a close imitation of Blaeu’s globe. Therefore it is not surprising that Colom followed Blaeu also in adding Arabic names in the original Arabic script. However, he introduced a substantial innovation. He was in close contact with the great Dutch orientalist Jacob Golius (1596-1667), professor of Arabic and also of Mathematics in Leiden. Golius supplied Colom with the authentic forms of the Arabic names, to replace the fantastic and incorrect names taken over by Blaeu from Scaliger and Grotius. From Golius Colom received not only the Arabic names for the 48 classical constellations, but also names for the major individual stars, for the 28 lunar mansions and even for the 13 new southern constellations (the latter of course not taken Arabic tradition, but newly translated into Arabic by Golius himself); also the designations for the fundamental circles on the sphere are added in Arabic. The Arabic script used on Colom’s globe is a print script very similar to the script used on Blaeu’s globe and in Grotius’ book.

III. VINCENTZON CORONELLI (1650 - 1718)

Of the numerous celestial globes produced by Coronelli it is the type of Q 110 cm which often - though not always - carries Arabic names, in Arabic script, for the constellations. For my research I inspected, or read about, 15 out of the 57 celestial globes of Q 110 cm registered by E. Berleth in: *Der Globusfreund* 25-27 (1977/78/79), pp. 24 f., to which has to be added another one in Trier, Stadtbibliothek. From this material I was able to derive the following conclusions:

First, not all of the 110 cm globes carry Arabic text. The globes in Venice, Museo Correr, and Milan, Observatory, both convex, of 1693, do not have the Arabic names in Arabic script.

Second, for the globes carrying Arabic inscriptions, I
was able to identify the following three "types":

Type I, convex, of 1688, in Venice, Biblioteca Marciana.

Type II, convex, of 1692-93, in Vienna, Österreichische Nationalbibliothek (GL 22); Steiermark, Stift Vorau; Prague, Clementinum; Munich, Bayerisches Nationalmuseum (Fausser, no. 71); Erlangen, University Library; Bamberg, Historical Museum; Brussels, Bibliothèque Royale Albertine on exhibition in the Musée Royaux d'Art et d'Histoire. To this type also belong the gorges printed in the Libro dei globi of 1693 (1701), repr. Amsterdam 1969 (these gorges show the exemplar dedicated to Alessandro VII and Cardinal Ottoboni) and a separate set of gorges kept in the Bayerische Staatsbibliothek, Munich (here called Strittura d'un globo celeste, Venice 1700).

Type III, concave, of 1693, in Vienna, Österreichische Nationalbibliothek (GL 30 and 31); Munich, Bayerisches Nationalmuseum (Fausser, no. 73); Stift Melk; Trier, Stadtbibliothek.

In his book, Epitome Cosmographicae, Venice 1693, Coronelli gives a detailed survey of the constellations shown on globes (Lib. I, cap. 19, pp. 40-44), altogether 73 in number; there follow (pp. 45-156) tables of the 1,880 individual stars represented on the globes (with the addition of their order numbers so that everybody could look them up in the book). But he does not mention anything about names in Arabic script.

According to my findings, the three types of Coronelli's celestial globes carrying inscriptions in Arabic letters may be characterized as follows:

Type I seems to be the nearest to the source used by Coronelli's engravers, here the rendering of the Arabic script is the most accurate. The contents of the name blocks (in all languages) added to each constellation is sometimes, and the printing is often, different from types II and III.

Types II and III are identical in content, but different in the type setting both from type I and between themselves, type III apparently being a version second to type II.

Without going too deeply into further details here, let me just mention two points of interest. Among the names cited by Coronelli for each constellation there are also, of course, Greek names. But, astonishingly, he does not use, for all of the 48 classical constellations, the traditional Greek names, but, instead, often has new names alien to the tradition; and he adds Greek names also to all the new constellations which had been unknown to the ancients.

A similar procedure is to be observed for the Arabic names: also here we have many "new" names different from those used in traditional Arabic astronomy and names for all (or most) of the new constellations. As far as the script is concerned, it is not rendered on Coronelli's globes in printed type (as on Blaeu's and Colom's globes). Moreover it is clear that Coronelli had the Arabic names first written down by a native Arab (as can still be recognized from the styling of the letters); from this pattern sheet they were then copied and engraved by the Western artists employed by him. Naturally, these could not render the artificial forms of the Arabic model very well, and so we find the Arabic names degrading from one type to the next. The key name for understanding this development is the name of the constellation Piscis Austrius. In type I it is still rendered in a rather correct and legible form, but in types II and III it has degenerated in a way that the true reading of the name is no longer possible.

It is thus evident that Coronelli employed linguists or native speakers for the formation of the Greek and Arabic constellation names. The Arabic collaborator not only translated the names into Arabic, but he also wrote the pattern sheet for the engravers from which they copied the Arabic script. Some of the Arabic forms (Hercules, Coma Berenices, Eridanus) seem to echo a French pronunciation of these names alien to the Arabic language. It is therefore quite probable that the Arabic names for Coronelli's globes were devised in Paris (before 1688, the publication of the first globe type with Arabic inscriptions). Could there have been Arabs around in Paris near the end of the seventeenth century? By chance, we know of the Christian Arab from Syria, Salomo Negri (ca. 1665-1729), who was sent by the Jesuits to study in Clermont, but shortly afterwards went to Paris where he remained until the conclusion of the peace treaty of Rijswijk, 1697. He made his living in Paris by giving Arabic lessons to Western scholars. It is tempting to imagine that he might have been Coronelli's authority in Arabic matters. It may be worth adding that this was also the time when the great orientalist B. d'Hérelot (1625-1695, author of the widespread Bibliothèque orientale, 1st ed. Paris 1697) and A. Galland (1646-1715, author of the famous translation of the Arabian Nights, (1704-1717) were active in Paris.

IV. GEORGE ADAMS (1704 - 1737) and his son, DUDLEY ADAMS (1762 - 1830)

The last occurrence of names in Arabic script on European celestial globes is on the globe of Q 46 cm, ca. 1765, of George Adams. Here, however, we do not have Arabic names for the constellations or for the major stars. What Adams presents is, instead, only the series of the 28 lunar mansions of Arabic astronomy. In his book, A Treatise Describing and Explaining the Construction and Use of New Celestial and Terrestrial Globes, London 1766, he explains the reason for entering this topic on his globe and names the source from which he collected the names. The mansions and their names "may be of very great use to beginners to teach them the names of the stars...", and also for mariners; they will serve to show how the moon passes from star to star, "which is a curious and useful amusement"; and they are a topic not found with the Greeks. The source mentioned is the edition of Ulugh Beg's star catalogue (epoch 1437) by the English orientalist Thomas Hyde (1636-1703), printed in Oxford 1665. Adams took over from Hyde the Latin transliteration of the Arabic names (comparison shows that both in the book and on the globe he closely imitated Hyde's spelling, also in the special accents etc.) and their Arabic forms. The latter appear on the globe in printed letters.

A later edition of the same globe made in 1789 by the son, Dudley Adams, is identical in the Arabic names with the 1765 version. 1789, then, seems to be the last year in which Arabic inscriptions were added to a European celestial globe.
The Arabian Gulf in a World Context
a personal view of the rare books
in a European Library

Abridged from a lecture by Robert Jones

The record of European travellers and artists published over the past 500 years is one of the primary sources for the history and culture of the Arabian Gulf. Distinct both in appearance and in content from the Islamic historical tradition, these books are significant for the broad context in which they place the Arabian Gulf and its surrounding region.

European books provided a unique pictorial record of a way of life that has changed beyond recognition in the modern world. Special effects were employed in de luxe editions that were colored by hand; and these made a profound impact on Western perceptions of the Arab and Islamic world. Portraits of local people can speak to us across the centuries because of their charm and almost photographic realism. It is an old-established convention in European publishing to present the reader with a portrait of the author at the beginning of the book. Thus we are familiar with the appearance of Europeans who travelled to the Gulf three or four hundred years ago.

European travellers liked to be portrayed in their books in eastern dress, which is how they dressed when travelling. François de La-Boullaye-le-Gouz, for example, enjoyed his eastern clothes so much that he continued to wear them on his return to France.

Through books with charts and maps we discover the strategic and commercial importance of the Gulf region during the last 250 years. Rare European publications represent the common heritage of the peoples of Europe and of the Arabian Gulf.

One of the earliest travellers to the Arabian Gulf to publish an account of his journey was Ludovico di Varthema of Bologna, between 1503 and 1508. His return journey was via Africa. But the outward journey was via the Hijaz, where he learnt to speak Arabic, and then down the Red Sea. The Red Sea route was also chosen by Carsten Niebuhr in the eighteenth century when he undertook the famous scientific expedition to Arabia on behalf of the Danish King.

In European maps from the sixteenth century to the nineteenth, the Arabian Gulf undergoes a complete change of shape. The early maps, based on classical sources and imperfect hearsay, gradually improve in reliability until they include the previously neglected Qatar Peninsula. By the later period, we have precisely surveyed charts that give sufficient detail to make navigation safe; and in larger scale maps the Gulf begins to take on the shape we recognize from satellite photos today.

Muscat is the most frequently illustrated port in the Gulf region. As in the case of cartography, images published in the seventeenth century are not very faithful. Views of Hormuz, Bandar Abbas and Baghdad published in this same period in Dutch travel books make them look like European towns.

By contrast, the famous views by Richard Temple in
1813 possess a naturalism which lends an air of reality to Muscat and to Ras al-Khaimah. Ras Musandam has a special luminescence in the proof copy of James Morier's journey through Persia, published in 1812, as does Bushahr on the other side of the Gulf. A hundred years before, the views of the horizons at Hormuz and Bandar Abbas have a practical purpose for travellers wishing to identify parts of the coast. We leave the old methods of illustration behind in one of Jane Dieulafoy's books where we find a gravure of the Amir's palace in Bahrain.

European artists and craftsmen took a great interest in Islamic architecture, producing detailed drawings and paintings which reproduce the dazzling luster of the original ceramic decorations. Pilgrimage was studied and depicted according to reports of the holy shrines of Islam and with the help of believers who knew the appearance of the Holy Ka'ba.

European travellers also recognized the external qualities of Islam. They admired the beauty of handwritten copies of the Holy Qur'an and reproduced pages written in Kufic script. They formed collections of Arabic manuscripts, studied them, and compiled catalogues. They observed Islam in practice and illustrated their books with examples of rituals for the benefit of those at home who had never visited an Islamic country.

In the nineteenth and early twentieth centuries, the majority of publications concerning the Arabian Gulf are intelligence reports, largely unilluminated, and written by British officials stationed in the region. These confidential reports provided an essential record of life on the Arabian coast, of commercial activity, political alliances, and social and economic matters. Published for a restricted circulation, some of them are now extremely rare.

British activity in the Arabian Gulf intensified in the late eighteenth century AD. And it was then that a number of travellers rediscovered the ancient trading route between Kuwait and Syria as a means for getting home from India. Basra was an important trading center at the head of the Gulf. From there the route followed the river northwest via Hillah, and then across the desert to Aleppo and Latakia where the traveller could embark for Venice or Marseilles.

In 1903, Lord Curzon, Viceroy of British India, visited Sharjah. He delivered an address to the Sheikhs of the region, which was later published in English and in Arabic. Europeans visiting the Ottoman world wrote books which provide important information on the Ottoman presence in the Gulf. Similarly, books about Persia and the rise and fall of the Shahs provide insights and historical details. Persia, or rather Russia and Persia, provided another overland route for Europeans travelling to the Arabian Gulf. In 1711 Cornelius de Bruyn went this way, and his panoramic views of Moscow and of Isfahan evoke the different worlds of Czar Peter the Great and the Safavid Shah Husayn.

European libraries have always reserved a place for books about the Arab and Islamic world, including the Arabian Gulf. The printed dedications at the head of these books testify to the respect given this subject by noble and royal patrons. The royal families of Europe and companies such as the East India Company all supported the publication to a high standard of books about the Gulf region. From their fine bindings, it is also evident that books about the Arab and Islamic world and the Gulf were held in great esteem by powerful patrons of learning and the arts. Coats of arms stamped in gold leaf on skillfully embossed and gilded bindings reveal interest and ownership among the most influential figures in European society.

In the twentieth century, the world has undergone greater change than at any time in its history. This is especially true for the Arabian Gulf. Though written and published by people from a completely different cultural background, the record of European travellers to the Arabian Gulf and its neighboring countries can help us to appreciate the complex historical context of our own times. Perhaps by turning to the contribution of the European travellers, we may face the challenges of the future with a surer understanding of the past.