

AGAINST ALL ODDS: SCIENCE IN THE PALESTINIAN TERRITORIES

BY ALISON ABBOTT



Travel restrictions and paltry funding hamper researchers, who are trying to build a scientific base.

Dalal Saeed is very clear about what she wants from life: an academic research career in geochemistry. But there are no PhD programmes in the natural sciences in the Palestinian territories. So, every workday, she travels from her West Bank village, across the concrete wall that divides her homeland from Israel to the Hebrew University of Jerusalem, where she has just started her doctoral work.

It's barely 10 kilometres, but the first few times she made the journey through the nearest, traffic-choked checkpoint, it took her more than three hours. She soon learnt to drive farther along the wall to a quieter checkpoint, and halved her travel time.

After decades of conflict, many embittered Palestinians from the occupied territories boycott any form of economic or cultural activities with Israel — including research. But higher education is an exception. “It is an individual decision,” says Saeed, who has so far found long travel times her only challenge. Her Israeli co-supervisor, geochemist Boaz Lazar, helped to organize a multi-entry permit for her to enter Israel during the daytime, a scholarship courtesy of the University of Haifa and a project to measure heavy-metal isotopes in and around the Dead Sea, which borders Israel, the West Bank and Jordan.

Saeed has a strong affinity with the Dead Sea, having grown up near its shores and studied it for her master's project. The opportunity to do a PhD “is a dream come true”, she says. Once qualified, she'd like to move on to a Palestinian university, but is open to wherever life may take her. Who knows what can happen in three or four years, she asks.

That's a question that many scientists in the territories ask themselves.

They view their predicament as unjust and unstable. But whether Israeli occupation ends in the creation of an independent Palestinian state or in the absorption of the territories into the state of Israel, they say their future depends on having a strong intellectual base and the capacity to carry out research.

Anger in the Palestinian territories festers as conditions for its residents grow increasingly desperate. Travel and imports are heavily controlled by the Israeli military, so researchers find it difficult — and sometimes impossible — to get to international conferences or labs and to access research materials. This year, political tensions have ratcheted up — particularly in July, when the Israeli government passed the Jewish Nation-State bill, which conferred lower citizenship status on non-Jews, including the 20% or so of citizens who are Arabs. Movement restrictions seem to have tightened, too. And Palestinian authorities have devoted little financial support to building up science in the territories.

On the other side of the separation barrier, many — although not all — Israeli scientists oppose how people in the Palestinian territories are being treated. And there have been sharp disagreements in the academic community, especially over the legal status of a university in a Jewish settlement in the territories.

Despite the problems, some researchers and educators are doing what they can to develop a functioning scientific community there. They are setting up research groups for young scientists and taking advantages of opportunities to train overseas and get research grants from foreign governments. “We have so many challenges,” says inorganic chemist Abdullatif Abuhijleh, president of Birzeit University near Ramallah.



HEIDI LEVINE FOR NATURE

“But we work hard, we do research and we make progress.”

Israel took control of the Palestinian territories — the regions of East Jerusalem, the West Bank and Gaza — after the 1967 Six-Day War between Israel and its Arab neighbours. (The United Nations and much of the world refer to these as the occupied territories, whereas Israel calls them disputed territories.) During the First Intifada, or Palestinian uprising, in the 1980s, Israeli forces frequently closed Palestinian universities because of suspicions that they might be nurturing attacks on Israelis. The signing of the Oslo Accords in 1993 led to serious peace talks, with a goal of ending the occupation. The Palestinian Authority was established as a governing administration and momentum seemed to be moving towards an independent Palestinian state. But the talks failed and violence resumed in 2000 with the Second Intifada.

Since then, Israeli settlements have expanded into the Palestinian territories and Israel has constructed the separation barrier, which loops protectively around the new settlements. In the past year, tensions have spiked as Palestinians have thrown firebombs and explosives across Gaza's border fence and launched mortar bombs into Israel. Israeli troops have responded with tear gas, live ammunition and air strikes — an escalation to levels of violence not seen since 2014.

Science has not been a high priority for the Palestinian Authority, which has rarely allocated money to research. But education minister Sabri Saidam's 2017–22 strategic plan strives to develop research capacity. Last year, his ministry announced a modest, 20-million-shekel (US\$5.5-million) research fund — the first such science budget in 5 years — to be shared between the 14 universities in the territories and the 2,200 full, associate and assistant professors employed there. “It is a signal” of support for science, says Isam Ishaq, assistant president for research at Al-Quds University, one of the territories' leading universities, in East Jerusalem. Still, he says, it is a constant struggle for universities to find the money to cover running costs for science, and to keep any big equipment in working order.

(The situation is even worse for scientists in Gaza, a strip of coastal land separated from the West Bank by Israeli territories. Electricity is limited to a few hours a day, ruling out most forms of experimental research.)

In the West Bank and East Jerusalem, the Palestinian Authority's lack of focus on science “is a major gap”, says Sari Nusseibeh, a philosopher at Al-Quds University and a leading academic in the region. Nusseibeh was president of his university in the optimistic 1990s, when he strongly encouraged the development of research — as well as academic cooperation with Israel, a powerhouse for world-class research. Back then he reasoned that if the Palestinian territories were to become an independent state, they would need a strong base in research — not least because they have few natural resources. “As Palestinians, our only resource for self-improvement is ourselves as human beings, and the more initiative we have, the better.”

After the violence of the Second Intifada worsened prospects of an end to the occupation, the idea of a non-violent boycott of Israel gained ground in the territories. Many academics outside the Middle East today boycott cooperation with researchers in Israel, although this movement is much stronger in the humanities and social sciences than in natural sciences, where it has had minimal impact, say Israeli scientists.

Inside the territories, Nusseibeh says it was never clear to him if the mandate of the Boycott, Divestment and Sanctions movement should apply to Palestinians wishing to forge academic links with Israel. “But local pressure increasingly grew to put an end to scientific cooperation,” he says.

Palestinian universities respect the boycott of Israel at the institutional level, but don't ban individual academics from working together. A few brave souls risk the wrath of public opinion by doing so, although they tend not to broadcast it loudly. This is evident in the fact that applications

Left: Abdul-Rahman Sawalma extracts DNA from a blood sample at Al-Quds University in the West Bank. Right: Palestinians cross the Qalandiya military checkpoint to enter Jerusalem in the early morning.

continue to come into the German Research Foundation (DFG) for its trilateral programme, in which Germans and Israelis collaborate with Palestinian scientists, according to a DFG spokesperson.

OUTSIDE FUNDING

More than €71 million (US\$81 million) has been distributed in these projects since the DFG programme started in 1995. Other international programmes have sprung up specifically to help Palestinians. These include the Palestinian–German Science Bridge, a €12.5-million, 5-year programme supported by the German science ministry to help postgraduate students get training in Germany. And last year, the Quebec region of Canada launched a 4-year, million-dollar programme to bring 60 researchers from the territories to the province for 3–5-month research missions.

Palestinians rely heavily on such international programmes, modest as they are, as well as on European Union programmes, which have in the past decade or so transferred nearly €3 million to scientists in the territories who are participating in collaborative projects with people in EU countries.

Although their access to funding is limited, scientists there say that an even bigger impediment to carrying out research is the Israeli occupation. One major problem is a lack of free movement: most people in the West Bank need a permit to enter Israel, and their applications often involve major delays or rejections. Scientists throughout the territories also have trouble importing reagents and equipment because that requires approval from Israeli security channels. Some basic items, such as the fertilizer ammonium nitrate or simple acids, are listed as ‘dual use’ and are banned, for their alleged potential to be used in weapons. What’s more, the isolation of the region has meant that the research community has remained too small and underfunded to be able to offer PhD programmes. Still, the challenges have not killed ambition.

Some Palestinian scientists working in other countries avoid politics and instead organize practical support that they hope will help create human capital for future high-level research back home. Nanotechnologist Mukhles Sowwan keeps a close eye on his former lab at Al-Quds from his position at the Okinawa Institute of Science and Technology in Japan. He helps guide master’s students at Al-Quds, assisting the brightest in

is late, has missed a small deadline or has written a careless e-mail. He also discourages any discussion of politics in his lab, which he says can divert attention and cause problems. “Our focus has to be strictly on science and professionalism,” he says. No one objects. The atmosphere is eager, expectant.

Only 33 years old himself, Herzallah sees PNI members as the seeds of a future international-level research hub in the territories, and he instructs some of his group in team-leading skills. Abdul-Rahman Sawalma, who already has a medical degree and intends to move to Germany next year to complete a master’s and then a PhD, is one of those getting leadership training. Once in Germany, Sawalma will regularly Skype his group at the PNI, just as Herzallah does, to share the knowledge he gains while supervising related research activity there. After his PhD, he wants to do a neurology medical specialization in Germany, but his firm intention is to then return home. “It feels great to be building something pioneering in Palestine,” he says.

Many others struggling to get research done in the territories find the topic of politics hard to avoid. The permit and visa issues are a constant reminder. Palestinians who live in the West Bank are not allowed to fly to other countries from Israel’s airports without a special permit that they say is practically impossible to get. Instead, they usually first have to travel overland to Jordan, which can add an extra day to a trip.

TRAVEL TROUBLES

Some West Bankers require permits even to move within the West Bank. Young male scientists say that they, in particular, are often stopped by the military for inspections between checkpoints. They asked for their names to be withheld because they feared getting on Israeli security lists. “Every day, the situation gets worse,” says one, a sentiment echoed many times. Polymer chemist and Al-Quds vice-president for science and society Hasan Dweik says bluntly: “We are in a big prison.”

Foreigners need a visa from Israel to enter the occupied territories, and Palestinian universities have reported a sudden increase in the number of faculty members who have had visa problems. A survey carried out by the Palestinian Ministry of Education found that in the past two academic years, more than half of the 64 foreign faculty members in Palestinian universities have had visas denied or delayed without expla-

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enrolling in PhD programmes in countries such as Germany, France and Japan — even occasionally at the Hebrew University. Most of the doctoral students have an agreement to return to Al-Quds after their training. Sowwan says his contribution is small, but rewarding. “If I am able to open up an opportunity to an individual, I can feel their happiness.”

Neuroscientist Mohammad Herzallah, a postdoc at Rutgers University in Newark, New Jersey, works from afar with the Al-Quds’ Palestinian Neuroscience Initiative (PNI), which he founded in 2009. The initiative currently includes more than 30 students who aim to become scientists, and they carry out research projects under Herzallah’s remote guidance.

One project concerns the biology of depression, which has a prevalence of around 30% in the Palestinian territories, one of the highest rates in the world. The PNI gets financial support from private donors and from the US National Institutes of Health. Together with scientists in Germany, Herzallah is now applying for support from the German research ministry to build a PNI lab that allows Palestinian students to investigate differences in electrical activity in the brains of people with and without depression.

Crowded around a long table, the PNI students update Herzallah on their individual progress in weekly Skype meetings, which take place well before dawn breaks in New Jersey.

The discussions are lively, but Herzallah doesn’t tolerate anyone who

nation. At a press conference in July, Saidam said that the problem is “undermining the quality of education and research programmes at our universities”.

The Israeli organization COGAT (Coordination of Government Activities in the Territories), which is responsible for visas, did not respond to requests by *Nature* for comments about the specific problems of academics but told *Nature* that there has been no change in its visa policy and that “each individual case is examined on its merits”.

Birzeit University says that 8 of its 20 foreign faculty members have failed to get visas in the past 2 years, which Abuhijleh describes as a major problem. Having international scholars keeps the relatively isolated universities connected with the world, he says, “but the visa issue makes it so difficult to get and retain them”.

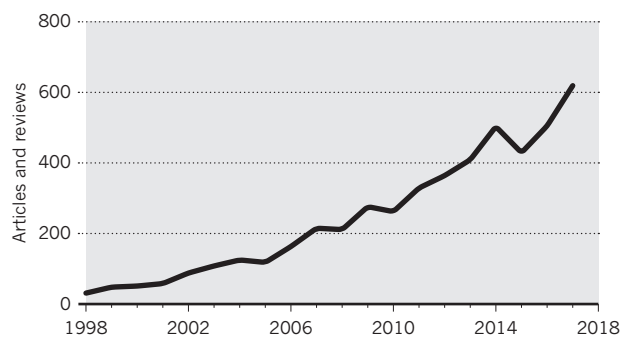
Despite all the challenges, some universities have managed to increase their research output. According to the Scopus database, the rate of scientific publications from Palestinian universities has nearly tripled in the past decade, although the absolute level remains low and many publications are from large international collaborations in the health arena (see ‘Science statistics’).

Tensions over the occupation and a lack of progress towards peace cast an omnipresent shadow over scientists in Israel, where government money for research and scientific output is above the EU average.

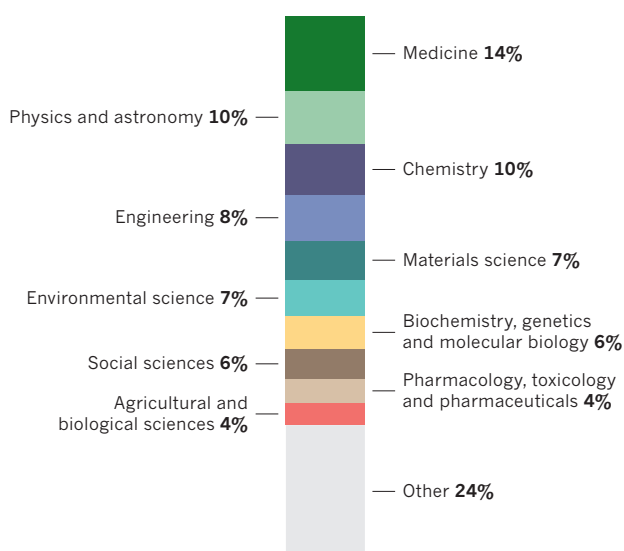
SCIENCE STATISTICS

In the past 20 years, there has been a sharp rise in the number of publications in the Scopus database from scientists in the Palestinian territories, covering a wide range of subject areas.

PUBLICATIONS



SUBJECT AREAS



Israel is second only to Switzerland in the number of prestigious grants its scientists win from the European Research Council, in proportion to its population. Scientific organizations and institutions, including universities, remain carefully neutral on politics, and many individual scientists prefer to keep their heads down, too.

Not all are so reticent, however. Physicist Eli Pollak at the Weizmann Institute of Science in Rehovot, who is also a member of the Israel Council for Higher Education, says that the Palestinian terrorist attacks following the Second Intifada, and the continuing, if lessened, danger, justifies the careful vigilance of Israel's defence system. And the Israeli public has shown strong support for enhancing security measures. Prime Minister Benjamin Netanyahu's party won the highest number of votes in the 2015 election on a platform that emphasized security.

But particularly sensitive government decisions that touch on academia reveal significant splits within scientific organizations. Computer scientist David Harel, also at the Weizmann Institute, is a vocal critic of Israeli politics, which he says is creating an apartheid state that segregates Palestinian and Jewish people and denies Palestinian people many of the most basic rights.

Human-rights activists have heavily criticized the Israeli government's policies in the Palestinian territories, and there have also been concerns about how Palestinian leaders have treated people there.

The organization Human Rights Watch reported last month that the Palestinian Authority in the West Bank and the Islamist militant group Hamas in Gaza crush dissent through violence and imprisonment, which limits free speech in those areas.

In Israel, several government actions in the past year have triggered protests by academics. Education minister Naftali Bennett shepherded through a law in February that would bring a new university in the West Bank's largest settlement town, Ariel, under the umbrella of the Israeli Council for Higher Education. The proposed law was unprecedented and of high political significance, because Ariel is outside Israel's sovereign borders, and some see it as an opening towards annexation of the town.

Harel — who is vice-president of the Israel Academy of Sciences and Humanities — and some other academy members considered the move to also be a danger to the well-being of science in Israel because it offended international colleagues. Harel argued that the academy should issue a dissenting statement, but academy president Nili Cohen disagreed. "It is a political decision of the Israeli government, and the academy does not take positions on political issues," says Cohen, a lawyer at Tel Aviv University.

Harel organized a public letter that was signed by 51 of the academy's 115 members, warning that the controversial law might fuel a tightening of the international boycott of Israel's academia. The legislation was passed anyway, on 12 February.

In another recent conflict, science minister Ofir Akunis blocked the nomination in July of neuroscientist Yael Amitai to the scientific committee of the German-Israeli Foundation for Scientific Research and Development (GIF), which distributes around €12 million per year to collaborative research projects. Akunis says he ruled Amitai out because she had signed a 2002 petition supporting university faculty members and students who refused to carry out military service in the Palestinian territories. The affair caused a storm of protest in Israel and Germany. In Israel, more than 1,300 faculty members signed a petition protesting that the move was political interference in scientific affairs, and calling for a boycott of the GIF until Amitai is appointed. Two German GIF science-committee members resigned.

The Association of University Heads in Israel appealed to the High Court of Justice to decide whether Akunis was within his rights to block her. Akunis has stated that he did so not because of her opinions, but because the petition encouraged "conscientious objection to enlistment in the Israeli Defence Forces". On 11 November, the court ruled that the appeal against Akunis' decision has merit. It will hold a hearing on the case next month, and Akunis cannot appoint a different person until the case is decided.

Occupation politics complicates life for Palestinian scientists — but so does the limited and sporadic nature of financial support. Mutaz Al-Qutob, a chemist who operates a lab in a corner of Al-Quds' elegant central courtyard, says he cannot stick to a clear research agenda, but has to adapt to whatever occasional funding opportunity might appear, to which his ageing equipment might be applied. He struggles to run his mass spectrometer, which was bought with a German grant, and his fish tanks for toxicology studies because he cannot find funds for maintenance and repair costs. He has participated in EU projects on biodiversity in a World Heritage village near Bethlehem, and he has analysed heavy metals in local water supplies, contamination that results in part from the informal e-waste recycling economy that has emerged in the territories. "We are not free to do as we like," he says. "We hope for a better future."

On top of all this, scientists have to cope with the many inconveniences of the region's impoverished environment — not least the poor general infrastructure, including unmaintained roads with densely pot-holed surfaces that slow traffic even without the border queue-ups.

That is something that Saeed will have to confront less frequently in the new year. She has just acquired a permit that allows her to stay overnight in west Jerusalem, freeing her from a daily commute. One step at a time, she is moving towards her goal "to become a postdoc, to become a professor — if not in Palestine, then anywhere". ■ [SEE EDITORIAL P.293](#)

Alison Abbott is Nature's senior European correspondent.

CORRECTION

The News Feature 'Against all odds: science in the Palestinian territories' (*Nature* **563**, 308–311; 2018) located Mohammad Herzallah at the wrong campus. He is in Newark, not Piscataway.