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## Small Country with Big Problems

When the Government of Israel invited us to visit their country for two weeks to see whatever might be of interest, we accepted promptly, for we wanted to find out what role science and technology are playing in the Israeli economy.

A fortnight is much too short a time to form a judgment about such matters by direct observation, but it is not too short a time to form many impressions, to correct erroneous preconceptions, and to find out what the scientists and technologists themselves think of as the major problems they face. With the primary aim of concentrating on this last point, we visited several of the major educational and research institutions of the country: the Weizmann Institute at Rehovoth, the Hebrew University at Jerusalem, the Technion (Technical Institute) at Haifa, and the Desert Research Station at Beersheeva.

Aside from its shortages in most of the minerals that provide the basis for industrial production, the country has two dominant needs: energy and water. Israel produces only about 10 percent of the oil it consumes and has no workable deposits of coal. Consequently, power is expensive and Israeli factories are at a competitive disadvantage. Every avenue of possible supplemental power is being explored: hydroelectric power from the Jordan River on its way to the Dead Sea; windmills of advanced design; and, especially, solar energy. Practical solar devices for heating water for domestic use are already in production, as are solar air conditioners for the desert regions of the country. Industrial production of solar power is still not economical, but a considerable program of research is under way, and with increased efficiency of production, solar power may provide a partial solution to the power shortage. Nuclear power stations will be installed—the first at Elath, which is the southern edge of the Negev Desert—but, like other sources of power in Israel, they will be relatively expensive.

So far as water is concerned, the needs are obvious. The southern two-thirds of the country is composed of the Negev Desert, where wells yield for the most part a brackish water currently unsuitable for agricultural use. The research effort being made to solve the water problem is many-pronged and vigorous. Intensive studies of ground water and ground-water replacement are being made, and studies of runoff and possible surface storage, especially in the desert, and the development of elaborate irrigation schemes form a large and coordinated program. Current resources will permit the irrigation of the northern part of the Negev by water from the Yarkon River north of Tel Aviv, but the great hope lies in the proposed diversion of the waters of the Jordan—an undertaking which at present is politically impossible.

The coordinated attack upon the water problem does not end with irrigation schemes. All feasible ways of desalting water are under study, but so far the product is relatively expensive: if the power requirements are low, the capital costs are high or the output rate is low. Among the schemes being investigated are steam distillation at nuclear power stations, solar distillation, compression distillation, freezing processes, direct filtration, and electrodialysis. But the problem is being attacked from other angles as well. Plants that can tolerate brackish water are being sought, and in one unorthodox proposal, an attempt is being made to modify the salt balance of brackish water by the addition of supplemental salts, thus making it suitable for agriculture.

Israel's needs stand out in sharp relief; science and technology clearly form the indispensable basis for the solution of her economic problems.
—G.DuS.