

ISRAEL HIGH-TECH REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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From the Editor

Israeli Scientists and Entrepreneurs get favorable nod from Russians and Eastern Europeans

The rapidly moving events in East Europe have seen one nation after another repudiate and overthrow totalitarian regimes. One of the early results of the liberation movements was the new to establish political and economic ties with Israel. Even without the benefit of a time perspective, it is possible to envisage a rapid revival of relations between Israel and Eastern European countries. They are seeking closer cultural, scientific and economic ties with Israel and that is exactly what is already happening as contacts between businessmen, scientists and entrepreneurs are leading to individual and bi-national cooperation which, in the early fall of last year, could only have been thought of as "mission impossible". This process is likely to gain momentum and develop favorably because many Eastern Europeans view with respect and admiration Israel's level of technological achievement and high standard of living. Having spent most of their lives under totalitarian regimes they appreciate that Israel, a small western orientated country, has survived and even prospered in the Middle East which is characterized by extremism and hostility.

There are reasons why relations can be expected to assume meaningful proportions. Israelis and Eastern Europeans mutually share cultural roots and common languages. There are many Israelis whose familial roots are traceable to Czechoslovakia, Poland, Hungary, Rumania, Russia and Bulgaria. Many of them speak the languages of these countries allowing for meaningful and purposeful communications.

We are beginning to hear details of deals being signed. One such example is a joint venture with the Hungarian Tungstam company to establish a

high-power industrial laser service plant. This high powered industrial laser was developed in Israel and offers Hungary a low cost entry into laser metal processing.

The era of reestablishing ties with the East is happening at the same time as contacts between Russian and Israeli scientists are entering high gear. Last month at the superb international Forum on Science and Government, held at the Weizmann Institute, Israel's foremost center of scientific research, visiting participants included internationally known scientists and statesmen. A notable appearance which drew widespread media attention was the participation of Prof. Y. Ossipyan, Vice President of the USSR Academy of Sciences and a member of the USSR People's Congress. During the same month, at a seminar on biomolecular structures, several researchers from the Ukrainian Academy of Sciences and the USSR Academy of Sciences were among the participants.

There is considerable scope for international scientific and technological cooperation between Israel and the eastern block countries. Those who are skeptical about these prospects would do well to consider that during the recent visit to Moscow by the Israeli Minister of Science and Development there were initial talks on space research cooperation between the two countries.

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Forum on Science and Government

The Weizmann Institute in mid-December was the venue of one of the most unusual conferences to be sponsored by that institution. It was notable in that it brought together a group of internationally known personalities whose lives are related to government, science and technology.

The blue ribbon participants debated how scientists and technology specialists can more effectively serve as advisors to heads of governments and thus play a critical role in shaping policy. The consensus was that priorities are now changing as to which are the most important areas requiring governmental attention. Weapons, space and high energy physics are being challenged by other problems, foremost among them, global environmental threats, such as the greenhouse warming, stratospheric ozone depletion, destruction of genetic diversity---biomedical issues such as the development of new drugs, the prevention and treatment of AIDS, sequencing of human genome--- industrial economy and development issues. Other vital issues for the 1990s include improved manufacturing technologies, reduced requirements for energy materials, environmental impacts, increased productivity, sustainable agriculture and long range energy supply.

Most academicians and scientists conceded that much can be done to improve the way scientists communicate to government leaders. It was also pointed out that the media can assist in creating an environment which, in turn, will affect governments' views as how to put into effect long range programs dealing with issues that are not always seen by governments as priority situations.

Prof. Y. Ossipyan, Vice President of the USSR Academy of Sciences delivered a intriguing paper providing fascinating insights into Russia's ways of dealing with fundamental research. He contrasted the choices as to whether scientific research should be carried out on the basis of competition for funds or on the basis of total scientific freedom.

Frederico Mayor, the director general of UNESCO, made a forceful presentation dealing with new approaches for improving relations between science and governments which would measure up to the growing world complexities.

The Hon. Barry Jones, Minister for Science and Technology Assisting the Australian Prime Minister, provided valuable insights into the scientific advisor-government relationship.

News from the Institutes of Higher Learning

Increased Fertility and Milk Production Improves Chances for Survival in Drought Stricken Areas

Intensive breeding of camels is leading to an increase in fertility and milk production which is one answer to the plight of populations in arid zones, especially in times of drought. The camel has been pinpointed as the only animal that can survive drought conditions and continue to produce large quantities of protein and vitamin rich milk. In certain parts of the world the female camel is capable of producing sufficient milk to supply the daily protein requirements of two adults. Increasing the fertility and daily milk production of female camels is enhanced by breeding. At the Ben Gurion University of the Negev this is being achieved by the transfer of multiple embryos from hormonally selected females into low yielding surrogate mothers. The know-how related to the intensive breeding techniques is especially important to nations where camel milk and meat are in great demand. Egypt is just one of the countries that is benefitting from this project. Heading the project is BGU's Prof. Reuven Yagil who also serves as consultant to the UN's FAO. Underlying his extensive research, which concentrates also on other desert animals such as ostriches, goats and sheep, is the philosophy that the solution to food shortages in undeveloped desert areas is not to ship food from industrialized countries to the stricken areas but to make those areas self-sufficient in food production, even when drought strikes.

Clinical Tests Started on Technique Allowing Ovulation in the Human Female

New insights into the understanding of fertilization are expected to find application in the establishment of new protocols of hormonal treatment which could increase the rate of successful fertilization in both farm animals and human patients. Mammalian ovaries contain some half a million oocytes, yet in the human female only one of these in the best event, matures into an ovum each month. According to Weizmann Institute research the reason why so few cells mature into ova is that the oocytes subsist in a state of "meiotic arrest" or arrested development. Prof. Nava Dekel at the WI has found that a small molecule known as cyclic AMP controls oocyte development. Increasing its concentration inhibits the maturation of oocytes into ova and, conversely, decreasing the concentration allows the oocyte maturation into an ovum within hours.

A therapeutic T cell vaccine against rheumatoid arthritis, developed at the Weizmann Institute, is entering clinical testing at a Netherlands hospital. Behind this development is the use of the patient's own T-lymphocytes which, instead of fighting bacteria, attack the body's joints. Isolating these destructive cells allows for their modification before their reintroduction into the patient where they reactivate the immune system. This approach, taken by Prof. Irun Cohen, is similar to the one taken in developing vaccines against polio and diphtheria. Prior to the beginning of the clinical tests T cell vaccines were found to be effective in laboratory animals with various auto-immune diseases.

Growing Tomatoes in Sand Dunes Irrigated with Salty Water Achieves Commercially Acceptable Yields

Irrigation. Deserts such as Israel's Negev desert often are situated above vast aquifers, underground rock formations containing saline water. Ben Gurion University of the Negev's Prof. Dov Pasternak together with kibbutz researcher Joel de Malach over the past 16 years have carried out experiments resulting in the growing of wheat, cotton, sugar beet, processing tomatoes, sweet corn, asparagus, melons, and lettuce in loess soils, consisting of fine rock flour originating in arid regions and transported by wind.

Multiple, five times a day, pulse irrigation with saline water and fertilizer, resulted in yields of 33 tons per acre of processing tomatoes. In Israel there are 100,000 acres of sand dunes which lend themselves to the application of these agricultural techniques.

Russian-Israeli Cooperation Aims at Developing Low Cost Electricity Based on Magneto-hydrodynamic Technology

Prof. Herman Branover pioneer in magneto-hydrodynamic research in Israel is discussing a joint research project with the Soviet Academy of Sciences.

The work in Israel has concentrated on the magneto-hydrodynamics of liquid metals aimed at developing a practical cost-effective technology which would result in the conversion of heat to electricity without the use of turbines and in an

environmentally safe manner. The local research which has been in progress for several years, is being carried out at the Ben Gurion University of the Negev and includes a group of former Russian physicists who have settled in Israel.

Catalytic Process to Aid Chemical Industries Developed

A novel catalytic process developed at the Weizmann Institute enables the efficient production of commercially important organic compounds from inexpensive raw materials, representing a considerable saving over present approaches. Its use may eventually prove to be of value to the pharmaceutical, agricultural and synthetic fiber industries that require such organic materials.

The new process takes advantage of palladium, a noble metal that can bind and activate otherwise inert molecules. The method, developed by Prof. David Milstein of the Institute's Organic Chemistry Department, aided by technician Yehoshua Ben-David and graduate student Moshe Portnoy, uses a new complex of palladium to split apart non-reactive molecules of aromatic chlorides, yielding fragments that can then bind to other carbon-based molecules.

This procedure, which requires only minute amounts of the catalyzing metal, leads to a wide range of organic materials.

Professor Milstein has also found that electron-rich compounds of the noble metal iridium are capable of cleaving ammonia at room temperature, and he is now attempting to develop, together with post-doctoral fellow Robert Koelliker, an iridium-based catalyst that would allow for the direct attachment of a variety of organic molecules to ammonia.

This development would make possible more efficient industrial usage of ammonia, an abundant and inexpensive chemical that is used extensively in the manufacture of paints, polymers and agricultural products.

It is hoped that this approach may lead to the development not only of new industrial processes, but also of fundamentally new techniques for altering the molecular structure of basic compounds.

Israeli Companies on Wall Street

Selected income and earnings summaries for the 9 months ended September 30, 1989, unless otherwise indicated. Nearly all of these companies are intensively export oriented. Prices are as of January 17, 1990 and the price changes relate to those a month ago.

<u>Company</u>	<u>Revenues</u> (in \$ mil.)	<u>Net Income</u> (in \$ thou.)	<u>Price</u>	<u>Net</u> <u>Change</u>
ELBIT COMPUTERS Defense electronics ELBTF OTC	117,200.	8,750.	9.875	+0.50
ECI TELECOM Telecommunications ECILF OTC	38,745.	3,671.	11.25	-2.000
ELSCINT Medical imaging ELT NYSE	108,000.	0,987.	2.75	+0.50
FIBRONICS Fiberoptics FBRX OTC	34,160.	1,450.	6.00	-0.50
INTERPHARM LAB. Biological products for health care IPLL F OTC	7,812.	0,236.	3.00	-0.25
LASER INDUSTRIES Surgical lasers LAS ASE	na	na	4.625	+1.875
OPTROTECH Electro-optical systems OPTKF OTC	52,920.	3,330.	9.375	n.c.
SCITEX LTD. Computer graphics SCIXF OTC	170,550	21,687.	16.125	+1.25
IIS INTELL. Computer peripherals IISLF OTC-	12,608.	2,983..	4.125	-0.25
TEVA PHARMACEUT. Pharmaceuticals TEVYF OTC	191,250	11,980.	11.125	-0.875

Leishmaniasis Enzyme Isolated at the Technion

Researchers at the Technion-Israel Institute of Technology in the Faculty of Biology have for the first time isolated an enzyme that may be the key to developing a cure for Leishmaniasis, a parasitic disease widespread in Africa. The research project has been given top priority funding by the World Health Organization (WHO).

Leishmaniasis, spread by sandflies, appears in different forms and degrees of intensity. Once the parasite has been introduced into the human blood by a sandfly's bite, it enters the immune system. The mildest form of the disease - usually affecting children - causes lesions on the skin which generally take about a year to heal, according to Dr. Dan Zilberstein of the Technion's Biology department who headed the project. In more severe cases, the parasites migrate into the liver, and bone marrow, causing severe anemia and disturbing the protein balance of the serum. These cases of the disease are usually fatal, Dr. Zilberstein says.

Development of New Shale Combustion Process

Energy and Infrastructure Minister, Moshe Shahal, announced that the Weizmann Institute of Science and the Energy and Infrastructure Ministry are developing a process of shale combustion by means of solar rays rather than regular combustion. In this process the stone heats up, decomposes and releases gas. During the combustion of gas, steam is released, from which electricity is obtained. The caloric value derived from the solar method of shale combustion is double that derived from regular combustion. This is a revolution in energy production. In the U.S. \$3 billion have already been invested in research on the subject. A pilot facility for the production of steam and electricity by burning shales without using fuel is already in operation.

The Minister also said that the implementation of this technology turns the existing 11 billion tons of shale into a mineral capable of supplying Israel with energy for the next 80 years. About one hundred employees work at the pilot facility, which is the first to be able to perform direct combustion of stone. The burned material does not release sulfur, which makes this one of the cleanest methods of combustion from an ecological point of view.

Fast Agricultural Hole Driller Developed at Technion

New machinery which fully automates hole preparation in agroforestry and plantations, has been developed by researchers in the Department of Agricultural Engineering at the Technion-Israel Institute of Technology.

The system can operate either through self-propulsion or hitched to and powered by a standard tractor with the proper hitching system.

Currently, holes are drilled by two main methods: (1) manually, in cases of stony soils, (2) by tractor-towed drills which can drill between 30-40 holes an hour. Both methods are labor-intensive and time consuming. The Technion-developed drill can operate in even the toughest soil conditions. It can drill 1000 or more holes per hour. Holes are dug consecutively in a straight row. Travelling speed is defined by the hole dimensions and soil conditions. The distance between the holes is precise. Hole shape and dimensions can be changed by altering the drilling tool. Typical hole size is 40 cm deep and 40 cm in diameter. However, holes of 10-60 cm. in diameter and 10-50 cm. in depth are within the system's capabilities.

The new system provides a solution to the significant increase worldwide in the planting of trees to produce paper and other products, and an expanded demand for hole drilling on plantations such as bananas, cocoa, coffee, tea, and fruit orchards, including tropical and sub-tropical fruits. South America. There is an especially high demand for this technology in South America.

Israel High-Tech Report Index*

83.61 + 6.14%

*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of leading high-tech companies.
BASE=100 AS OF SEP.30.1984

Major Projects at the Space Research Institute of the Technion

The placement of an x-ray telescope on a satellite -

Professor Giora Shaviv is in charge of this project which will enable the investigation of objects which emit x-rays and show time-variability, and their observation for long durations.

The Ofeq Project under the guidance of Professor Timnat -

This project deals with trajectory studies and solid rocket propellant behavior under low gravity conditions.

Solar Sail Propulsion -

The study of solar radiation on some extended surfaces in order to propel a small spacecraft. This has been triggered by a U.S. sponsored competition to send such a vehicle into space in 1992.

An innovative autonomous navigation system, unprecedented in miniaturization performance and reliability has been developed in the Department of Aerospace Engineering at the Technion-Israel Institute of Technology.

Its developers, Sundstrand Data Control Inc. (SDC) of Redmond, Washington, USA, consider it a technological breakthrough and they have demonstrated that it is competitive and accurate. Called "Sunstrand Coriolis Inertial Rate/Acceleration Sensor" (SCIRAS), the device is ten times smaller and lighter than current autonomous, navigation systems - smaller than a tennis ball and only 140 grams in weight - at substantially less cost than that of currently used systems. In the area of accuracy, the SCIRAS is a "state-of-the-art" for navigation of planes - and exceeds the performance of current systems for missile navigation. It is also a new concept which eliminates many expensive components. SDC is a world leader in the field of precision instruments.

SDC contacted Professor Shmuel Merhav of the Flight Control Laboratory at the Technion after having read his article in the AIAA Journal of Guidance and Control, and an agreement was reached for developing the prototype, as Israeli industries did not have the necessary resources. As a result SDC in 1984 began intensive efforts to

develop a prototype in close cooperation with Professor Merhav. Recent tests have shown that the new navigation system will close a serious gap in current military and civilian aviation needs. SDC plans to begin marketing the device within the next year.

AgroTechnology Aid to East African Nation

An Israeli mission headed by Professor Ben-Asher of the Center for Desert Agrobiolgy at Ben Gurion University, recently returned from Kenya after advising that government on the potential of agricultural development. A region of massive rainfall, the Kitui district has an annual rainfall of 1,100 mm, five times that of Israel's Negev, but most of the rain water is lost in runoff.

The Israeli mission's recommendations included the use of certified seeds developed in Kenya, the introduction of fertilization and the development of new fodder plants. Professor Ben-Asher also advised gathering rainwater from the flat roofs of dwellings and storing it in large containers for use throughout the year, constructing small dams in the riverbeds (wadis) and building microcatchments in the fields. He also proposed that farmers create microdams (tide ridges) during plowing. By lifting their primitive plows manually at intervals and putting them down several inches farther, the farmers create an unplowed area within the furrow in which rainwater can collect.

A demonstration farm for these technologies is planned in the Kitui district, funded by the Shelter Afrique, the African Development Bank, the Joint Distribution Committee and Israeli development agencies.

ISRAELI COMPANIES ON WALL STREET

Scitex Realizes Takeover Attempt Losses

Scitex Ltd has announced that it has sold its entire 4,425,000 share holding in De La Rue Co. The shares were acquired last year on the London Stock Exchange in a futile attempt to takeover Crossfield Electronics Ltd., a De La Rue subsidiary which produces digital scanners, page composition systems and related equipment used by the printing industry

to produce high resolution color images. Instead the American Du Pont and the Fuji Photo Film of Japan purchased Crossfield. Since the acquisition of the shares their price has fallen precipitously and Scitex took a \$ 4 million loss in the third quarter of 1989 and an additional loss of \$1.5 million in the fourth quarter.

DEGEM SYSTEMS LTD is planning a financing issue in the United States. Degem was established in 1967. A decade later sales reached the \$1 million mark, and by 1989 its turnover was \$15 million. Degem Systems' overseas subsidiaries in 1989 accounted for an additional \$5 million. The company's international activities have been growing steadily over the years and most recently it appeared on the East European scene as a result of a joint venture with a Hungarian bank. Hopes for the penetration of the East European market are connected to a Bulgarian joint venture with a local manufacturer and trade company with close business links with Russia.

RADA ELECTRONICS INDUSTRIES establishes European office

The recently opened office in Amsterdam is to be Radar's center for European operations. Rada has signed cooperation agreements with certain electronic companies in Belgium, Italy and Holland, aimed at the joint production and marketing of automatic test equipment, aviation systems and military computers. Current backlog of Rada is \$30 million.

Changes in Laser Industries Ownership Structure

22% of the equity capital of Laser Industries is being purchased by Haifa Chemicals as part of its diversification plan. The main seller is Etz Lavud who has been one of the owners since the early 1970's when serious development began on a surgical medical laser. Laser Industries, whose shares are registered for trading on the American Stock Exchange, has seen its market capitalization fall from \$62.5 million in September 1987 to a late 1989 market capitalization of under \$12 million. Inside company projections are aiming in 1990 for sales of \$37 million and profits of \$400-600,000. Laser Industries has installed world wide more than 1,600 surgical lasers.

A Roundup of Recent Developments

New Investment in Efrat Future Technologies

Ascorn, a major Swiss participant in the telecommunications market, is investing \$6 million for 15% of the share capital of Efrat. Efrat develops, produces and markets intelligent message systems.

Sapiams International Export Systems Finds Markets in Switzerland and France

Sapiams International, founded by a group of Weizmann Institute researchers, specializes in export systems used in data processing applications development, using IBM mainframe computers. The respective buyers are Natural AG of Switzerland and Canon France.

Prior to its export ventures, Sapiams installed thirty systems in Israeli government offices and private firms. Israel Aircraft Industries has signed a five-year contract with Pratt & Whitney to overhaul and repair JT9D engines used in Boeing 747s. I.A.I., in the aftermath of the cancellation of the Lavie project, is

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concentrating more and more on its basic business of overhauling of planes.

ADACOM Technology complete a first time ever capital financing with a total of NIS 6 million on the Tel Aviv Stock Exchange.

Data General together with the Israeli **TEAM Computers Company** and U.S. investors are planning to open a development center in Israel. Initially the company plans to employ ten programmers to develop and write software programs for Data General. The move comes at a time when there is growing evidence of strong software capability in this country.

ABIC Pharmaceuticals part of Teva Pharmaceuticals has received product approval and patents in the U.S. for its synthetic anti-biotic veterinary medicine for anti bacterial treatment of infections resulting from bites of disease carrying insects. The product will be marketed for use primarily by poultry producers. Breeders will benefit by obtaining protection from losses due to insects attacking their animals' digestive and respiratory systems and causing high mortality rates. The newly developed veterinary medicine is expected to have a major impact and double Abic's export sales within the next 24 months.

1990 BIRD SEMINAR

The second annual BIRD seminar is scheduled for Tuesday, February 6th. CFOs and CEOs of Gilat Communication Systems, NICE Limited, TIKI Software Systems Ltd. and Mercury Graphics Corp. will deliver papers related to their corporate experience with a focus on R & D.

An Emerging Growth Company is Awarded Research and Development Funding

The funding of industrial research and development activities is carried out by Israeli companies with funding from a number of sources. Young and

emerging growth companies which have not created profits from their activities, turn to the Office of the Chief Scientist of the Ministry of Trade and Commerce, or to BIRD, the Israel - US Binational Research and Development Foundation or seek funds provided by local or foreign industry.

Gilat Communication Systems Ltd. is an Israeli company which has been chosen as a prototype of an emerging growth company which merits BIRD-F financing. Gilat is a telecommunications company specialising in the development of satellite earth stations for data telecommunications systems. The company has focussed on satellite networks for data transmission by a very small antenna.

Starting with an R & D effort in 1986, in less than three years Gilat began marketing a state-of-the-art satellite communication ground equipment. The product's trade name, "U-CORD" is an 18 inch wide earth station for one-way data broadcasting. The product has passed beta-site testing at GTE Spacenet.

The company's first effort with GTE's Spacenet has led to the next development of a new generation satellite based earth station. The project creates a satellite -based communication network made up of 2-way earth stations, including a terminal, network hardware and software. Yoel Gal, states that the company's philosophy is: "To customise the product to the customer's need from a system point of view. A customer who needs a network with 50 remote terminals should not have to invest in equipment designed for a 2,000 terminal network."

From the Laboratory to the Market Place,

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