

# ISRAEL HIGH-TECH REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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March 1988 Vol.IV. Issue No.3.

ISSN 0334-5307

## EDITORIAL

### SCIENCE IS THAT WEAPON

"The potentialities for industrial development must be surveyed and harnessed ... by the State as one of the supreme tasks... 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 defence" stated Chaim Weizmann in 1949. The scientist and statesman was to become Israel's first president.

His concepts formed the basis for Israel's policy of building a viable state, capable of defending itself in a highly volatile part of the world. Over four decades, neither time nor expense was spared by the country's decision-makers in establishing research facilities in institutes of higher learning and scientific research units in public institutions.

Each fiscal year not less than 30% of the national budget is allocated for defense purposes. The veil of secrecy surrounding the exact figure makes it impossible to accurately assess annual research and development expenditure related to defense; but most reliable sources assume that the amount greatly surpasses that spent by Israeli industry on its research and development programs.

In recent years, however, there have been severe cuts in defense spending. In absolute terms, this has been the case in the past two budgets tabled by the Israeli Cabinet. As a result, there is a broadly held perception that funds will not be available for developing the new technologies needed to meet the challenge of maintaining Israel's security. This, however, is not the case. What

is happening is a restructuring and rationalizing of defense plans for the 1990s, and into the 21st century. The new plans differ in that the weapons systems on the drawing boards are more sophisticated, dedicated specifically to the perceived needs of the Israel Defense Forces. They will rely more on effectiveness than on manpower. This in turn implies the same or more, rather than less, research and development effort. Government scientists and researchers are learning that cost effectiveness and efficiency are as important as their scientific work. In due course this should translate itself into savings. The cancellation of the Lavi fighter development project was a dollars and cents decision. The Lavi's heritage is a highly advanced state-of-the-art avionics program which, with some more effort, will make Israeli fighter planes more effective -- whether they are of Israeli manufacture or produced by U.S. aerospace companies.

In the civilian sector, the picture is not so sanguine. Research and development in Israel's non-defense related industries have been severely hampered by reduced government spending. Exports are increasing, but if this is to be part of a continuous trend, there must be a rise in R&D

### In this issue

- \* Science is that Weapon: Editorial
- \* Yissum Research Development Co: Hebrew University of Jerusalem
- \* Israel High-Tech Report Index Unchanged
- \* New Order
- \* New Products
- \* From Laboratory to the Market Place: A Cheap Alternative to Peat Moss
- \* New Investment

Subscription: 1 year \$125.-. Bulk copy and reprint information available on request  
Israel High-Tech Report: Copyright 1987 Israel Publications Inc.  
Circulation Offices: Israel Publications Inc. 47 Byron Place, Scarsdale, N.Y. 10583, USA.  
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spending, to bring new and more refined products to overseas buyers. For more than 20 years, local industry has leaned heavily on support from the offices of the chief scientists of the various ministries. High technology R&D grants and support have come from the office of the chief scientists of the Ministry of Trade and Commerce. For the past two years, this program has not increased, and a growing group of participants say (not for attribution) that the lateness in remittance of such grants and the bureaucratic procedures involved reduce the program's value.

Research activity at Israel's institutes of higher learning has also been badly hit by Government budget cuts. Yet, the quality of the research is such that it attracts funding from Israeli industry or from overseas industrial groups. Unheard of at one time, but presently now much more common, is news of tenured scientists at the Weizmann Institute of Science taking two year sabbaticals to accept positions as chief scientists at Israeli industrial plants. They are reaching out as well to overseas industries and obtaining funding from industrial groups from all parts of the world.

As the government radically reduces R&D defense spending and cuts its monetary allocations to institutes of higher learning, long term concerns arise. Will there be a substantial brain drain? Will scientists find their creative forces being stifled? Will the situation lead to an outflow of technology and lessen prospects for establishing new science-based industries in Israel? To what extent will basic research be affected?

At present, leading Israeli researchers are relying on their own abilities to obtain funding for R&D activities, much of it coming from sources outside the country. Inevitably, their work is pushed more and more into the practical sphere, since financial backers demand quick results. But whatever new trends develop, Israeli researchers continue to harness the power of science for the benefit of the country and its defense.

#### **BEN-GURION UNIVERSITY HIRES U.S. TECHNOLOGY AGENT**

Advanced Products Beersheba Ltd., Ben-Gurion University's marketing wing, has hired the Philadelphia-based University City Science Center (IHTR-3/86) as its official U.S. agent, to sell and license BGU-developed technologies to U.S. companies. Under the contract, the Science Center's business development and venture management division has exclusive rights to BGU properties for one year.

Founded in 1963, the Center is the first urban research park and the largest science and technology consortium in the United States. It is involved in many other business development activities with Israel's advanced and high-tech companies, as well as its universities. It is developing these commercial relationships through the initiative of the Philadelphia-Israel Commerce Affiliates Inc. (PICA), which is a non-profit making organization fostering reciprocal trade and commercial relationships between firms in greater Philadelphia and Israel.

#### **ISRAELI-GERMAN PROJECT PROBES THE ORIGINS OF ACID RAIN**

Acid rain--the fall-out from steel mills, chemical plants and oil refineries that kills crops, forests and fishlife in many industrialized nations--is not a problem in Israel. On the contrary, Israeli rain is often alkaline. Research by scientists at Tel Aviv University, led by geophysicist and Dean of Research Prof. Zev. Levin, indicates that desert sand may help to neutralize acid rain and make the rainfall alkaline.

Prof. Levin is directing the Israeli side of a joint Israeli-German project aimed at a better understanding of the processes that create acid and alkaline rain. The research is supported by Israel's National Council for Research and Development and West Germany's Ministry of Research and Technology. The scientists hope that pinpointing the causes of acid rain may eventually lead to a way of preventing it.

**YISSUM RESEARCH DEVELOPMENT CO.  
OF THE HEBREW UNIVERSITY OF  
JERUSALEM.**

Yissum is a wholly owned subsidiary of the Hebrew University, with total responsibility for the commercialization of all the University's applied research. The 1987 turnover of \$5 million was the highest recorded by any R&D development authority connected with Israel's major institutes of higher learning. The average turnover at Yissum, for each of the preceding five years, was \$2.6 million. Yissum's income originates primarily from research and licensing agreements concluded with local and overseas companies. Of the total of 124 projects now licensed, 15% have been licensed outside of Israel, including nine in the U.S.A., three in Europe, six in Australia and one in Canada.

Among the most recent joint ventures are Unikoor, 25% Yissum and 75% Koor Chemicals Ltd, set up in September 1984 to develop enzymatic process and fermentation techniques. Another is Lev-Universities Ltd, 25.1% Yissum and 74.9% H.F. Scientific Ltd. Agreements signed in 1985 with H.F. Scientific, a venture capital company owned by the Lev Group, Israel, established Lev-Universities Ltd. to develop specific R&D projects in the area of medical physics. F.R.M. Agricultural Sciences Partnership, A.S.P. - 49% Yissum and 51% First Mississippi Corporation of the U.S.A. was set up in 1987, to develop new products in the area of agricultural biotechnology, including bioinsecticides. First Mississippi Corporation facilities and the up to date equipment, were provided by the U.S. group as part of its investment. Yissum is Israel's second largest patenter and its portfolio projects, available for licensing total 187, with 42 in bio-technology, 37 in agricultural sciences, 20 in chemistry, 29 in physical sciences, 18 in medical science and 41 in the area of pharmaceuticals.

**TWO ISRAELIS SHARE WOLF PRIZE IN CHEMISTRY**

Two Israeli scientists -- Tel Aviv University Prof. Joshua Jortner, President of the Israeli Academy of Sciences and humanities, and Prof.

Raphael D. Levine of the Hebrew University of Jerusalem -- have been named as the 1988 recipients of the Wolf Prize in Chemistry. The Chemistry Prize Committee noted that their ideas have had an immense impact in many fields of modern chemistry. The prize will be awarded by President Chaim Herzog at a ceremony at the Knesset in May. This is the first time that the Wolf Prize in Chemistry has been awarded to an Israeli. The Wolf Foundation, based in Israel, gives six international awards annually for outstanding achievements in chemistry, medicine, mathematics, agriculture, physics, and the arts.

**SPEEDIER TREATMENT FOR VASCULAR ILLNESS**

A new diagnostic method developed by researchers at the Hebrew University's Veterinary Medicine School and physicians at Kaplan Hospital is making possible faster and more efficient treatment of temporal arteritis, a dangerous inflammation of the blood vessels of the temporal region and the brain.

The researchers proved that by using the electronic scanning microscope, it is possible to significantly reduce the time required for diagnosing the disease. Conventional methods take hours or even days, while the new method makes diagnosis possible within five hours, enabling the attending physician to begin treatment at a much earlier stage.

**HEBREW UNIVERSITY IDENTIFIES COMPUTER 'VIRUS'**

A computer "virus"--a rogue program planted by an unknown culprit in the personal computers of Hebrew University--was discovered and neutralized by quick-thinking experts at the University's Department of Computer Sciences. The "virus" was in a tiny program that was implanted into one of the University's computers. The virus "infected" other programs, and when they were copied, they spread the illness from one computer to another. It took the computer experts 48 hours to identify the virus and they quickly devised means for nullifying its effects. The objective of the "germ warfare" is unknown.

## ISRAEL HIGH-TECH SHARES TRADED IN THE USA

	<u>P-E</u> <u>Ratio</u>	<u>Price</u> <u>as of</u> <u>2/15/88</u>	<u>Change</u> <u>since</u> <u>1/15/88</u>		<u>Earnings per</u> <u>share</u>	
					<u>1986/7</u>	<u>1987/8</u>
<b>BIOG</b> OTC BIO-TECH GENERAL Biological products for health care	d	6 1/8	+1 5/8	9 Mo Sep	d 0.65	d 0.80
<b>ELBIT</b> OTC ELBIT COMPUTERS Defense electronics	8	4 5/8	n.c.	6 Mo Sep	0.50	0.37
<b>ECI</b> OTC ECI TELECOM LTD. Telecommunication Systems	d	2 1/8	- 7/8	9 Mo Sep	d 1.23	0.10
<b>ELRON</b> OTC ELRON ELECTRONICS Company investing in high technology		3 1/4	- 5/8	6 Mo Sep	0.20	d 0.08
<b>ELSCINT</b> NYSE Full range medical imaging	d	1 1/8	- 1/4	3 Mo Dec	d 0.51	0.01
<b>FIBRONICS</b> OTC FIBRONICS INT'L Fiberoptic communications	d	2 1/2	+ 3/8	9 Mo Sep	d 0.20	d 0.14
<b>INTERPHARM</b> OTC INTERPHARM LAB. Biological products for health care	d	4	+1	9 Mo Sep	0.38	d 0.34
<b>LASER</b> ASE LASER INDUSTRIES Surgical laser systems	19	6 3/4	- 1/2	6 Mo Sep	0.47	0.44
<b>OPTROTECH</b> OTC OPTROTECH Electro-optical systems for PCB	7	5 1/4	+ 1/2	9 Mo Sep	0.09	0.39
<b>SCITEX</b> OTC SCITEX Computer graphics	d	3	n.c.	9 Mo Sep	d 1.63	d 0.59
<b>I.I.S.</b> OTC I.I.S. Computer peripheral equipment	6	2 3/4	- 1/8	9 Mo Sep	0.48	0.56
<b>S.P.I.</b> OTC S.P.I SUSPENSION - PARTS INDUSTRIES Military components	7	1 3/8	- 1/4	9 Mo Sep	0.23	0.08

d = deficit

**BIRD FOUNDATION FUNDS FIBRONICS PROJECT**

The Israel-U.S. Binational Industrial Research and Development Foundation (BIRD-F) has approved funding for a \$2 million joint development project between Fibronics Ltd., Fibronics International's Israeli subsidiary, and Spartacus Inc., the company's U.S. subsidiary in Lowell, Massachusetts.

Funded equally by BIRD and Fibronics, the project will lead to development of the next generation, high performance, open systems networking products for connecting IBM mainframes to the 100 MBPS, Fibronics' System Finex, FDDI Local Area Network.

The agreement includes a plan for an overview of the potential market and the research, development, design and manufacturing of these products. These responsibilities will be jointly shared by the two subsidiaries.

**ELSCINT EKES OUT PROFIT**

Elscint Ltd. (NYSE:ELT) has announced a \$305,000 profit for the quarter ending December 31, 1987. These results have been made possible by the debt restructuring. Elscint appears in a position to close out its fiscal year in March 1988 with worldwide sales of just under \$150 million.

It would be premature to expect any meaningful progress in profit over the next two quarters unless Elscint succeeds in obtaining a new inflow of capital, by our estimates not less than \$10 million.

**FIVE UNITS SOLD BY ALUMOR LASERS**

Alumor Lasers Ltd. (IHTR-3/87) has received initial orders for five of its ultra compact carbon dioxide laser units, a medium high power laser for industrial cutting applications. The lasers are used for robotic application on material processing systems.

Alumor Lasers Ltd. was established in 1983 by Ophir Optics Ltd., a subsidiary of Aryt Optronics Industries Ltd., and T.M.D., the R&D

division of the Eisenberg Group of Companies. A top executive stated that an additional \$500,000 has been allocated to hasten the further development of the ultra compact carbon dioxide laser, which is among the smallest units of its kind.

**ESHED ROBOTEC 1987 EXPORTS OVER \$1 MILLION**

Eshed Robotec (1982) Ltd. (IHTR-8/86) announced that 1987 was the first year in which exports exceeded \$1 million. Plans are for exports to reach \$1.5 million in the current year.

The company's SCORBOT-ER III robot instructs users in robotic industrial applications. The company has sold more than 1,000 of these systems with 80% going to export markets. Eshed Robotec is now introducing its VIEWFLEX, a hardware and software package which operates on IBM computers and allows the user to design, create and apply complex vision tasks.

**ISRAEL HIGH-TECH REPORT INDEX UNCHANGED**

The Israel High-Tech Report Index on February 15 at 36.57 was nearly identical to January 15. The market capitalization for Bio-Technology General (OTC: BTGC) advanced to \$32.8 million from \$24.1 million. In the second and third quarters of 1988, companies such as Elbit, Laser, Optrotech, Fibronics and Scitex can be expected to report improved results which, in keeping with general market conditions for high-technology shares, could see their market capitalizations appreciate.

	<u>2/15/88</u>	<u>1/15/88</u>
DJIA	1983.26	1956.07
S&P 500	257.63	252.05
NYSE INDUSTRIALS	173.22	169.55
ASE MARKET VALUE	277.00	268.31
NASDAQ INDUSTR'LS	353.53	346.71
ISRAEL HIGH-TECH REPORT INDEX*	36.57	36.49
*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of 10 leading high-tech companies. Base=100 as of 9/30/84		

**ARYT EARNINGS FALL**

Aryt Optronics Industries Ltd., in its third fiscal quarter ending December 31, reported sales of \$2.3 million with a net income of \$268,000, marking a drop of 20 percent from last year's earnings in the comparable period.

**NEW ORDER****AT&T AWARDS \$14 MILLION ORDER TO ECI TELECOM (NASDAQ:ECILF)**

AT&T Communications Inc. has placed a new order totalling \$13.7 million for ECI Telecom's DTX-240 five-to-one circuit multiplication system. AT&T had previously, in 1986, placed an order for \$4.3 million in connection with TAT-8, the first transAtlantic fiberoptic cable. The DTX-240 system provides a five-to-one circuit multiplication ratio. It represents technologies chosen by major American and European international carriers as a method of providing voice and voice-band data services via digital transmission media, throughout the 1990's. The terminals ordered are for use on international satellite and fiberoptic links.

ECI Telecom designs, develops and markets telecommunications and communications systems employing digital speech processing, switching technologies and ISDN (Integrated Services Digital Network) compatible technologies.

**NEW PRODUCTS****Miniature Modem by RAD**

RAD Communications Ltd. is offering a high-speed fiberoptic miniature modem which operates without AC power supply. The modem operates at two selectable rates; 56 or 64 kbps, with a range of up to two miles. It offers the user the benefits of fiberoptic systems, including low attenuation, EMI/RFI in unity, data security and safety and electrical isolation.

\*

**Keren Exports Ten Amplifiers**

Keren Electronics Ltd., a subsidiary of Koor Electronics Ltd., is marketing custom-designed RF systems and narrow and broad-band amplifiers and transmitters. Its two most advanced products are: a solid-state

IKW-broad-band RF amplifier in three bands. This amplifier is equipped with a high-speed pin diode switch, complete byte control and forced air cooling systems. Ten such amplifiers have already been exported.

BD-4 is a new generation of a mission-critical command, redundant, destruct transmitter system. One such system has also been exported.

Keren Electronics, more than 30 years old, specializes in telecommunications and sophisticated RF systems for civilian and military applications.

**NEW SYSTEM USES LASER SCANNING AND IMAGE PROCESSING TECHNOLOGIES**

ELOR Optronics Ltd. is marketing optoelectronic gauging and inspection systems for production in quality assurance applications. Three systems are offered: VIDI, a high precision non-contact blade inspection and measurement system using non-contact laser optics; VIGA, an advanced high precision non-contact gauging system for dimensional measurement, highly time effective; and VINA, a unique concept in visual ammunition inspection which allows the user to inspect up to 300 cartridges per minute with near 100% sorting capability.

The ELOR systems, simply explained, consist of categorization elements, a computerized optical unit and an analysis unit. Their computerized vision unit is said to be state-of-the-art and includes two computers working independently of each other. The computers examine different parts of the cartridge.

ELOR is jointly owned by Schneider Optics GmbH, Clal Electronic Industries and Elron Electronic Industries Ltd.

**EFRAT EXTENDS MARKETING ARM**

Efrat Future Technologies announced that Converse International Inc., its parent company, has signed marketing contracts in Switzerland, Britain and the Far East for the sale of Trilogue, the very smart multi-microprocessor computer system used in audio message switching and storing.

## R&D IN INSTITUTES OF HIGHER LEARNING: FROM LABORATORY TO THE MARKET PLACE

### A CHEAP ALTERNATIVE TO PEAT MOSS

The cost of fertilizing and manuring soil has escalated, especially for cultivation of plants in containers, where the most commonly used substrate material is peat moss. This is mined in non-cultivated areas, and cost is high due to the exhaustion of natural sources. Notwithstanding its high price, peat moss does not fulfill all criteria for the optimal substrate which will result in good germination, rooting and growth.

Israeli farmers, together with a group of scientists led by Prof. Yona Chen at the Hebrew University Faculty of Agriculture, have developed a novel method of composting agricultural wastes, giving rise to a substitute for peat moss. The product has proven economically effective in Israel and could serve as a model in other parts of the world. Known as "fortified compost", the product has the chemical and physical properties of a growth medium. It is also effective in suppressing soil-borne plant pathogens.

The researchers produced fortified compost from two types of agricultural waste: the solid fraction of slurried cattle manure separated out as a raw material or after anaerobic digestion; and marc obtained from vineries.

### Technology

The anaerobic digestion of organic matter is a well-known technology, used to produce biogas from wastes. The solid fraction left following methanogenic fermentation was one source of the raw material. Following sieving and leaching of the post-fermentation waste, it was subjected to digestion by the novel procedure of composting. Alternatively, the solid fraction was separated from fresh manure by solid-liquid separation and then subjected to compostation. Both methods gave rise to a similar product, a substitute for peat moss. Similar results were obtained when grape marc served as the agricultural waste.

### Applications

Fortified compost can be sold at lower prices than peat moss. The economic viability of the process depends on accessibility of agricultural waste. For example, it is economical for cattle farms where substantial quantities of manure slurry are being produced. This has been proven on dairy farms in Israel, where the raw material is collected at the milking station. In addition to the waste products mentioned above, others are being tested as basic materials for the production of fortified compost. The whole process is at the scaling-up of production stage.

### HOPES FOR INCREASED ELECTRONICS EXPORTS

As a result of diminished domestic defense spending on electronics, and an improving dollar exchange rate (editorial IHTR-2/87), Israel's electronic industry is expected to increase exports by 10% in 1988. Ministry of Industry and Trade officials are looking for exports of electronics to reach 50%-60% of total industrial exports by 1990.

#### ISRAEL HIGH-TECH REPORT NEWS AND INVESTMENT OPPORTUNITIES

Written for venture capitalists, investment bankers and bankers active in international trade, industrial researchers, business men, security analysts and portfolio managers, underwriters, private and institutional investors and individuals who need to maintain insights into Israel's evolving and dynamic high-technology field.

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**NEW INVESTMENT****ADLER & CO. AND ATHENA VENTURE INVEST \$1 MILLION IN DIATECH**

Diatech, a start-up firm, specializes in buying technologies for commercialization from Israeli institutes of higher learning. It also finances scientists who have made promising discoveries for a number of months until their work can be transferred into a structure suitable for commercial development. It concentrates its activities in the field of human health and diagnostics. Located in the Kiryat Weizmann Science-Based Industries Park, Diatech was set up by Bio-Technology General co-founder, Prof. Haim Aviv. The firm is already producing several diagnostic kits. One of these, the technology for which was developed by Prof. Natan Tzitri of Haifa University, identifies urine impurities. Another kit identifies bacteria in urine and was developed jointly with Tel Aviv University.

Athena Venture Capital and Adler & Co. have invested about \$1 million in Diatech. For Athena it marked the first science-based investment in 1988 for its Israeli portfolio. An executive of Athena stated that in five years the company expects sales to reach \$15-\$20 million. Diatech currently has four employees, led by general manager Prof. Emil Katz.

**SMALL BUT RAPIDLY GROWING HY-LABS SALES EXCEED \$1 MILLION**

For the first time in its 13 year history, 1987 sales of bacteriological reagents produced by Hy-Labs for the health and food industries passed the \$1 million mark.

An important product is the Hy-pbc-flask, a gamma-irradiation sterilized blood culture system with agar-coated paddle and broth placed within a factory-sealed, transparent plastic flask. The device rapidly detects both aerobic and anaerobic bacteremia, generally within 18-24 hours of incubation.

**WINTER OLYMPICS PROTECTED BY ISRAELI FENCING**

The security fences at the Winter Olympics held last month in Calgary, Canada, were provided by an Israeli firm, Trans Security Fences Ltd. of Petah Tikva, which won an international tender for an electronic fence detection system.

Trans Security's system was developed by its founder and general manager, Technion graduate, Uri Alizi. The firm supplies electronic intrusion detection systems to protect both civilian and military installations.

**WORKSHOP ON HIGH-POWER MAGNETS ATTRACTS WORLD EXPERTS**

Physicians rely on magnetic resonance imaging technology as a diagnostic tool in locating brain tumors without resorting to surgery. Nuclear magnetic resonance techniques are a standard tool for investigating molecular structures. Some 120 physicists, chemists, biochemists, and biologists from 11 countries met at the Weizmann Institute of Science to discuss these and other magnetic resonance techniques in a recent workshop. According to Prof. Shimon Vega, the future direction of magnetic resonance spectroscopy is towards an ever wider range of non-invasive applications, in medicine as well as in materials research and geology.

**WEIZMANN INSTITUTE MARKS N.I.H. CENTENNIAL**

The Weizmann Institute of Science held a symposium to mark the Centennial of the National Institutes of Health. Representing the N.I.H. were three of its most distinguished scientists: Dr. Robert C. Gallo, known for his contributions to virology, cancer research, and especially his pioneering studies on AIDS; Dr. Michael Zasloff, who recently discovered a new family of antibiotics; and Dr. Joseph E. Rall, Deputy Director of Intramural Research at N.I.H.