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Across the great divide

Scientists like to think that research collaboration can overcome political barriers. But for those on opposite sides of the Israeli–Palestinian conflict, how realistic is this ideal? Jim Giles visited the region to find out.

There can't be many coffee-break conversations as tense as some of those that take place in Gershon Golomb's lab at the Hebrew University of Jerusalem. Golomb, who heads a research group working on improved methods of drug delivery, lives in Efrat, an Israeli settlement in the occupied territory of the West Bank. To Palestinians, the very existence of such towns is a major barrier to peace. Golomb is also a senior officer in the Israeli reserve forces, and until recently served in the army for up to two months every year, often on the West Bank. All of this makes it surprising — and unique, claims Golomb — that one of his team is a Palestinian.

That researcher, Yousef Najajreh, lives in Beit Jala, just a few kilometres from Efrat. Even nearer to Najajreh's hometown lies the Israeli settlement of Gilo — to which Irith Gati, the group's technician, returns home each evening. When violence flares overnight — as it frequently does — the group's discussions the next morning are understandably strained. "There can be shooting between Gilo and Beit Jala," says Najajreh, whose house has been hit by stray bullets. "I come in and we accuse each other's community of starting it. But at the end of the day we are there for the science."

To those who believe that scientific collaboration can help break down the barriers raised by conflict, the fact that Najajreh and his Israeli colleagues are able to work together against the common enemy of disease is an encouraging sign. And although few working relationships are overshadowed quite so starkly by the conflict as those in Golomb's lab, examples of joint Israeli–Palestinian research projects are not hard to find — a paper in this issue of *Nature*, for instance, on the seismology of the Dead Sea region, boasts both Israeli and Palestinian contributors (see page 497).

But it would be naive to conclude that such collaborations tell a simple story of scientists successfully putting their political differences aside in the pursuit of knowledge. Researchers from both communities are able, in many cases, to manage their huge divergences in viewpoint — but these differences cannot simply be disregarded. Would you expect an Israeli academic who has lost a friend in a suicide bombing to have no misgiving about working alongside people from a society that sees the perpetrator as a martyr? And is it any surprise to learn that Palestinian researchers who are shut out of their labs by the Israeli army, and whose neighbours' homes have been bulldozed, may view the idea of collaborating with Israeli scientists with incredulity?

For an outsider, even finding the right language to discuss the situation is problematic. When e-mailing scientists to set up meetings before my visit to the region, I inadvertently offend one Palestinian researcher by asking about "science on the West Bank". He requests, politely but firmly, that I refer to the territories occupied by Israel as "Palestine". But for many Israelis, his preferred label for this disputed land is equally inflammatory.

In the end, Israeli and Palestinian scientists alike ignore my clumsy attempts to find acceptable terminology. They are happy to discuss their work, and how it has been affected by the conflict — or, in rare cases,

defined by it (see 'Know the enemy', overleaf). I visit in August, a period of relative calm. Hamas and other militant Palestinian groups have called a ceasefire, and the Israeli army's presence in the occupied territories is more low-key than in the preceding months. As a result, I am able to venture onto the West Bank to meet Palestinian scientists without encountering too many problems. In Israel, students are on their summer break and there is a relaxed atmosphere on the modern, Western-style campuses.

Yet within two days of my departure, the violence and despair have returned. Today, the outlook is as bleak as anyone can remember. Suicide bombings have resumed, bringing terror to the heart of Israeli society, and Israel's military has embarked on a vigorous security clampdown, leading to the deaths of around 40 Palestinians. One Israeli minister has even aired the possibility of assassinating Yasser Arafat, president of the Palestinian National Authority.

Such hardline attitudes find few echoes among Israel's academics. Like their counterparts in many other countries, their political views tend mainly towards the liberal end of the spectrum. Many researchers criticize their government's strategy in the occupied territories, and argue that politicians should do more to push the peace process forward. What's more, Israeli academics are generally enthusiastic about the idea of working with Palestinian scientists. "A lot of Israelis hate the idea of sitting in an ivory tower and doing nothing," says Benjamin Geiger, a cell biologist at the Weizmann Institute of Science in Rehovot. "Over the past few years there have been many, many attempts to create interactions with Palestinian colleagues."

Some of these attempts have failed because of the huge disparity in resources at the disposal of these neighbouring research communities. Israel is a world leader in fields such as biotechnology and physics, and the country's labs are as well-equipped as those anywhere in the world. By contrast, the total amount spent on research across all of the Palestinian universities is a fraction of that deployed by a single major Israeli research institution. Sometimes, Israeli scientists who are interested in reaching out to Palestinian colleagues simply fail to find a partner.

But numerous collaborations do exist, spanning fields from chemistry to plant biology. The Israeli researchers involved stress the scientific value of these efforts, but many are also motivated by a desire to promote peace by helping their Palestinian colleagues to build up their research capacity. "We know that building science communities is important," says microbiologist Hervé Bercovier, vice-president for research at the Hebrew University, which has been particularly active in promoting joint projects with Palestinian institutes.

In some fields, the results of collaborative projects will feed directly into any peace negotiations. Some of the region's key aquifers lie beneath the West Bank, and hydrologists frequently find themselves involved in political arguments about how these resources should be distributed (see 'Water and the wall', below). "If we want to share water in a professional manner, we

Water and the wall

When it comes to juggling science and politics, the hydrologists of the Middle East are experts. In this arid environment, deciding how to allocate the freshwater of the Jordan River and the aquifers below the West Bank will be a vital component of any peace agreement.

"Water in Palestine is not hydrogen and oxygen," says Abdel Rahman Tamimi, director of the Palestinian Hydrology Group, based in Ramalla. "It's politics." The sensitivity of the issue is highlighted by the fact that data on the amount of water extracted from aquifers by Israeli settlements on the West Bank have been declared a military secret.

Yet despite such obstacles to cooperation, Israeli and Palestinian hydrologists have a surprisingly good record of working together — producing reports that may prove invaluable in future political negotiations. Funding from abroad, meanwhile, has enabled new monitoring stations to be set up, improving knowledge of seasonal river flows and sources of pollution.

Today, however, there is a new problem: the 'security wall', now partly constructed, that will separate the West Bank from Israel. Palestinian hydrologists claim that it is designed partly to annex key water resources. The barrier, which the Israeli government says is necessary to restrict the movement of terrorists, at some points snakes several kilometres beyond the pre-1967 Israeli border, and has left some Palestinian farmers unable to reach their land. On the edge of Jerusalem, it slices through the campus of Al-Quds University, forcing staff and students to take detours lasting several hours to get to work.

S. NACKSTRAND/AFP

High and dry: Palestinians have accused Israel of using the security wall to annex water supplies.

The wall has also separated some Palestinians from their water supplies. When a World Bank-led team visited the initial section that had been built on the northwest border of the West Bank in May, it found a handful of sites where the barrier comes between Palestinian communities and the wells that they had used for irrigating their crops.

The Israeli authorities say that the wall's path is determined by the need to protect vulnerable Israeli settlements. They argue that problems with access to water will be resolved by putting gates in the wall, and by issuing permits to cross it.

But Palestinian hydrologists reject this explanation, and are convinced that the appropriation of water resources is one of the primary goals behind the wall's construction. "This will finalize the status of water rights before negotiations begin," Tamimi complains.

So far, only around 150 kilometres of wall have been built, and the Israeli authorities have not released details of its future direction. But by talking to villagers who say they have been approached by the Israeli army about requisitioning their land, Tamimi's hydrology group and other Palestinian non-governmental organizations have drawn a map of the course they believe the wall will take. This suggests that it will leave some 50 wells used by Palestinians on the Israeli side.

Israeli hydrologists see things differently. "The basic reason for the wall is security," argues Hillel Shuvel, professor emeritus at the Hebrew University of Jerusalem and one of Israel's most prominent hydrologists. "I realize that injustices are being done, and these need to be corrected. But I don't accept that the goal is to steal water resources. That is paranoia."

Despite the proud record of cooperation between Israeli and Palestinian hydrologists, it seems some subjects are just too politically sensitive for the two sides to reach agreement.

CAM99/GETTY IMAGES

need to work together," says Gedeon Dagan, a geophysicist at Tel Aviv University who sits on the steering committee for a project on the hydrology of the Jordan Valley involving both Israeli and Palestinian scientists.

Talk to Palestinian researchers about the value of joint projects with Israeli scientists, however, and you hear a diverse set of opinions. The Palestinian Ministry of Higher Education opposes links with Israeli institutions. And although many Palestinian researchers ignore this official line, many of those who work in towns that have borne the brunt of security operations by the Israeli army support their government's view.

At An-Najah National University in the West Bank town of Nablus, chemist Maher An-Natsheh explains why his experience of the conflict has left him unwilling to work with Israeli scientists. "We are in a state of war," he says. "They have to give Palestinians the right to exist; then we can start talking about collaborations."

An-Najah University's students often vote for militant groups such as Hamas in campus elections, and the university is regarded as a nest of terrorists by the Israeli authorities — the army says that several suicide bombers have been An-Najah students.

Two months before my visit, Fadi Alawneh, a journalism student at An-Najah, tried to avoid Israeli army checkpoints by crossing a deep ditch; he lost his balance when approached by an armoured vehicle and died from his injuries. He was the thirty-fifth An-Najah student to die since the present Palestinian uprising, or *intifada*, began in September 2000, says An-Natsheh.

During this period, An-Najah University has been closed several times. An-Natsheh, who is the university's vice-president for academic affairs, says that deliveries of chemicals are frequently impounded on suspicion that they may be used to make explosives. In

Israeli tanks are once again a common sight on the streets of West Bank towns such as Nablus.

Hebron, some 80 kilometres away, where tensions are particularly high due to the presence of a small Israeli settlement surrounded by a hostile Palestinian community, it is a similar story (see 'A campus under siege', page 449).

West Bank towns are also frequently held under curfew. Research at many institutions ceases during such clampdowns, but some scientists take risks to continue their work. In July 2002, for instance, a curfew order prevented staff at the Applied Research Institute-Jerusalem, which conducts environmental studies, from commuting to and from their headquarters in Bethlehem. Rather than stop working, they moved computers and equipment to the houses of friends and family in Beit Jala, where the narrow streets made it easier to evade the Israeli army. "You could easily knock on a door and hide if you saw a patrol," says Jad Isaac, the institute's general director.

Even against this background, some Palestinians are open to the idea of interacting with Israeli scientists. But they are not always comfortable about expressing this view in public, for fear of attracting a backlash from their own community. Last month, for example, a small group of Palestinians attended a 'Frontiers of Science' conference in Istanbul, Turkey, which was organized by the US National Academy of Sciences with the aim of promoting dialogue between researchers from across the Middle East. But some of these researchers were anxious about the signals that they were sending out by attending. "We don't want the media to take pictures and announce that Palestinians met Israelis," says Awni Khatib, a chemist at Hebron University.

Other Palestinian researchers are simply so frustrated with the difficulties of daily life that they have no wish to work with scientists from the country they see as the cause of their troubles. Even if researchers from Nablus and Hebron did want to collaborate with Israeli scientists, they would struggle to travel to the nearest Israeli universities in Jerusalem, just a few dozen kilometres away. The journey would require a special permit, which can take months to arrive and still does not guarantee access.

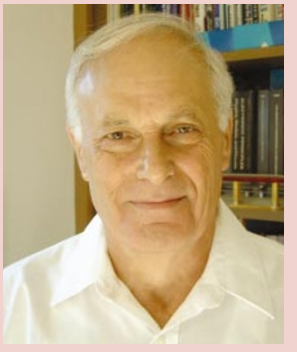
Travelling back to Jerusalem from Hebron one afternoon, the reality of this situation is brought home. The taxi-van in which I'm travelling is stopped at a checkpoint and instructed to turn back — the road has been closed for security reasons. Nearing the end of a hot and uncomfortable journey, our driver has other ideas. He initially withdraws as requested, but quickly cuts back onto the main road and speeds past the

Know the enemy

In May 2000, Ariel Merari persuaded an extraordinary group of people to sit around the same table. Several armed organizations, responsible for kidnappings, killings and bombings, sent representatives to Paris. There, away from the world's media, a group of academics probed the attitudes of people who have been vilified by their opponents as heartless terrorists.

In what Merari describes as a "cosy and informal setting", political scientists and psychologists met with members of groups including the Basque separatist organization ETA, the left-wing Colombian guerrilla group FARC, and armed militants associated with Yasser Arafat's Fatah faction of the Palestine Liberation Organization. Through various role-plays, the militants were asked to act out the side of governments and armed rebels involved in confrontations.

Merari has made a career out of trying to understand people involved in armed uprisings. Trained as a psychologist at the University of California, Berkeley, his career trajectory changed dramatically after the 1973 Yom Kippur War. Then a reserve paratrooper, Merari was sent to the Golan Heights. His unit was trying to rescue colleagues pinned down by Syrian fire. "We were running towards the Syrians when I got a bullet in the chest," says Merari. "I was evacuated. If I had got to hospital two minutes later, I wouldn't be sitting talking to you now."



Ariel Merari: seeking to discover what motivates armed militants.

After this experience, Merari felt incapable of returning to his research on hormones and behaviour. "This ivory tower suddenly seemed too detached from the reality of Israel," he says. In the mid-1970s, his expertise as a psychologist earned him a place on an army hostage-negotiation team. Around the same time, he began to trawl the literature for work on terrorism — a direction that ultimately led him to Tel Aviv University to study the subject full-time.

Merari began to focus on suicide bombers in the early 1980s. One of his methods is the psychological autopsy. Through a trusted third

E. GAILLARD/REUTERS

Show of support: Palestinian women wave banners bearing the insignia of the militant group Hamas.

checkpoint, escaping the young soldier's attention. "Don't worry, he would have shot our tyres before aiming at us," another passenger says.

Not all Palestinians face such severe restrictions on their movements, however. And where security controls are less stringent, attitudes towards working with Israelis are much more positive. At Al-Quds University in Abu-Dis, a suburb of eastern Jerusalem, Palestinian researchers are building links with nearby Israeli universities, with encouraging results. "Before we started collaborating in 1994, Al-Quds spent US$35,000 a year on research," says Ziad Abdeen, who works on nutrition and disease and is the university's dean of research and graduate studies. "Now it is $3 million."

Most of this money has come from abroad, and much of it was made available specifically to promote joint projects with Israeli institutions. The increased funding, says Abdeen, has provided new facilities such as the university's molecular-biology lab, constructed using money from the Belgian government for a joint project with the Hebrew University. Israeli academics have also helped researchers at Al-Quds to gain experience in writing grant proposals. "Our research culture was created by working with our Israeli colleagues," says Abdeen.

The issue of collaborative projects is not the only one to split the Palestinian research community. In April 2002, more than 100 academics, mostly Europeans, wrote to the British newspaper *The Guardian*, calling for the European Union to suspend Israel's participation in its Framework research programme, in protest at "the violent repression of the Palestinian people". The idea of boycotting Israeli science was rebuffed by the EU, but generated a remarkable amount of debate. Isolated incidents of academics refusing to work with Israeli colleagues were

party, Merari has conducted interviews with friends and families of most of the 36 *shaheeds* — the Arab word for martyr — who struck Israeli targets up until 1998. By combining these interviews with studies of bombers who were apprehended before they detonated their devices, he has been able to build up psychological profiles of the attackers.

None of the bombers seemed to need psychiatric help, nor were they feeling suicidal in the normal sense of the word. They came from a broad cross-section of Palestinian society. "There was no single psychological profile," says Merari.

More important than individual characteristics, Merari claims, is the role of the group that helps to organize the bombings. Many suicide bombers, Merari believes, volunteer in the heat of the moment, and are then placed under a 'contract of honour' from which they may find it difficult to back out. "Shortly before they are sent on their mission, most *shaheeds* are filmed declaring that they wish to be a martyr," he says. "It's hard to break something like that."

Equally important, Merari argues, is the role of a society that idolizes suicide bombers — posters depicting *shaheeds* are a common sight in Palestinian towns. "In this kind of atmosphere, many people say: 'I want to become a *shaheed* too'," says Merari.

Eyad El-Sarraj, director of the Gaza Community Mental Health Programme, argues that such attitudes are borne of a desperation to be free from Israeli rule. He says that many Palestinian youths feel that they should sacrifice their lives for the good of their people — a view that is strengthened by the belief that they will be rewarded for their actions in heaven.

In the long run, Merari believes that countering the wave of suicide bombings will require a sea change in Palestinian public opinion. He suggests that the Israeli army might become involved in distributing food and medical care in Palestinian towns, so that residents' experiences of the security forces are less uniformly negative.

For many Israelis, however, Merari's ideas are unpalatable. Following the recent upsurge in violence, security clampdowns are the order of the day. And for most Palestinians, Merari's suggestions simply miss the point — they want the Israeli army to withdraw from their towns, not to act like an aid agency.

For all of his desire to make a practical contribution towards peace, Merari is forced to admit that he has yet to reach out beyond the confines of academia. Asked whether politicians listen to his arguments, he responds: "Unfortunately, very little."

J. WAIZMANN/ACTION PRESS/ZUMA PRESS

Bus blast: more than a dozen Israelis died in this bombing in Jerusalem in June; after a period of relative calm, such attacks have now resumed.

reported, and the controversy was re-ignited in June this year, when a pathologist at the University of Oxford, UK, was suspended from his post after rejecting an application from a prospective PhD student who had served in the Israeli army (see *Nature* **424,** 120; 2003).

Many Palestinian researchers reject the idea of boycotting Israeli science. "It's counter-productive," says Abdeen. Even among Palestinians who support the idea of an economic boycott on Israel, there is unease about the idea of extending protests into the scientific arena. In towns such as Nablus and Hebron, however, some researchers support the actions of those foreign academics who have refused to work with Israeli scientists. Despite his own willingness to work with Israelis if the collaboration strengthens Palestinian science, Khatib is among their number. "Pressure must be exerted on Israel," he says. "I support the boycott because it can enhance movements in this direction."

Such comments are distressing to Israeli academics, especially those involved in collaborations with Palestinians. There is a saying in Israel that reflects the country's love of debate: "put two Israelis in a room, and you'll get three opinions". But this definitely does not apply to discussions about the call for a scientific boycott. "You're not going to get three opinions on that," says Jonathan

Touched by terror

For almost a year, the unpainted door of Michael Beenstock's office in the Department of Economics at the Hebrew University of Jerusalem served as a terrible reminder of the darkest day in Israel's academic history.

In July last year, builders were busy renovating Beenstock's department and other buildings on the university's Mount Scopus campus. On the final day of that month, one of the workers left a bomb in a cafeteria, close to Beenstock's office. Nine people — staff, students and visitors — were killed, and more than 80 injured. "Every day, that unfinished door reminded me of what happened," says Beenstock.

For academics who believe that research collaboration can help to defuse Israeli–Palestinian tension, the targeting of the Hebrew University was especially painful. Of all the universities in Israel, it has the strongest tradition of organizing joint projects. More than 20 collaborations with Palestinian researchers are still ongoing, and 45 new Palestinian students have enrolled for courses this autumn.

Memories of the bombing are still vivid. Beenstock was in his office at the time, talking with some of his students. "We heard a bang and thought the builders had caused an accident," he says. "Then we heard ambulances and knew it was a bomb."

Yousef Najajreh, a Palestinian researcher at the university who works on methods for drug delivery, was having lunch in a cafeteria on another of the university's campuses when the bomb went off. "My wife didn't realize there were different cafeterias," he says. "She knew I would be eating at that time. She was going crazy trying to call me, but the telephone network was down."

Najajreh condemns the attack on an institution that has tried to build links between Israelis and Palestinians, but says that he nevertheless found it difficult to approach Israeli colleagues in its immediate aftermath. "It's not easy for a Jew to see a Palestinian after people have been killed," he says.

Beenstock remains angry about the muted reaction from many of the Hebrew University's Palestinian students. On the day of the bombing, he had spoken to an Arab postgraduate whose PhD thesis he had supervised. "People from all over the world called that night," recalls Beenstock. "But my student never bothered to pick up the phone."

Clearly, the bombing has scarred relationships between Israelis and Palestinians at the university. But officials remain determined to continue the tradition of joint projects. Hervé Bercovier, the university's vice-president for research, notes that a contract to collaborate with An-Najah National University in Nablus — which has been accused by the Israeli army of harbouring terrorists — was signed earlier this year. "There are no restrictions on who we work with," he says.

That sentiment is shared by some of those most severely affected by the bombing. Inna Zusman, then a first-year Israeli student in computing and cognitive science, suffered a spinal-cord injury in the blast. Now in a wheelchair, she will resume her studies this autumn. "People look more at your face and your race than before," she admits. "But the attack won't change the way we interact."

Gressel, a plant biologist at the Weizmann institute. "I don't think it ever helps to keep scientists out of science for political reasons." His colleague Geiger agrees: "This breaks with one of the most cherished and important features of science: that it is international and non-political."

Scientific bodies and publications, including *Nature* (**417,** 1; 2002), have spoken out against the idea of boycotting Israeli science, and an anti-boycott petition has attracted more than 15,000 signatures. The academics behind the letter to *The Guardian* have also since stressed that any boycott should not extend to Israelis who work on joint projects with Palestinian researchers.

Nevertheless, many Israeli scientists feel that the debate has had a chilling effect on their relations with colleagues abroad. When I suggest to Shy Arkin, a biochemist at the Hebrew University, that the boycott is only weakly supported in Britain, he immediately dissents: "It's not a small minority."

"You hear of a variety of initiatives," agrees Geiger. "Some are individual people expressing their views; others are channelled in a more institutional way." Geiger points out that the European Molecular Biology Organization has come under pressure from some academics to suspend the membership of Israeli scientists.

Other Israeli academics tell of more personal attacks. "There is an unpleasant feeling in Europe," says Michael Beenstock, an economist at the Hebrew University. Just back from a meeting in Finland, Beenstock recounts an argument with an academic who began to berate him about his government's policies towards the Palestinians, after reading the institutional affiliation on his name badge. "He very quickly became critical of 'you Israelis'," says Beenstock. "I lost my temper until someone told us both to shut up."

It is understandable that Beenstock might lose his cool under such circumstances — his office is less than 100 metres from the site of last summer's attack on a Hebrew University cafeteria, in which nine people were killed by a bomb placed by Palestinian construction workers (see 'Touched by terror,' opposite). For those who have been exposed to such acts of violence, being blamed for the conflict is hard to bear.

Back in their drug-delivery research lab, Golomb and Najajreh try not to engage in similar arguments, as they know that they can never agree over the conflict. Yet somehow they manage to work together. "We turn down the volume on our arguments because we have a shared value against sickness," says Najajreh.

Until the political leaders of Golomb's and Najajreh's respective communities can negotiate a peace agreement that both sides can accept, however, this shared value will remain bound by a tenuous thread. ■

Jim Giles is a reporter for *Nature*, based in London.

Up in smoke: in recent weeks, the Israeli military has targeted buildings suspected of housing Palestinian militants in Hebron.

NAYEF HASLAMOUN/REUTERS

A campus under siege

Radwan Barakat waves his hand towards the olive groves and low-rise buildings that blanket the hills opposite Hebron University. "They call this the martyrs' neighbourhood," he says. The area's association with suicide bombings — or 'martyrdom operations', in the lexicon of Hamas and other militant Palestinian groups — has left its mark. Across the valley, a single apartment has been blown out of the side of a building. This is the usual response when the Israeli army identifies the home of a suicide bomber.

The dusty campus of Hebron University, which hosts some 4,500 students, also bears the scars of conflict. Barakat takes me in through a side entrance — the only one that is not welded shut. The university was shut down in January, after students from the area were linked with suicide bombings. This single gate was broken open a few months later.

During the closure order, which lasted until shortly after my visit, the university's activities were in disarray. Barakat is a plant pathologist, and needed to care for his plants and fungi to avoid losing data. He points to a low roof below the windows of his laboratory, which allowed his support staff to enter without attracting the attention of soldiers who were watching the building's main entrance. "I really have to respect my technicians and graduate students for doing this," Barakat says.

Other areas of Barakat's work have not survived, however. He used to divide his time between the university and an agricultural research station at Al-Arroub, a few kilometres outside Hebron. But this station sits opposite a refugee camp that is closely monitored by the Israeli army. When the latest Palestinian uprising began in September 2000, Israeli forces moved into the station. A watchtower now stands where Barakat's experimental crops once grew, and access to the area is prohibited.

Work at Hebron University continued despite the official closure. Nearby school halls were recruited for lectures, and students moved in as the schoolchildren left each afternoon. Teaching hours were cut back, however, to allow students to travel home in daylight hours and so avoid problems with the Israeli security forces.

On the day of my visit to the university, administrators are rehearsing for a graduation ceremony, laying out chairs and setting up a public-address system. But the next day, the Israeli army intervenes, making it clear that the ceremony should not go ahead.

When I call in September to see if the event would be rescheduled, the outlook is grim. "Listen," says Naim Daour, Hebron University's director of public relations. "Can you hear the sirens? The army has destroyed a building near the university." Later, I speak to Maher Al-Jabari, a chemist and trustee of the university. "The purpose of the celebration was to add happiness," he says. "But this now contradicts the feeling of sadness in Palestine."