Israel: Oasis for Science

by Kendrick Frazier

Two of its four presidents, including its present one, have been scientists.

Albert Einstein could have been its president but declined the offer. Nevertheless Einstein is honored by appearance of his picture on the nation's 5-pound currency (roughly equivalent to the U.S. $1 bill).

The most honored professions in the country are, according to whom you ask and how you categorize them, physician, physicist and chemist; or physician and professor.

From scientists and science administrators alike everywhere you go you constantly hear that the country performs not too little but too much basic research.

Einstein's image on 5-pound note symbolizes Israel's veneration of science.

What kind of country can this be? Well, the country is Israel, and it is true that there is a deep-seated national ethic that holds science, learning and academic life in high regard. It is also a country with as rich a cultural history as any in the world. To take one example (from the Israeli-occupied West Bank), resting within a huge green oasis in the sub-sea-level desert north of the Dead Sea is the oldest continually occupied city in the world, Jericho, where 9,000 years ago man first made the transition from nomadic living to permanent settlements and developed agriculture. Israel is also, despite its cultural antiquity, a frontier country, politically young, facing the challenge of developing a land that is half semi-arid and the other half desert. It has pressing needs to apply science and technology to the search for more water, food and resources. It also is suffering from devaluation, run-away inflation and the financial drain brought by a tense military situation that has led it to devote one-third of its gross national product to national defense, including development of the capability to make nuclear weapons.

Israel's highly developed academic community has had to go to unusual lengths to avoid a sense of isolation. "Just look at a map," says Israel Dostrovsky, president of the Weizmann Institute of Science. "We have to go thousands of kilometers before we find people we can talk with on our own scientific level."

This has resulted in what Dostrovsky calls "a very generous policy of travel by scientists," at least up until the present economic difficulties.

The other tool to overcome geographical separation is the telephone, which to a large extent in Israel substitutes for journals as a means of keeping up to date about scientific developments in other countries. "We do much of our communications work by telephone," Dostrovsky says. "We do not rely on publications."

The process seems to work well. The same day physicists at Stanford University discovered the first of the two psi particles now causing great excitement throughout the world, Israeli physicists at the Weizmann Institute heard of it. The telephone rang from a colleague at Stanford telling them the news, and they immediately began working on the same problem.

The comings and goings of their own and visiting scientists and the use of the long-distance telephone are thus essential to the Israeli scientists' sense of participation in world science. "But for this," says Dostrovsky, "we'd be completely isolated. Like an island."

All courses at the Weizmann Institute are taught in English, a bow to the fact that 20 percent of its students are from abroad. The institute has only graduate students (about 500), no undergraduates, somewhat like the model of Rockefeller University in the United States. It carries out a full spectrum of advanced research in the life sciences, chemistry, physics and mathematics.

The institute, on a campus designed with great attention to aesthetics at Rehovot, south of Tel Aviv, was founded by Chaim Weizmann, the scientist-statesman who became Israel's first president. He opposed chauvinism and provincialism, insisting from the outset that the institute's scientific work be judged by the best international standards for research. He also clearly articulated the unique role science plays in the life of Israel. The statement was made just before his death in 1952, but it seems just as valid today:

"We live in a pioneering country. We are pioneering in the wilderness, in agriculture and in industry. But in Rehovot we are also engaged in a peculiar kind of pioneering—we are pioneering in science. There are many problems to be solved in our land, many difficulties to overcome. There are also many dangers still to be met. But to meet them, we must not rely only or chiefly on physical force. We have a mighty weapon which we must utilize with ingenuity and skill, with every means available to us. Science is that weapon, our vessel of strength and our source of strength."

Science may be a source of strength in Israel, as Weizmann said, but it is hardly immune from criticism. As reported earlier (SN: 12/7/74, p. 357), the amount of academic, basic research conducted in Israel (one-third of all its research and development) is widely considered to be too great in relation to the amount of applied research performed, and a gradual process of readjustment is under way. Exacerbating that process are new financial stringencies brought on by inflation, devaluation, and the government's austerity program. (High academic officials from at least three of Israel's seven universities have traveled to the United States in the last six weeks in search of funds.)

To a visitor from the United States, where scientists have nearly made a second vocation of complaining about what they consider an overemphasis on mission-oriented at the expense of basic research, the opposite situation in Israel seems a bit unreal. But then of all the R&D done in the United States, only 7.4 percent is done in colleges and universities. In Israel the

figure is over 30 percent.

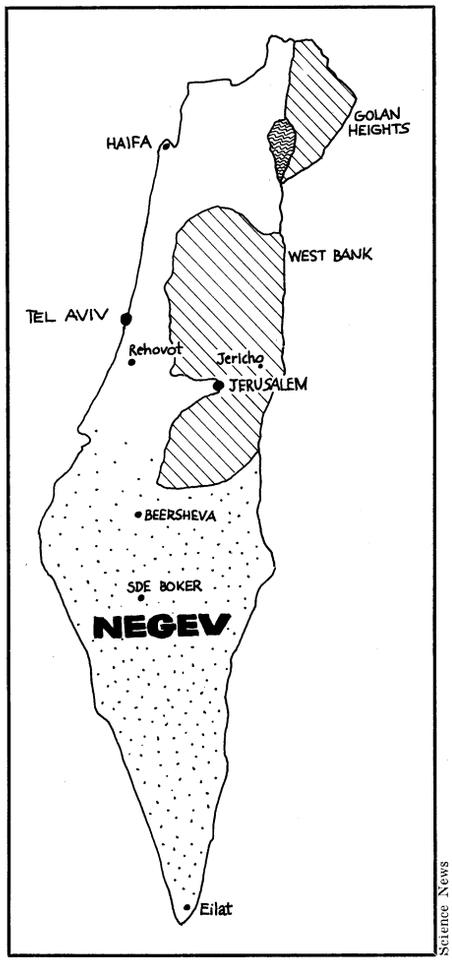
The movement to bring more science and technology to bear on Israel's problems of domestic development is led in part by Eliezer Tal, science adviser to the Prime Minister and director of Israel's National Council for Research and Development. But the current President of Israel, Ephraim Katzir, himself a biophysicist and formerly a professor at the Weizmann Institute, echoed Tal's views when he told a group of American and European science writers visiting with him at his official residence in Jerusalem in December: "It is nice to have intellectuals if they are not spoiled intellectuals—if they are willing to contribute to the building of a new society."

Joel Schechter, an applied scientist and director of the research and development authority of the Ben-Gurion University of the Negev, states the situation a little more bluntly: "There is a huge academic bureaucracy that enjoys tremendous prestige in this country. It has tremendous influence on the government and it frowns on applied work. We are trying to get people involved in society and not isolated in an ivory tower."

Israel obviously takes pride in considering itself an intellectual oasis in the Middle East. Now, however, it is insisting that that intellectual capacity be devoted to a greater extent to helping cope with the practical problems of Israel. □

Shall the Negev Bloom?

As one travels south from the populous Tel Aviv-Rehovot-Jerusalem cross section of central Israel, the land becomes visibly drier and more sparsely settled by the mile. Green crops of sugar beets, corn, wheat and vegetables gradually give way to cactus and hardy desert shrubs. The city of Beersheva receives only a third as much rainfall (rarely exceeding 8 inches a year) as Rehovot, 50 miles to the north. Just 6 miles farther south the rainfall drops to no more than 4 inches a year. From there on south, Israel is all desert, or as some prefer to call it (there being no Hebrew word for desert), the wilderness.



Science News

About 50 percent of the land surface of Israel (not counting the Sinai and other post-1967 occupied territories) can be classified as true desert. The Negev, the vast southern portion of Israel, accounts for 60 percent of Israel's (pre-1967) land area but contains only 10 percent of the population.

Israel considers development and settlement of the Negev essential to its long-range survival, as the fertile areas to the north become increasingly crowded and industrialized. It maintains a broad program of desert research to aid in the attempt.

Such research is considered to have worldwide significance. One third of the earth's land surface is desert. The desert areas of the world are seen by many as the last major land mass offering hope for successful large-scale settlement and development.

Spearheading the effort to turn the Negev into a habitable and thriving region is the fledgling Ben Gurion University of the Negev. Located in Beersheva, a frontier development city on the northern edge of the desert, it has primary responsibility for the social, economic and scientific development of the Negev. To accomplish this task, it is forming special relationships with the land and people of the region. Its new center for health sciences, for instance, which began its first classes only two months ago, is more than a medical school. Its task is to join all health care services in the Negev into one system and then to operate that system. Its president is also chief health officer for the Negev. University officials are excited by this experiment merging medical education and regional health care. They believe it to be unprecedented in the world.

In 1973 the university established a research and development authority. It deliberately has a nonacademic, pro-industry orientation to help overcome the tendency in Israel to favor basic over applied research. In addition to initiating R&D that is important to the Negev, it is also charged with encouraging industry, especially local industry, to develop and produce new products from the Negev.

One such product is a hard wax obtained from the jojoba, a desert shrub found naturally in northern Mexico and the southwestern United States (SN: 7/14/73, p. 26). Jojoba plants brought to Israel from the University of California at Davis agricultural laboratories have been found to grow better in Israel than in North America. Joel Schechter, director of the university's R&D authority, says the jojoba plants are currently yielding about 400 kilograms of wax per acre, a figure he expects can be doubled in the next five years. By then the project expects to be planting several thousands of acres of jojoba and harvesting enough wax for commercial operations. The wax, which according to Schechter no synthetic plastic can match, has applications in carbon paper, wax paper and waterproof coatings. It could be used to make bright-burning, smokeless, dripless candles, and it has potential medical uses in ointments and salves.

Another new project aims to develop an algae-growing industry, making use of two of the desert's abundant resources: sunlight and wind. Algae growing requires continual mixing of nutrient-rich water. At this early stage of research, the algae are grown in small tanks stirred by electrically driven paddlewheels. But Schechter envisions large basins in the ground, covered with plastic so the algae can be grown in winter as well as summer, the water stirred by paddles attached to windmills. The algae, which is 60 to 70 percent protein, would be used initially as feed for chicken and cattle. It could eventually become a protein resource for humans.

Overlooking a magnificent dry desert valley at the isolated outpost of Sde Boker, 30 miles south of Beersheva,