XXXVth Scientific Instrument Symposium

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This year's international Scientific Instrument Symposium was held in Istanbul from Monday, 26th September to Friday, 30th September, a location that provided both opportunity and motive to broaden the usual focus on western scientific culture and celebrate some of the rich history of Islamic science and also to recognise more recent progress in science and technology in parts of the Middle East. Accordingly, the general theme of the symposium was 'Instruments between East and West'. The venue was the recently-built Istanbul University Congress and Cultural Centre, adjacent to the main campus of Istanbul University, now a thriving modern university but with a history going back to the Ottoman Sultan Mehmed II in 1453 on an even more ancient site, Beyazıt Square, built by the Roman Emperor Constantine the Great.

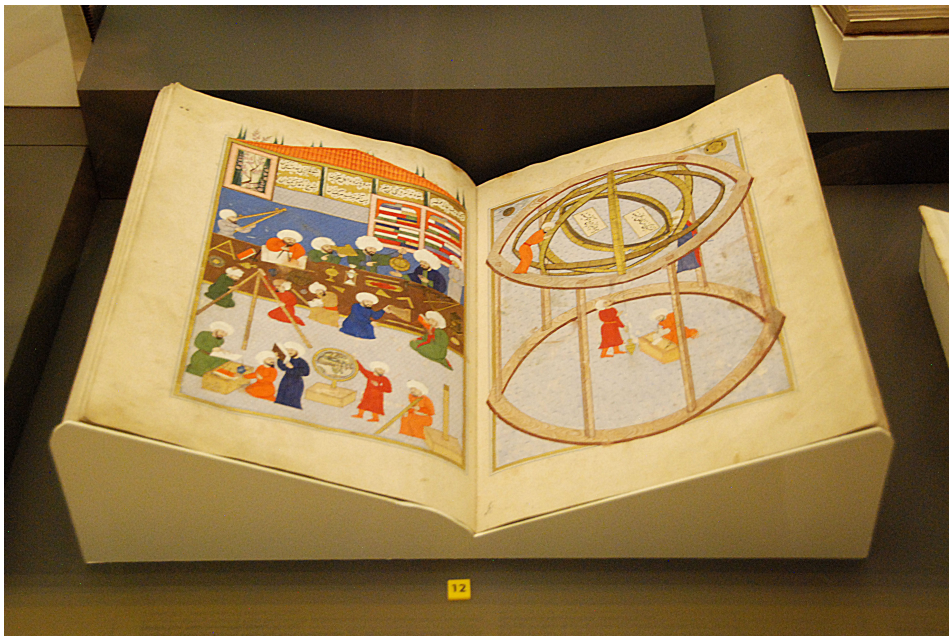

Fig. 1 *Shahinshanama (Book of the Shah of Shahs),* 1581, open at pages showing the interior of the observatory founded by Taqi al-Din in 1575 to update Ulugh Beg's 'Zij', displayed in the special exhibition in the Bayezid II Museum for Turkish Bath Culture. The two men were the subject of papers at the symposium.

Monday: For early arrivals the optional pre-symposium visit to the Istanbul Museum of the History of Science and Technology in Islam set the scene for much of what was to come. It is an unusual museum and one which purists might disdain because all of the many exhibits are either replicas, models or reconstructions. Genuine historic Islamic instruments are few in number and dispersed among many museums, often in the western world far from their origins, and many other instruments that were highly innovative in their time are known only from rare historic manuscripts. Most of the exhibits represent artefacts from the ninth to the sixteenth centuries, the period in which Islamic science and technology was at its most flourishing. This display does help western European tourists appreciate how much Islamic knowledge influenced modern science as it began to develop from the Renaissance onwards, but more importantly it helps the people of Istanbul to appreciate and take a justifiable pride in their own history.

The formal opening of the symposium took place on the Monday evening, a joint event with the inauguration of a special exhibition entitled 'Pursuing Knowledge: Scientific Instruments, Manuscripts and Prints from Istanbul University Collections'. Opening speeches from Prof. Dr. Mahmut Ak, the Rector of Istanbul University, Prof. Dr. Feza Günergun, who headed both the local organizing committee for the symposium and the exhibition committee, and Dr. Silke Ackermann, current president of the Scientific Instrument Commission and head of the symposium programme committee, were followed by an excellent outdoor reception and the opportunity to view the exhibition. This was housed in the adjacent Bayezid II Museum for Turkish Bath Culture. Islamic astronomy was illustrated by beautiful illuminated manuscripts from the Rare Books Collection of the University Library (Fig. 1). The instruments on display were western, for teaching or applied science, unremarkable in themselves but interesting for what they reveal about science in Turkey in the late nineteenth and early twentieth centuries. Especially interesting were the instruction leaflets and textbooks that accompanied some of them, translated into Turkish but mostly illustrated by the original engravings. It would have been easy to become engrossed in the exhibition and miss the building itself, which is a historic *hammam* or Turkish bath dating from the 16th century, newly restored and reopened as a museum only last year. A narrow door from the temporary exhibition hall led to the fascinating marble-walled and floored bathing rooms with their proper fittings, and with showcases full of the sorts of accessories needed by the bathers.

Tuesday: Tuesday was very much a working day, with a brief welcome and introduction by Silke Ackermann and three pairs of parallel sessions each with three papers, followed by the business meeting. Conference participants always lament the need for parallel sessions but with so many people wanting to

share their research, and institutions prioritising funding to speakers, they are inevitable, and one has to be resigned to make sometimes invidious choices. I will probably never learn how that fascinating device the torquetum (or turketum) got its name: it was one of the topics but I was in the other lecture room at the time.

Two of the morning sessions, on 'the Migration of Objects and Ideas between the Ottoman Empire and Northern Europe in the Period 1500-1700', were sponsored by Stockholm University and organised by Inga Elmqvist Söderlund who had assembled a group of papers which, though all delivered by western speakers, showed that the historic contacts between east and west are being studied and being given more of the prominence they deserve. Other sessions had more of a mix of speakers and examined different periods. One group of papers looked at the first electron microscopes in Turkey, from Germany between 1953 and 1975; a cyclotron model and a high-voltage generator model made for an 'Atomic Age' exhibition in Sweden in 1949; and the various oceanographic research ships built by East and West Germany during the Cold War – stretching the definition of a scientific instrument more than some might like, but provoking thought. Of course there were many papers about the more familiar range of instruments, a nineteenth-century Greek device for studying standing waves, the monochord in music and science, Estonian-made seismographs in laboratories throughout the world, dissolving view magic-lantern shows in the Ottoman empire, the scientific instrument trade with the Ottoman empire, the Moroccan Sultan's scientific instruments, and several papers about astrolabes, that already ancient instrument highly developed in the Islamic world and introduced into Europe via Moorish Spain.

Various administrative matters were dealt with at the business meeting. Next year the International Union for the History of Science and Technology, Division of History of Science and Technology, will hold its four-yearly congress in Rio de Janeiro from 23rd to 29th July, and as a constituent of that body the Scientific Instrument Commission will hold its symposium in Rio as part of that event. The Scientific Instrument Symposium visited Rio in 2012 (before the venue for the big congress was announced) and was well supported by local scholars, so although it is recognised that participation from Europe will be more limited next year, there should be a successful symposium. Planning big events becomes ever more complicated, especially with the need to raise sponsorship in order to keep direct costs down, and it is already decided that the 2018 Scientific Instrument Symposium will be held in Leiden, returning to its roots as that is the city where one of the earliest symposiums was held.

Information about future symposiums will be disseminated as usual via the Rete email list.[1]

The other main item at the business meeting was the change in officers of the Scientific Instrument Commission. The current officers, the president Silke Ackermann from Oxford, the secretary Michael Korey from Dresden and the treasurer Marta Lourenço from Lisbon will stand down at the end of the 2017 symposium and be replaced by officers chosen in an internet election conducted earlier this year at which participants at recent symposiums were eligible to vote. The new president will be Richard Kremer from Dartmouth, USA, the new secretary will be Sofia Talas from Padua and the new treasurer will be Janet Laidla from Tartu. They will shadow the existing officers for the next twelve months.

The business meeting also heard about the new Scientific Instrument Commission website that has been prepared over the last few years by a working group co-ordinated by Janet Laidla. It is not quite finished and so is not yet 'live' but should be available soon.[2] The existing website[3] has all the essential information but the new one will be more extensive, more attractively presented, and copiously illustrated. Lastly we were informed about the latest book published under the auspices of the Scientific Instrument Commission in the series edited by Giorgio Strano and now available: *How Scientific Instruments Have Changed Hands*, edited by Alison Morrison-Low, Sara Schechner and Paolo Brenni.[4]

After the business meeting and the traditional group photograph participants boarded coaches for the first of two visits, to the Greek Orthodox High School in Istanbul. This claims a history going back to the fifteenth century and beyond and is the oldest surviving and most prestigious Greek Orthodox school in Istanbul, but the Greek population is now very small and the school has few pupils. The current impressive (almost intimidating) red-brick building was completed in 1883 and features a beautifully decorated main hall, but the rest of the interior is more worn and the collection of teaching instruments that we were able to examine sadly appeared to have received little use or care in recent times (Fig. 2).

1 To join Rete, go to www.mhs.ox.ac.uk/join/rete.

2 The address will be www.scientific-instrument-commission.org.

3 www.iuhps.org/contact/index.shtml.

4 Published by Brill, 2016, ISBN 9789004324923, €125.00 or $150.

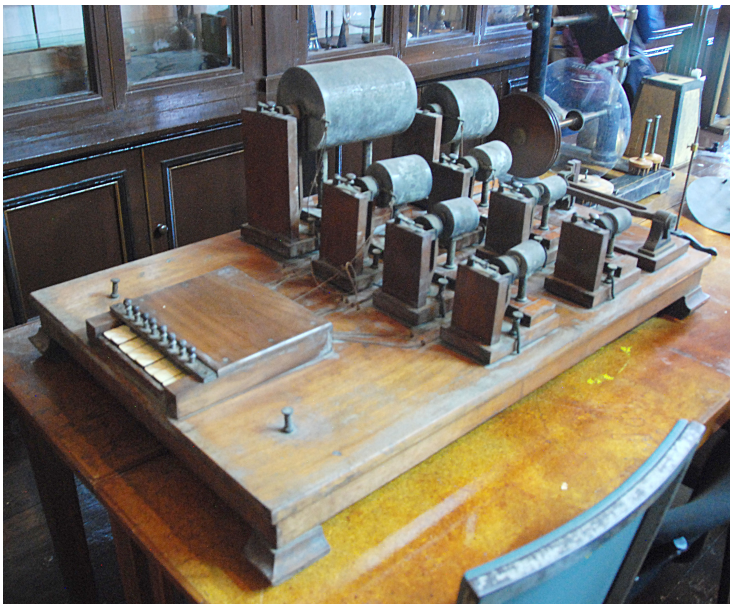

Fig. 2 Set of Helmholtz resonators excited by key-operated electrically-maintained tuning forks, sadly in need of conservation, at the Greek Orthodox High School in Istanbul.

The second visit, to the Rahmi M. Koç Museum on the other side of the Golden Horn, could hardly have been more different. This privately-run museum which opened in 1994 is dedicated to the history of transport, industry and communications, and has grown to display a mind-blowingly diverse range of exhibits (including scientific instruments) from miniatures to reconstructions of traditional workshops to full-size ships, in a variety of buildings old and new, and in the open spaces and on the water of a former dockyard (Fig.3). One cannot help but wonder about the rationale behind the museum – how do so many scale models of British and other railway locomotives come to be displayed in an Istanbul museum, in a building that was originally an anchor foundry? It is, nevertheless, extremely impressive, a wonderful educational and recreational resource, and was far too much to take in during one short evening visit.

Wednesday: A very successful innovation at the symposium in Turin last year was a session called 'Agora' for brief presentation and discussion of new projects and exhibition ideas. A similar session was included in the programme this year, but there were so few responses to the invitation to contribute that they were easily included in the business meeting and the session was cancelled, with the welcome benefit that the Wednesday programme could be rearranged to start half an hour later. The day began with a full plenary session addressed by a distinguished academic from Tehran, Mohammad Bagheri, on the 'History

of Gnomics in Iran'. Sundials and the slightly simpler noon markers have existed in many cultures, not least in pre-Islamic and Islamic era Iran where much is known about them and about the scientists who worked in this field, and some of them still survive.

Fig. 3 One small corner of the amazingly diverse Rahmi M. Koç Museum.

The rest of the morning was given over to a poster session where the presenters were each given a few minutes to speak about their posters before they were opened to general inspection. Subjects ranged widely from the colourful silk bags with their wax seals enclosed in special capsules used by Crimean Tatars sending diplomatic letters to Sweden in the seventeenth century, to a treatise on the construction of astronomical instruments in Iran, to an ophthalmoscope developed by a Turkish professor, to the perhaps more conventional descriptions of small collections of scientific instruments.

During the lunch breaks on Wednesday and Thursday there were opportunities to visit the History of Pharmacy Museum in the nearby Faculty of Pharmacy of the university. This small museum, based on the collection of a professor in the faculty, opened officially in 1968 but the building was damaged in the earthquake of 1999 and the restored museum did not reopen until 2012, in two large rooms. The exhibits include the furniture of two Ottoman pharmacies, separate cupboards for toxic and for non-toxic substances as required in Turkish pharmacies, drug jars and other containers, mortars and other tools for drug preparation, registers of prescriptions dispensed, a large collection of pharmaceutical products from Ottoman times to the present day, and an

extensive library of pharmaceutical books in various languages. It is a specialised, but valuable and interesting museum.

There were another two visits after lunch, first to the Topkapi Palace, one of the most popular tourist attractions in Istanbul. We were directed to the sundial in the palace grounds, but it was on a tall pillar and difficult to examine closely even when there was not a throng of people round it. Then we were directed to the collection of clocks. Elaborately decorated and bejewelled domestic clocks from Europe were popular in the Royal household. There is a curious feature of the English clocks: they are all signed Markwick-Markham, a clockmaker who seems to have specialised exclusively in clocks for the so-called Turkish market, actually most of the Middle East. These clocks are readily identified by the numerals on the dial in a script derived from classical Arabic. Following that, there was all too little time to visit the rest of the palace before transferring to our next visit.

Fig. 4 One of the magnificent imperial caiques in the Naval Museum.

This was to the Naval Museum, which dates from 1897 but opened in its new, still incomplete, facilities only in 2013. The new building displays three small caiques rowed by Atatürk, the revered founder of modern Turkey, but the huge main exhibits are the Imperial Caiques, the long, narrow, highly decorated boats with a small open cabin at the stern, some for the Sultan others with different motifs for the harem (Fig. 4). One of them, plainer than the rest but larger, requiring 144 oarsmen, is reckoned to be the oldest surviving original galley in the world and has been carbon dated to between 1521 and 1655. With

the glass wall of the gallery overlooking the Bosphorus, it is easy to imagine the majestic sight of a galley being launched into the water and rowed by a dozen or more pairs of oarsman into the Bosphorus – and also to wonder how they fared if the weather turned nasty. Somewhat incongruous among the magnificent vessels was a humble fishing boat used for gun running during the War of Independence. We could not see the smaller items in the collection as they will not be on display until an annexe building is completed. Our visit ended with an excellent reception in the museum.

Thursday: Thursday began with another plenary session in which Françoise Le Guet Tullet from France presented a paper co-authored with two French colleagues. We know that Islamic science preceded and influenced western science much more than has often been acknowledged and here was a clear example. The Zij, or astronomical catalogue, published by Ulugh Beg in Samarkand in 1437 was taken to Constantinople after his assassination two years later, where eventually copies were acquired by European travellers. It was much appreciated by western astronomers in the late seventeenth century, but in the early nineteenth century it was the subject of a dispute by French historians of science about the supposed superiority of Indian or 'Arab' astronomy.

Following the plenary session there was another very heavy day of talks – no fewer than four pairs of parallel sessions each with three papers. Enough has been said to show the wide range of papers and speakers at the symposium, and those mentioned in the following paragraphs are an arbitrary and personal selection.

At the symposium in Turin last year Marvin Bolt from the USA and Michael Korey, based in Germany, described some novel work on early telescopes, in which they subject the lenses to modern optical tests, using specially designed portable equipment. They gave an update on their work this year, commenting amongst other things on the high quality of the lenses of the oldest reliably dated telescope (1617, now in Berlin), the surprising existence of very long Galilean telescopes (which have a very narrow field of view) and, perhaps most importantly, the finding of the only two known seventeenth century Keplerian telescopes, which can only be used for astronomy because they invert the image, but which have a wider field of view. This project combining science and history is the more remarkable for its success in obtaining the co-operation of two dozen museums and collections across Europe and the trust of their custodians in allowing valuable historical instruments to be dismantled. We could do with more projects of this sort, but the difficulties should not be under-estimated.

Very different was a paper on determining time without using an observational instrument. In sixteenth century Turkey, Muhammad ibn Katid Sīnān provided the means of doing just that in his *Mīzān al-Kawākib*, a catalogue containing more than 240 000 entries for the positions of some 500 stars. Though ingenious, it had no lasting impact on Ottoman timekeeping.

Paolo Brenni, who is possibly the only person who could claim to have attended over thirty symposiums, commented on how they had developed since the early years when there had been a very strong focus on describing relatively unknown collections of instruments, and proceeded to do just that with a paper about the fine collection of eighteenth- and nineteenth-century physics and astronomy instruments in the Museo Civico di Modena, many of which were made by little-known local makers and show considerable ingenuity.

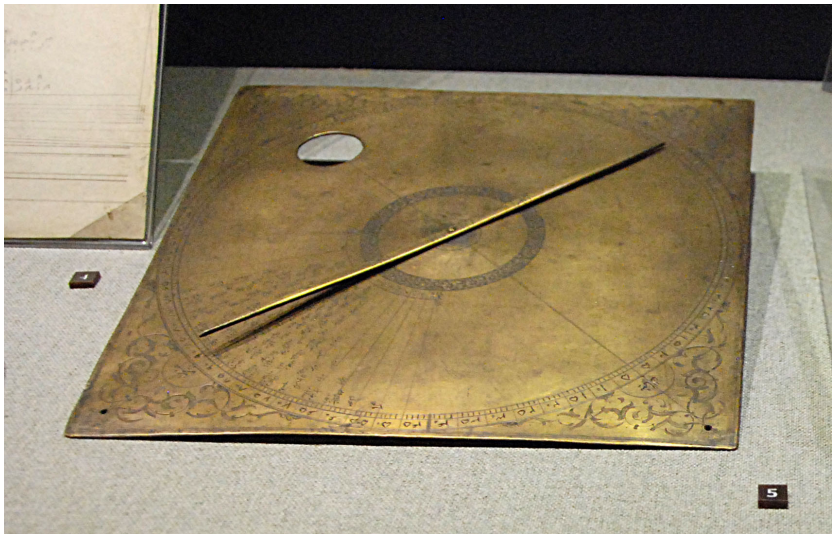

Fig. 5 Brass quibla indicator, 19th or 20th century, used to determine the direction of the Kaaba in Mecca and inscribed with the names of Tehran, Isfahan and Samarkand, on display in the Pera Museum.

That was not the only paper about collections of instruments. There was a paper describing the building up of a collection of more than 300 mostly French physics instruments at the Greek Orthodox High School in Istanbul after physics was introduced into the curriculum in the second half of the nineteenth century. It was the surviving instruments from this collection that we had been able to examine earlier in the week. Another paper was about the collection of some 450 instruments built up by Georg Friedrich Parrot, Professor of Physics at Tartu from1802 to 1828. Over 60 were designed or improved by Parrot himself, and about 50 survive. Later, in St. Petersburg, Parrot demanded new

equipment to study electromagnetism, and this is a rare case where instruments can be directly related to an advance in science. They were used by Parrot's student Heinrich Lenz in developing his simple but fundamental law of electromagnetism.

Thursday finished with a visit to the Pera Museum which has recently redisplayed a broad selection of its outstanding collection of Anatolian weights and measures, used over four millennia in just about every activity where measurement is needed (Fig. 5). Equally interesting was the exhibition of paintings of ambassadors to (and one or two from) the Ottoman Empire, and of their diplomatic activities and lives. These pictures are now historical sources as the extensive text panels (far too much to absorb in one visit) explained. As the rest of us dispersed to our hotels, the younger scholars went to a dinner organised by one of their number where they could talk freely about matters of particular concern during the early stages of a career. This was introduced last year, and has proved to be a very useful event.

Fig. 6 Ottoman quadrants in the collection of the Kandilli Observatory.

Friday: Friday, the final day of the symposium proper, began with another plenary session in which Attila Bir and Mustafa Kaçar, two professors from another Istanbul University, gave what was described as a comparative study of the observational instruments of Taqi al-Din and Tycho Brahe. Taqi al-Din was an Ottoman astronomer who, on the orders of Sultan Murad III, built a short-lived observatory in Istanbul which resembled Tycho Brahe's in many ways. Later he wrote a treatise in which he described the huge instruments in it.

Most of the paper was devoted to Taqi al-Din's instruments leaving little time for Tycho Brahe's, but these are more widely known and better documented.

The rest of the morning was occupied with final sessions of papers, and a closing session to sort out remaining administrative details and express well-deserved thanks to the head of the local organising committee, Feza Günergun, and her team especially the symposium secretary Gaye Danişan Polat, for the organisation and smooth running of the symposium, the careful shepherding of participants around the city, and not least the tempting Turkish biscuits at the coffee breaks and the excellent lunches that sustained us throughout the busy days.

After lunch there was the final visit which took us over one of the bridges across the Bosphorus to the Asian side, and to the Kandilli Observatory. Here we were shown the collection of instruments including a large orrery, globes, astrolabes, mariners' quadrants as well as late nineteenth- and twentieth-century observatory instruments (Fig. 6). The nameplates by the door showed that the building had housed a solar physics observatory and a time service. The Zeiss refractor in the dome was demonstrated projecting an image of the sun. Unfortunately no sunspots were visible so we had to make do with an image from the previous day which did show some. A number of precision clocks attested to the time service function, some by Dent of London and several from Riefler in Germany. The observatory site also houses the Earthquake Research Institute and there were several large seismographs formerly used in that work preserved with the other instruments. Being on high ground like all observatories, the flat roof afforded good views of the surroundings, the best view being from the upper level reached only by an unprotected outdoor vertical ladder! The day was completed with the social highlight of the symposium, a relaxing evening cruise on the Bosphorus enjoying the views of the city and coastline, and with an excellent Gala Dinner on board.

Saturday: The Gala Dinner was not quite the final event. It has become a tradition to arrange an optional excursion after the formal business of the symposium. Those who could stay the extra day met at the ferry terminal on the Saturday morning to take the ferry to Heybeliada, one of the Prince Islands in the Sea of Marmara about an hour from Istanbul, to visit the former Greek theological seminary and high school. Many Orthodox Christian archbishops and patriarchs were trained here before the seminary was closed down in 1971. The school no longer takes pupils but technically remains open because under the terms of an old treaty if it closes then a Turkish school in Greece would also have to close. The building still houses a large multi-lingual theological library. The unused classrooms are a time capsule, with desks reminiscent of those remembered by the older symposium participants from their primary school

days. There was also a small collection of science teaching apparatus laid out for us to examine. We were provided with an excellent lunch in the seminary building, and then had a couple of hours to explore the attractive, almost traffic-free island before taking the ferry back to the mainland and watching the sun set behind some of the iconic buildings of Istanbul, Hagia Sophia, the Blue Mosque and the Topkapi Palace.

Postscript: The symposium was affected by the recent turmoil in Turkey, with some potential participants deciding not to attend, either because of understandable concerns about security or in some cases because of concerns about political influence on academic activity. In the event there was no feeling of tension on the streets of Istanbul and security precautions were not especially evident except (reassuringly) at the airport. Holding the symposium in Istanbul was a bold decision for an event that has been almost exclusively western orientated, but an appropriate one because eastern science and instruments preceded and informed developments in the west, as much as or even more than western instruments have influenced the east in relatively modern times. The programme committee, ably led by Silke Ackermann are to be congratulated on putting together a stimulating and balanced programme. Most valuably, it was an opportunity for the 71 participants from 17 countries, half or more of them men and women from the east, of whom few if any had taken part in a previous symposium, to meet informally, to build up useful contacts and just to understand one another a little better.

The programme for next year's symposium in Rio de Janeiro is already being prepared by Marcus Granato, who was the local organiser for the successful symposium there in 2012, and Marta Lourenço.[5] After two symposiums in more distant and unfamiliar locations it is sensible to plan to return closer to 'home' for the one after. Those not planning to go to Rio can look forward to Leiden in 2018.

[5] Currently available information can be found on the website http://www.ichst2017.sbhc.org.br/. Click on 'Symposium Proposals approved by IPC – Abstract Submission' and then on 'more info' under the Scientific Instrument Commission entry.