

Planting seeds for peace and health

Disease has plagued mankind from the beginning, but fortunately, Mother Nature's flora are the world's medicine cabinet, with the potential to cure human ills. A quarter of all existing medications are based on plants. The Mediterranean Sea basin was the cradle of civilization, and this region still has some 25,000 different plant species - about half of them endemic to the region. Estimates put the value of undiscovered drugs at around \$900 billion.

But this potential for healing is at risk, as less than one percent of plant species in the area have been studied scientifically, and 17% of them are already classified as endangered species due over-development. Three years ago, the European Community initiated a two-million-euro project that would have double benefits: to create trust and share complementary skills and resources among Israelis and Palestinians, with participation of Spanish and Greek scientists as well; and to collect and screen plants in their areas for possible anti-cancer, anti-viral, anti-bacterial and other characteristics that could be developed into beneficial pharmaceuticals.

Called BioXplore, the project was coordinated by Prof. Bertold Fridlender, president of the Hadassah Academic College in the center of Jerusalem, and the participants communicated regularly with each other via the BioXplore website, mutual visits and video-conferences.

Despite the current wave of terrorism and the bitter memories of Operation Protective Edge in Gaza, the Israelis from the college and Palestinians from the Biodiversity and Environmental Research Center in Nablus have successfully completed the three-year project. Also participating were colleagues from the Leit-Technology Center in Spain and the Hellenic Regional Development Center in Greece, along with two major associate partners at Rutgers University and North Carolina University in the US. The participants covered 10% of the cost, with the EU paying for the rest.

Each of the four partners performed parallel research, so the resulting consortium was able to establish a comprehensive database for the Mediterranean region of the multitude of medicinal effects of biodiverse regional plants. Using established protocols, as well as their own screening assays, the partners performed scientific research that both verified local folklore and identified plants previously unknown to have medicinal effects.

Creating a new prescription drug is a process that costs billions of dollars. In recent years pharmaceutical companies have preferred to use synthetic drugs because they can be created in their labs. They don't have to be searched for in far-off locations, and don't necessitate consultations with "shamans" with ancient healing traditions.

The BioXplore project focused on the identification of commercially valuable natural compounds derived from the flora of the Mediterranean area, with the final aim of protecting the natural resources while creating

new sources for local industrial development and job opportunities.

Based on technology developed the Global Institute for Bio-Exploration (GIBEX) the BioXplore project established the Mediterranean Hub of GIBEX, which was endorsed by the World Health Organization as a "unique model for scientific collaborations and cross-border partnerships."

Although it was the first time the Hadassah Academic College was involved in such scientific research, the Agriculture Ministry has already agreed to provide NIS 1.5 million for its students and faculty to continue collecting and examining plants in the Negev (where there are 800 plant species) and elsewhere for medicinal potential. In addition, the EU held a meeting of the participants in Rome to consider how to continue the cooperative activity.

Fridlender said at the conference earlier this month that his college wants to "continue to build bridges by joining scientists abroad to make use of their natural resources. Our mission is to utilize financial and human resources to discover, develop and commercialize health and wellness products derived from Mediterranean plants to promote human health based on scientific knowledge. We use science to communicate with Palestinians and create trust."

The participating scientists also produced a number of published research papers.

The link between plants and medicine, Fridlender said at BioXplore's "Final Capitalization Conference" at the college, goes back to biblical times. In fact, he quoted the Prophet Ezekiel who described the trees of the region: "Their fruit will be for food and their leaves for healing."

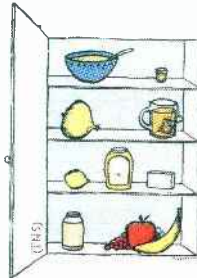
The inspiration behind the project, Fridlender said, was "to help countries around the world make use of their natural resources and products, utilize financial and human resources to discover, develop and commercialize health and wellness products derived from Mediterranean plants, promote human health and use science to communicate. We have brought people from different cultures, religions and regions together. New jobs were created. We Israelis have enjoyed a close partnership with Palestinian scientists in Nablus."

Together, the teams extracted compounds from some 1,000 different samples and performed assays on them using the dose-response method, said Fridlender.

"We have identified plants with commercial potential as well as that for increased employment and business opportunities in agriculture, food, cosmetics and the biotech industry. There is now increased awareness in the local populations of the value of their natural flora."

DR. DAN Bolotin, an adviser to the project who teaches at the college, in his younger days spent some five years interviewing traditional healers in South American countries such as Bolivia and Ecuador and collecting plant compounds. Showing many photographs he had taken in nearly unreachable spots in the rain forest, and among tribes whose men go around naked part

A three-year EU project to identify natural compounds in Israel, the Palestinian Authority, Spain and Greece that could be turned into beneficial drugs was a success. Judy Siegel-Itzkovich reports



Nature's medicine

Israeli & Palestinian scientists search for plant compounds



of the time, Bolotin noted that the white flowers in one photo were from the coffee plant. "One of the things I learned there is that the caffeine prevents the germination of other things. If there is too much caffeine, other things won't grow."

"The Amazon River area constitutes the largest rain forest anywhere," he told the audience. "Half of the world's species - about 70,000 different types - of plants are there, and it has societies that still use traditional medicinal plants. Israelis know little about it, but when I was a student at Tel Aviv University, I went with Prof. Fridlender to interview a Beduin man at Ramat Hovav whom I had heard of. The man told me he had medical problems, but said he took prescriptions for ordinary medication from his health fund. He didn't know anything about natural medicine from Negev plants. The knowledge is quickly disappearing, as are the rain forests."

When Bolotin was a long-haired, bearded young scientist in the Amazon, he asked various tribal shamans what plants they used to effect cures. "One can't check every species," he says, "it would never end."

As an example of attractive but potentially harmful plants, he cited *Rafflesia*. The plant has no stems, leaves or true roots, and the only visible part is a huge, five-petaled flower as much as 100 centimeters in diameter, that resembles a uterus. Nicknamed "the corpse flower," it emits the horrible odor of a decomposing body.

The plant is found in the Indonesian rain forest, where it has been popular among women who have just given birth, who are known to drink water in which the flower was boiled to shrink their wombs, and to lose weight. Men drink the "tea" supposedly for sexual stamina. But it can be harmful, because scientific research found that drinking such a brew can have adverse effects on the

liver and spleen. It may even damage the liver thereby compromising its functions. The uterus may shrink, but the concoction can also have a similar effect of shrinking the liver and spleen.

However, there are many beneficial medicinal plants. The cheapest and most commonly used plant-derived drug is salicylic acid - aspirin - extracted from the bark of the willow tree.

The periwinkle (*Vinca*) plant contains dozens of alkaloids, some of which have been extracted and used to treat childhood cancers, includ-

ing leukemia. Taxol, made from the bark of the yew tree that grows on the US Pacific Coast, is used for the treatment of breast, ovarian, lung, bladder, prostate, melanoma, esophageal and other cancers. "Milk" from the fig tree can make warts caused by the papilloma virus disappear, said Bolotin.

Curare, an alkaloid plant extract, was used by South and Central American tribes to poison arrows. The toxin kills animals but in humans causes weakness of skeletal muscles. It was utilized in surgery as a muscle

relaxant until more effective drugs replaced it, said Bolotin, who added that his younger brother is a cardiac surgeon and has used it on patients.

A friend of his who visited India some years ago was infected with intestinal parasites, and no conventional drugs eliminated them. When she visited him in Ecuador, a native expert made her a type of tea from a plant.

"She drank the liquid, which was tasteless, and from then on, her parasites were gone," Bolotin said.

He also showed a film of an Indian shaman who took two leaves of a plant and burned them on a skewer before pounding them into a black powder. The powder proved to stop bleeding immediately, prevent infection and to aid in quick repair of broken skin. "But it could have caused harm as well. You have to test such compounds before you make drugs out of them."

In looking for qualified shamans in the rain forest, Bolotin advises asking three different, independent people to recommend one. "Then it's likely he is good."

When the Hadassah Academic College scientist himself came down with malaria but had no conventional medication handy, a shaman offered him tea he made from a plant, and his fever disappeared almost immediately.

PROF. MARY Ann Lila of North Carolina State University's Human Health Institute discussed the plant discoveries her team made for translation into the marketplace. "Everybody in America knows they should be eating nutritious food, but instead of consuming five cups of vegetables and fruits per day, they eat an average of maybe 1.8 cups. In Israel, the figure is probably higher. Americans still prefer to go to fast-food restaurants instead of cooking nutritious food themselves."

The plants her team collected in North Carolina and other states were made into cell cultures, tested on lab animals and examined for the presence of antioxidants, changes in gene expression and cell death. From proven phytoactive medicine, Lila continued, "it's a long way to bring something to the consumer."

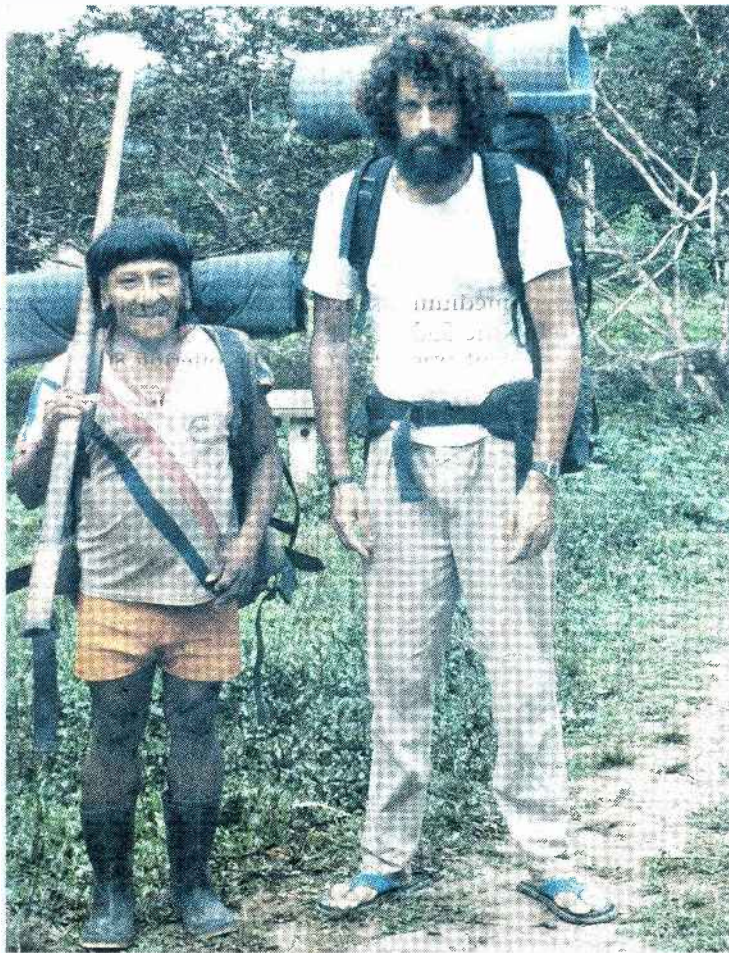
They were commissioned to produce highly nutritious extracts of fruit and vegetable for US soldiers, binding it in shelf-stable form for combat rations.

"Our soldiers gobble up a lot of junk food, but the US Army is frustrated when they try including better foods that the soldiers refuse to eat," she explained. In the field, soldiers and backpackers can't take fresh produce with them; they're too heavy, and they spoil quickly.

In Lila's lab, for fruit they decided to work on muscadine grapes, whose pigments are full of beneficial antioxidants, mixed with hemp flour and soy protein isolates. For a vegetable, they chose kale leaves, from which they made juice, which was added to whey protein made from milk without adding sugar. The resulting "energy bars" were tested in two labs and found by soldiers to be delicious as well as having a long-shelf life.

"Such bars can be eaten by astronauts at the International Space Station. We are working on this too," she reported.

Lila's lab decided to help sportsmen who push themselves to the limit, causing their immune systems to get weak and exposing them to colds and the flu. "We tested athletes, who are willing to do anything to excel, on treadmills. The resulting supplement we developed was a protein polyphenol called Nutrasorb. We found that the number of viral infections decreased when they ate them. They can make a difference and are very popular among athletes today."



DR. DAN BOLOTIN as a young researcher in South America with a local shaman. (Courtesy)