

A quarterly publication from the AAAS Center for Science Diplomacy

Kira E. Mock, "The Middle East Regional Cooperation Program: Opportunities for Israeli-Palestinian Collaborative Research," *Science & Diplomacy*, Vol. 2, No. 1 (March 2013*).
<http://www.sciencediplomacy.org/perspective/2013/middle-east-regional-cooperation-program>.

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*The complete issue will be posted in March 2013.

The Middle East Regional Cooperation Program: Opportunities for Israeli-Palestinian Collaborative Research

Kira E. Mock

THE Middle East Regional Cooperation (MERC) program is a competitive research grants program, financed by the U.S. Agency for International Development, that supports cooperation between Arab and Israeli scientists on topics that are likely to produce long-term development results. MERC projects focus on issues related to agriculture, water, the environment, and health. Selection criteria include technical merit, innovative approaches, contributions to regional development, and long-term Arab-Israeli cooperation. The program's impact on cross-border relationships has led to several long-term collaborative relationships that have spanned decades and have included multiple countries in the Middle East. In the West Bank and Gaza, projects have strengthened research capacity, enhanced educational opportunities, and forged lasting research bonds with Israeli counterparts.

After the Camp David Accords in 1979, interested parties initiated MERC to foster cooperation between Israeli and Egyptian researchers. By 1993 the program had been broadened to include all neighboring Arab countries interested in

Kira E. Mock is the program manager for Energy, Environment & Agriculture in the S&T Policy Fellowships Program at the American Association for the Advancement of Science (publisher of Science & Diplomacy). She has fourteen years of experience working with USAID cooperative development research programs and worked with the MERC Program as the program officer for the USAID Research Support Program in Policy and Global Affairs at the National Academies on a Cooperative Agreement with USAID for ten years.

cooperating with Israeli researchers. MERC criteria promote cooperative cross-border efforts, allowing access to higher education and supporting research facilities that did not exist prior to the funding of Israeli-Palestinian MERC projects. MERC now includes institutions in the West Bank and Gaza, as well as in Egypt, Jordan, Morocco, Lebanon, and Tunisia. Palestinian researchers are one of the largest groups of recipients of MERC funds, receiving roughly \$1 million from MERC's annual budget of \$5 million.

In 1998 MERC adopted a stringent peer-review process involving nongovernmental scientists, which raised the bar for scientific merit while requiring the demonstration of cooperation possibilities and contributions to regional development. The program also began encouraging more direct Arab-Israeli cooperation instead of relying on intermediary U.S. institutions to manage projects. By 2007 MERC had received more than one hundred pre-proposal submissions in the annual application cycle, none of which involved U.S. intermediaries. Most current projects have no U.S. partners, relying entirely on direct cooperation between Israelis, Palestinians, and other Arab partners.

In 2011 there were thirty-seven active Arab-Israeli MERC projects, with seventeen involving institutions in the West Bank or Gaza. Some projects included multiple Palestinian institutions or multiple Arab countries, with at least one Palestinian coprincipal investigator and funds for postdoctoral scientists, graduate students, and infrastructure facilities. MERC encouraged projects that had a high potential for regional development and capacity strengthening. Jordan was the only country with more MERC projects, with twenty-five active grants. Most of the grantees have been U.S. or Israeli universities, government research institutions, or nongovernmental institutions. They manage the project funds, which can be as high as \$1 million, and they make sub-awards to partner institutions in Arab countries, the United States, and Israel. In some cases, Jordanian or Palestinian institutions have managed the funds, but this is comparatively rare because of institutional constraints.

Cerebral Palsy Study

MERC has had many health-related projects and each has produced interesting results. One in particular focused on improving the functional motor abilities of Middle Eastern children with disabilities caused by cerebral palsy (CP). The researchers taught and disseminated the functional motor learning (FML) therapy approach; compared the efficiency of FML with the conventional neurodevelopmental treatment (NDT); developed simple, efficient, and low-cost tests to measure motor function changes; expanded collaborative research pertaining to children with physical disabilities; and developed functional motor questionnaires for parents of children with CP.

The project has made significant progress in the West Bank; children who had never walked are now walking, and parents who had never been a part of

their children's treatment are now involved thanks to the intervention and training. Prior to the study, therapists and doctors in the West Bank and Gaza would not talk to parents about treatments because of social mores that put doctors and therapists above the average person. As a result of this study, parents of children with cerebral palsy learned how to evaluate their children's functional levels and were empowered to share in the decision making regarding treatment plans and goals. Further, these parents were no longer afraid to go out with their children, and they did not care whether their therapist was Arab or Israeli—they were just happy to receive the help and results. These unprecedented results were so impressive that the U.S. National Institutes of Health analyzed the data for free.

The project also had additional benefits. Palestinian and Jordanian institutions specially assembled committees for the ethical approval of experiments involving human subjects, or institutional review boards. It was the first time that such committees were established for research in rehabilitation of children in these centers. Therapists from the centers attended joint Arab-Israeli courses where they learned about new research methods and the new treatment approach. These courses also helped lay the foundation for future cooperation. One therapist and one project manager from East Jerusalem received their master's degrees as a result of the funding from this project. The project provided equipment and training that will lead to new centers with expertise in cerebral palsy research and that will likely broaden to encompass children with other disabilities.

The quality of life for these disabled children has improved greatly thanks to the therapy, but also thanks to the creation of networks of cross-border cooperation among researchers and academics. The researchers and therapists have benefited from learning a new treatment approach and using new research tools. Palestinian therapists have gone out into the community and transferred these therapeutic techniques to groups throughout the West Bank. CNN even filmed a documentary on the project, which focused on the various families in the West Bank and Jordan. After the researchers accomplished all the project's objectives, the study was expanded to include additional populations, such as head injury patients, and it has received additional funding from the Carter Foundation.

Inherited Skin Diseases

Epidermolysis bullosa (EB) refers to a genetically and clinically heterogeneous, or diverse, group of inherited skin diseases characterized by skin blistering. The Middle East has a high prevalence of EB with significant morbidity. The MERC project developed a comprehensive approach for diagnosing and preventing EB in the Middle East by establishing the region's first epidemiological database based on a large mutation screening in affected families, identifying genotype-phenotype correlations specific to the region, developing simple molecular assays for the most

prevalent mutations, and identifying EB cases not caused by mutations in known genes. Researchers performed extensive mutation analyses in 157 affected families.

The team of Israeli and Palestinian researchers designed a joint network to perform patient recruitment and molecular analysis in an integrated way. Through this, they established a strong cooperation that has resulted in numerous continuing projects. The students and principal investigators (PIs) also formed close personal bonds during frequent meetings and personnel exchanges, and attended the Society of Investigative Dermatology annual meeting together to present their results.

The team recommended that patients be categorized according to background. Molecular epidemiological features found in EB patients of Western origin are quite different from those found in Middle Eastern populations. The researchers also recommended the development of a specific diagnostic algorithm. They discovered differences in the molecular epidemiology of EB in the Middle East when compared with the United States and Europe that has revolutionized diagnostic and counseling strategies for EB families in the West Bank and Israel. A novel technique for detecting these mutations was necessary because of the frequency of consanguineous marriages and the fact that 90 percent of parents of children with recessive disorders are closely related to each other.

The team developed Israeli-Palestinian specific diagnostic tools that are now routinely used to diagnose EB and other skin genetic disorders. Homozygosity mapping—a technique designed to map recessive diseases in consanguineous societies—was effective in decreasing costs for mutation analysis among junctional, or intersecting, EB populations. The project was responsible for determining the importance of histological and molecular analysis in EB genetic counseling in the region. As a result, prenatal genetic counseling advises that EB-positive mothers obtain cesarean deliveries to reduce trauma to skin at birth. This procedure can reduce the initial skin damage and result in less lifelong skin damage and suffering.

Agricultural Diseases Resistance Breeding

Some MERC projects have expanded from their initial purpose. For example, a plant viral indexing project began with three PIs fifteen years ago, but has since spanned several MERC projects, adding new partners, expertise, and countries to combat the spread of economically costly agricultural diseases.

Viral Indexing Certification Program

The Middle East needed standardized virus detection methods. This MERC project established these by

- developing reliable, sensitive detection methods for the major viruses infecting potatoes, tomatoes, bananas, and stone fruits;

- establishing a collection of virus antisera and virus detection probes;
- standardizing methods among the virus testing labs;
- expanding collaborative efforts; and
- implementing a fee-based structure for programs where appropriate

The project developed more than thirty-eight virus detection methods for bananas, citrus fruits, cucumbers, grapevines, stone fruits, potatoes, and tomatoes. The researchers shared these results publicly online and in a handbook. The viruses affect not only the Middle East but also U.S. agriculture. The team developed additional methods to detect pathogens for the eighteen most significant viruses and viroids for the above crops.

The project also helped twenty-five postgraduate students receive advanced degrees and resulted in forty-eight papers. Additionally, the project initiated molecular research laboratories where none had existed before, including one at a university in the West Bank. Project investigators transferred the detection methods to the governmental plant protection units in the countries involved, resulting in improvements to quarantine and certification methods. Seven Middle Eastern countries are now better able to detect viral pathogens in important crops, with well-equipped laboratories and trained researchers.

Training was a major priority. Individuals learned new techniques in other laboratories and then employed them in their own countries. There were forty-three short training periods during the project. Students in the West Bank received regular training at the Hebrew University of Jerusalem (HUJI) in Rehovot, Israel, and graduate students from HUJI traveled to Bethlehem University. Individuals transferred the newly learned techniques when they returned to their home countries.

In addition to the training sessions, researchers and students attended twenty-two professional meetings to present posters or give talks. More than three hundred scientists, technicians, and extension agents participated in workshops in the West Bank, Egypt, Tunisia, and Morocco for training plant protection unit staff, other area students, faculty, and individuals from the private sector.

As a result, a regional diagnostic laboratory including Palestinians has been implemented for detecting plant viruses. A Palestinian pathogen testing laboratory has been established in the West Bank.

Tomato Agricultural Diseases Resistance Breeding

Partners in six Arab countries and Israel developed tomato cultivars resistant to Tomato Yellow Leaf Curl Virus (TYLCV) that are adapted to local conditions and have characteristics suitable for the markets of partner countries. This could result in significant economic benefits for all the countries involved, as they are all vulnerable to the devastation the virus inflicts. Scientists and students designed breeding exercises to consider market preferences and growing conditions per

country. A diverse collection of TYLCV-resistant tomato germplasm resulted. Genetic markers were developed that tag known loci conferring resistance to TYLCV and to nematodes.

Through this project many students received training and a Palestinian student received her undergraduate degree from Hebrew University in Israel. Eleven joint publications were also cited. By the end of the project, all the groups will be familiar with new technologies, such as use of molecular marker-assisted breeding techniques. State-of-the-art facilities will provide for the continuation of this work. The Palestinian lab is now established as an efficient tissue culture lab and is one of the only fully active research labs at the Palestinian institution.

The plant viral indexing project employed forty-nine people, and the core members of this group have cooperated together for more than fifteen years. They remain dedicated to overcoming adversities to continue their close professional relationships.

Middle East Realities

Despite MERC's success in promoting cooperation, numerous obstacles still affect cooperative research. For example, for over a decade, security issues and strife have made the movement of people and equipment across borders a serious challenge, particularly into and out of Gaza.

Security is a great concern among MERC participants, and many researchers keep low profiles lest they expose themselves to unwarranted political and security problems. In this regard, mechanisms for increasing Palestinian participation in projects often involve innovative approaches. For example, third-party nongovernmental organizations may be required to provide a means for involving critical researcher groups at Palestinian government institutions, which increases project costs. Safety and security issues can cause challenges in communicating achievements of collaborative efforts. Despite such challenges, MERC has seen an increase in Palestinian projects since 2000. New proposals with Palestinians now exceed those from any Arab country.

In the Middle East, environmental, agriculture, and health issues are generally interconnected. For example, an arid climate leads to water scarcity, so it is important to understand how precious water resources are best managed. Limiting irrigation and using precision irrigation at critical stages in agriculture may help preserve water resources, but such measures need to be broadly implemented across the region to have a significant positive impact. MERC supports cooperative scientific research designed to tackle these types of regional concerns.

Need for Program Outreach

Security will continue to be an issue, causing researchers to want to minimize exposure. However, it is important to publicize the results as well as the achievements in cooperation, so that results of regional efforts are brought to the attention of stakeholders and local funding sources. Therefore, regular reports from project teams should document research results, provide data from cooperative research, and relate progress to regional development. In particular, providing the MERC community with access to a dedicated secure interactive website with list server capabilities would provide important perspectives at a low cost and may facilitate the implementation of demonstrated solutions to problems across disciplines.

MERC needs to continue to encourage better dissemination of results and evidence of Palestinian partners' active participation in new projects highlighting improved regional development and capacity strengthening. MERC can report the development of new technologies for enhanced economic and social benefits for Palestinians, Israelis, and their Arab neighbors. At a time when government outreach is more constrained, these scientific accomplishments, which travel across borders, will stand out and perhaps provide the groundwork for broader cooperation. **SD**