

Mathematics in the Near East: Some Personal Observations

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In October 2003 I visited Turkey, and in June 2004 I made a circuit through Lebanon, Israel, and the Palestinian West Bank. There is a lot of mathematics going on in the Near East,¹ some in places fairly well known to the West and others in places that are less well known. I would like to share with my colleagues here in the U.S. something about the conditions in the places I visited as well as some of the things the mathematicians in these universities would like from their colleagues in the West. I had been in Israel twice before, in September 1967 and in June 1995, but had never before visited any of the largely Muslim countries there. As the newspapers have been filled with articles on the wars there (not merely now, but in fact for

most of my life), I felt a strong urge to get a first-hand impression of what the Near East is like and how people are living. As a mathematician, I wanted to meet and talk with mathematicians and see what conditions were like for them. In particular, during these visits I promised to help some of those I met by publicizing a few of their needs and initiatives. We in the West can help and thereby further the development of mathematics in this part of the world.

As these were my first visits to largely Muslim countries, I was curious to see if there was a different “feel” to Islam. In fact, what I found was that the campuses were extremely lively and full of energy and not all that different from large state universities in the U.S. For instance, on all the campuses I visited half or so of the women did not cover their heads at all, and I saw no one in a burka. In the country the women were more conservative, and almost everywhere—in cities and small towns—you hear the call to prayer at dawn, something I loved, as I like to wake up early. But only on Friday at noon did there seem to be large crowds going to the mosques. I loved visiting the mosques: their austere beauty is very peaceful and moving (though sadly I have been denied entry to the al-Aqsa mosque on each visit to Jerusalem by one or the other party).

Turkey, the Middle East Technical University (METU), and Boğaziçi University

Though I had heard of Mustafa Kemal Atatürk, it was not until my trip to Turkey that I appreciated



The METU mathematics department. Safak Alpay is in the front row standing, with the white mustache. Ersan Akyildiz is to his right in the blue shirt.

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¹ Following what I believe is the most widespread usage, the term “Near East” is used here to refer to the land in the convex hull of Turkey, Iran, and Egypt. The “Middle East” is somewhat more restricted.



The Boğaziçi Center for Mathematical Sciences and its view over the Bosphorus.

the amazing transformation he brought about in his country, transforming the disintegrating Ottoman Empire into a modern country now on the verge of joining the EU. I had not realized that he was a champion of women's rights and universal education and embraced an integration of Western ideas with Islam. The universities reflect his philosophy.

METU is in Ankara and was founded in 1956 to train Turks and, more widely, people from all over the Middle East in the sciences and engineering. The language of instruction is English, and today it has over 20,000 students, of whom about 1,000 come from outside Turkey. It is a huge and bustling campus, with much green still-undeveloped space. A strong mathematics program was started at the outset through the guidance of the distinguished Turkish mathematician Cahit Arf and through bringing Masatoshi Ikeda to METU. They created an environment in which research was held to an international standard. They have a large and active Ph.D. program—sixty-six students are currently working for Ph.D.'s—and have forty faculty members covering all areas of mathematics. Many other students from there go to the West to complete their Ph.D.'s; we have had a stream of strong METU students coming to Brown. Their quandary is that they want to maintain their successful local Ph.D. program, yet if their students go to the West, they are exposed to more ideas, because the mathematical community is so much larger.

I had a very warm welcome from Safak Alpay, a functional analyst and the chair; Ayse Berkman, a group theorist and the vice chair; and Ersan Akyildiz, an algebraic geometer. My lectures were about vision and applied topics, and I met some excellent people from the Computer Engineering Department as well, in particular Sibel Tari, who has started up a strong modern program in vision (hard because the area often falls between departmental lines). Ayse is married to a colleague and model theorist, David Pierce, who proved to me that it is possible to learn Turkish, though it seemed

impossible at first to even remember names. As in almost all places outside the U.S.-European loop, one of their greatest needs is to have more visitors who can help to keep them in touch with the developments in the West. Their website is <http://www.math.metu.edu.tr>. I was astonished to learn that Bob Langlands is fluent in Turkish and has visited several times.

Going there for a sabbatical or as a visitor for a year is very possible, and I believe many mathematicians would find it fascinating (though salaries



AUB guides (left) with the author's son Jeremy.



The “Wall” with (left to right) Iyad Suwan, Suwan’s father, and the author.

in Turkey are a problem, as I discuss below). Ankara has one of the best archeological museums in the world, a reflection of the fact that so many civilizations have flourished there in the last ten millennia, and it is close to Cappadocia, amazing for its physical beauty and for its underground churches and whole subterranean villages. All of Turkey, in fact, is covered with interesting places to visit, although Ankara itself is not very beautiful. What Ankara lacks in charm, Istanbul makes up for in spades. Every era has left incredible structures, from the early Roman cistern through the Topkapi palace and the immense “covered market” of the Ottoman era.

The primary center of mathematics in Istanbul is Boğaziçi University (pronounced ‘bowazichi’, which means ‘Bosporus’ in Turkish). Boğaziçi was formerly Robert College, founded in 1869 by two Americans, Christopher Robert and Cyrus Hamlin, with a decree from the Ottoman sultan. It sits on a spectacular site overlooking the Bosporus and flourished for a long time with American philanthropy and trustees, teaching an American-style education in English to Turks. In 1971 the college was taken over by the Turkish government and renamed Boğaziçi University, though the medium of instruction remains English. It has about 10,000 students and is a wonderful and beautiful campus just to the north of the city. Like METU, they have vigorous master’s and Ph.D. programs and offer a full range of advanced mathematics courses. However, also like METU, they face a dilemma about whether to send their students abroad for their Ph.D. or not. Their website is <http://www.math.boun.edu.tr>.

I was welcomed by the chair, Betül Tanbay, a very dynamic woman working in operator algebras. She has created a new international mathematical institute, called the Boğaziçi Center for Mathematical Sciences (BMBM in Turkish), which is expected to open in 2005 and already has a new building on the campus of Boğaziçi University, where workshops and semester-long programs are planned in the style of the other major mathematics institutes. Last summer a workshop on M-theory

organized by Rahmi Guven was held at Boğaziçi. Because of its location exactly on the boundary between Europe and Asia (traditionally drawn along the Bosporus) and, more importantly, because of the political neutrality of Turkey, to which everyone can get a visa, it seems an ideal location for bringing together the Western and Near Eastern mathematical communities.

I should mention one problem which seems endemic to academic institutions in many countries but is especially bad today in Turkey: salaries. The situation in Turkey, which was brought up by colleagues both in Ankara and Istanbul, is that the public universities, such as METU and Boğaziçi, have traditionally been the best in the country, but they pay very low salaries. Today many private universities have been started, especially in science and engineering, that are tempting professors away by offering more reasonable salaries. Thus professors are split between those maintaining the high standards of the older public universities and those who feel the future is with the new private universities. I had a good talk about this with a Brown Ph.D. in computer vision, Aytül Ercil, who has shifted to Sabancı University, where she can offer a strong program in vision. There is very little a foreigner can do to help this situation, except to be aware and sympathetic, unless you are on an external advisory committee or the like.

Lebanon and the American University of Beirut (AUB)

Lebanon is arguably the most complex country in the Middle East from a sociopolitical point of view. It has deep divisions going back over a millennium between Christians, Muslims, and, until recently, Jews. But it is much more complex: there are Maronite Christians, other Christians, Druze, Muslims, Palestinian refugees, and many other subgroups of the population that have alternately fought and made alliances with each other and with Israelis. A Ph.D. in Lebanese history is required to read the newspaper intelligently! The economy that sustains the country is even murkier. While my son, Jeremy, and I were there, there was an incident in which some people in a mob were shot by the police. We heard a dozen theories about which group had instigated the mob, the confrontation, the police response, and why. On the positive side, we were taken on a fascinating tour through some of the remaining old districts of Beirut by AUB professor Jihad Touma. Here many of these groups were living in close proximity, and Jihad strongly recommended returning at 4:00 a.m. to sample the bread fresh from the ovens of an ancient bakery (something he assured us would be quite safe to do).

In the midst of all this confusion, the American University in Beirut plays a remarkable role: like

Boğaziçi University, it was founded by an American, Daniel Bliss, in 1866 and has been a neutral force for higher education and medical training. To this day it is governed by an independent board of trustees, now fully international, which gives it insulation from the byzantine politics of Lebanon. During the ghastly twenty-year civil war, it remained an island of peace, receiving only one hit from the bombardment while the center of Beirut was leveled, as it was considered an indispensable part of the city by all communities.

AUB has about 7,000 students and offers many master's programs but no Ph.D.'s. The student body is very mixed: Christian and Muslim, Lebanese and foreign (from sixty-seven countries!). It sits on the cornice of Beirut overlooking the Mediterranean, about half an hour's walk west of Beirut's center. For the visiting mathematician, the most exciting part of AUB is their new Center for Advanced Mathematical Sciences (CAMS), which was started with the help of Sir Michael Atiyah and Nicola Khuri (a physicist at Rockefeller University). Though still small, they are hosting a large number of workshops and summer schools under the leadership of the director, Wafic Sabra. This is a great place to visit, and I strongly recommend it. Their website is <http://www-1b.cams.aub.edu.lb>.

There is only one hitch! You cannot enter Lebanon if there are any Israeli stamps on your passport or if your ticket shows you have been or are going to Israel. Lebanon and Israel are still technically at war, though Israel has withdrawn from all but contested parts of Lebanon and there are only the usual skirmishes. To make our trip, Jeremy and I bought a round-trip ticket to Amman, stopping in Beirut, and made separate arrangements to get from Amman to Israel and back. This makes it impossible for Israelis to come to Beirut and is a major obstacle to CAMS's desire to be open to everyone. A peace treaty between Lebanon and Israel is conceivable sometime in the future, but right now no one is hoding their breath.

The West Bank and Birzeit University

My son and I were very fortunate in having a guide to help us travel in the West Bank, without whom this leg of our trip would certainly not have been possible. Iyad Suwan is a graduate student working with Achi Brandt at the Weizmann Institute. He is Palestinian but is fortunate in that his family has lived in East Jerusalem for three generations, so his Israeli identity card, identifying him as a Palestinian from Jerusalem, allows him to enter Israel and work at the Weizmann.

We traveled to the West Bank by flying to Amman, taking a taxi to the Allenby (or King Hussein) Bridge, crossing the border there, and taking a shared minivan to East Jerusalem, where Iyad met us. It is 44 miles from Amman to Jerusalem, but the trip



Birzeit University, Jeremy Mumford on left, Iyad Suwan on the right.



The Weizmann Institute.

took us six hours, mainly because it took three hours for the Israeli soldiers at the border to allow us to enter. We met Iyad in East Jerusalem and went to dinner that night at his house, which is fifty feet from "the Wall" (see photo). It has to be seen to be believed. Iyad's grandfather built the house in the 1940s, and the extended family has lived there ever since, paying taxes to whoever runs the city of Jerusalem. But now Iyad is moving because his children are 45 minutes and a checkpoint away from the hospital, which is less than a mile away across the Wall.

Going to Birzeit the next day, the Wall was massively visible from many points. Nor did there seem to be any spots in the West Bank where there were not Israeli settlements as well as Palestinian towns in view. My impression was of a fractal-like interpenetration which one cannot imagine undoing. There were stark contrasts: the huge settlement

Ma'aleh Adumim, as posh as a First World resort, in the middle of the rocky, uncultivable desert that constitutes much of the West Bank. We took a "service taxi", the ubiquitous minibus, to Birzeit to avoid bringing a car through the various checkpoints. Besides the delays of waiting in line, the problem of living with the checkpoints seems to be that the rules are never clear, rather like Kafka's story *The Castle*. And even if the rules are clear, some of them are enforced only rarely but are always a threat (for instance, the rule prohibiting West Bank Palestinians from working in Israel, which, when enforced, financially ruins a worker). This was quite a surprise to us when we encountered it at the Allenby Bridge, and Iyad counseled us later to be patient.

In the minibus I sat next to a young Arab woman in head scarf studying reinforced concrete. She was deep in her math but told me they make their own concrete in the West Bank, though they must import some key components for construction. Birzeit amazed me: the students looked as well dressed and happy as their counterparts in the U.S. Though there was a meeting at noon to discuss Palestinian students jailed by Israel, the campus did not feel as angry as I had expected. But clearly the university operates under great stress. In the last few years a new checkpoint has effectively shut them down intermittently. I have described the above not to make a political point—I am aware of the Israeli reasons for both the Wall and the checkpoints—but to explain the conditions under which the Palestinians work and do math.

Birzeit has been operating as a university since 1974 and today has about 5,000 students, all from the West Bank and Gaza, mixed Muslim and Christians. They offer a master's program in some areas but not in mathematics. Their greatest need is to have more contacts with universities in the West to which they can send their best students. Walking with Alaeddin Elayyan, the chair of the mathematics department, we happened to meet two students working on Cauchy's theorem; their best students seemed well prepared to make the jump to a regular graduate program. Birzeit has had support and collaboration with the EU and especially with France, where they have an interdisciplinary mathematics and economics program jointly with the University of Paris and hope to start a master's program jointly with the University of Tours. Their website is <http://home.birzeit.edu/math/>.

Israel, the Weizmann Institute, Haifa University, and Bar Ilan University

After our visit to Birzeit, Iyad drove us to the Weizmann Institute, which is a truly unique and extraordinary place. Our main hosts at the Weizmann were Ronen Basri, from computer science, and Eitan Sharon, who was born there, went on to get

his Ph.D. there with Achi Brandt, and is now a post-doc with me at Brown. Achi is also the advisor of Iyad, and at dinner in his house we learned a lot about the history of Israel. The Weizmann Institute is a combination of a research laboratory and a small and select graduate school (700 students and a comparable number of researchers) covering most of the sciences. The closest analog in the U.S. might be Rockefeller University, if it covered more fields, or Caltech. It was started in 1934 as a chemistry research institute under Chaim Weizmann. It has a gorgeous campus where the faculty live in a communal atmosphere, almost like a kibbutz. Scientifically, it is far and away the most exciting place I visited. I am good friends with and admire tremendously the work of people in several departments there.

Most of us in the U.S. know quite a few people in the seven Israeli universities and do not need my fairly random comments. The stimulus to my trip was an invitation to the University of Haifa, where I was hosted by Larry Manevitz. Overlooking Haifa from a hilltop, the university is moving ahead strongly by virtue of a major grant from the Rothschild Foundation, which gives it funds for a diverse array of new programs. I then visited my old friend Mina Teicher, now vice president for research at Bar-Ilan University. Bar Ilan is a religious institution, but, like the historically Christian AUB and like Birzeit, the scientists share a nonsectarian culture that keeps religious politics at arm's length. They have just opened the interdisciplinary Gonda Brain Research Center, bringing in Moshe Abeles, the best brain researcher in Israel (in my view), as director. Having been part of a group that sought to create something very much like this at Brown but with only partial success due to lack of funds, I can appreciate how much Mina and Moshe have accomplished at Bar Ilan. Economically, the Israeli universities and their science programs seem as well endowed, if not better, as comparable universities and programs in the U.S.

For me, three things stand out after these trips. One is the desirability of U.S. mathematicians engaging productively with all parts of this fascinating and troubled region through the universal language of mathematics. The second is the hope that the mathematical community in the Near East, on both sides of the religious divide, can bypass the political stalemate and find ways to enrich their mathematical collaboration. The third is the great potential for fruitful interchange between the isolated but scientifically motivated Turkish and Arab universities and American mathematicians.