

ISRAEL HIGH-TECH REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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May 1990 Vol.VI. Issue No 5

ISSN 0334-5307

From the Editor

Ofek-2 Seeks Answers to Space and Worldly Questions

Well ahead of its originally planned schedule, Israel's Space Agency gave the green light to Israel Aircraft Industries. IAI The Ofek-2 satellite was launched into orbit without hitches. The satellite is now serenely orbiting in space in an elliptic trajectory of 210-1,500 kms. above earth. Nearly identical in size and shape to its predecessor, Ofek-2 weighed in at 160 kilograms, four kilos more than Ofek-1. It is intended to enhance the ISA's scientific aims of collecting data on space environmental conditions.

As observers of Israel's technology scene we were not even faintly surprised with Time magazine's pre-launch story which not only predicted the launch but also reported that Ofek-2 would be carrying an electro-optical camera allowing for real time intelligence capable of real time detailing of the appearance of the terrain above which it travels.

Israel possesses highly developed expertise in the field of optical lenses. In addition it enjoys a leading edge position in infrared technology. These technologies are being applied to a growing number of applications both in the military defense areas as well as in the civilian sectors. They are used extensively on Israeli tanks including the internationally acclaimed Merkava. They are also in use on other military systems by the IDF where night vision and target siting capabilities are required.

The blend of optics and infrared technology is also being applied to non-military applications as the non-invasive detection of cancerous tumors or the detection of "leaks" in chemical plants. Research in the pipeline is also concentrating on the potential for seismic and oil search applications.

When the two technologies are applied to "optical telescopes" the resulting capability allows for the seeing of the minutest details, in day or night conditions and at distances which are not outside of

the range of the Ofek-2 satellite's flight orbit.

Neither the Israel Space Agency Coordinator nor its Chairman are providing any official indication as to the satellite's potential usefulness as a real time "seeing eye". Yet, we are assuming that an optical telescope/camera system is part of the on-board systems carried by Ofek-2. Therefore, the Israel Aircraft Industries announcement that among Ofek-2 mission aims is to verify the capability of two-way command transmission raises new implications to Ofek-2's importance. Not only does it provide a platform for pure scientific inquiry but from the surveillance aspect theoretically it can serve as a potent early alarm system.

The Ofek-2 satellite launch into space is a pointed indication to Israel's neighbors that Israel has the capability of monitoring events in their respective countries even down to the minutest details. Recently the free world has become aware of the Iraqi will to add to its already unsavory arsenal of chemical warfare agents a nuclear capability. The seizure of "atomic triggers" and other military offensive equipment destined for Iraq point to the need of new watchfulness and monitoring of ongoing developments in that country.

Iraqi President Saddam Hussein is unlikely to agree to international inspection of facilities in his country, which the West suspects are being used for production of materials which is outlawed under Geneva Conventions.

Russia, the United States, Japan, France, China,

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Subscription: 1 year \$150.-. Bulk copy and reprint information available on request

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Circulation Offices: Israel Publications Inc., 47 Byron Place, Scarsdale, N.Y. 10583, USA.

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Great Britain, India and Israel are the recognized members of the group of nations belonging to the highly exclusive "space club". One can only hope that Israel's space age technology achievements will move the country in the direction of becoming more internationally economic competitive in the fields of space exploration and telecommunications. Yet it also can be viewed as an addition to its arsenal of defense oriented systems which form a part of the country's continuous quest for peace through the development of deterrent strength by means of surveillance. One need only recall H.G. Wells dictum that "Human history becomes more and more a race between education and catastrophe."

Computer Chip Design

Computer chip designers are proving to be a growing source of innovation and expanding exports. Key participants in the field are Digital Equipment (DEC) Technical Center (Israel) Ltd., Intel Israel Ltd. and National Semi-Conductor Israel Ltd. The last mentioned had just reviewed its activities for 1989 and announced that exports for that year totaled \$41 million as compared with \$33 million in 1988. Dr. Giora Yaron, National's general manager projects that in 1990 exports will reach the \$60 million level. What is even a happier development, notes Yaron, is that National has received approval for its \$50 million investment program aimed at expanding its integrated circuit manufacturing capabilities and for the development of the infrastructure to produce new items. This will bring National's total investment in Israel to an impressive \$150 million.

Is what is good for National Semi-Conductor good for Israel? Yes, since National's rapid expansion is accompanied by a rapid growth in jobs. In 1987 the company employed 400. In 1988 the number employed rose to 430 and in 1989 the number rose to 480. With the the additional investment, National executives will require additional staff and is already embarked on an extensive personnel recruiting campaign. Additionally, National requires one hundred operators, technicians and and engineers. Dr. Yaron has indicated that National will consider anyone technically qualified and that includes new immigrants especially from the Soviet Union.

National Semiconductor's Design Center was established twelve years ago in 1978 when it set out to develop the series 32000 microprocessor

are designed for high performance and embedded systems in office automation, robotics, laser printers and CAD/CAM. The design center, located in the Industrial Zone in Herzliya employs more than 150 professionals including electronic, system and software engineers who are active in architecture, microprocessor and system design as well as software and CAD tools development. Less than three years ago National Semi-Conductor's state-of-the art wafer fabrication plant in Migdal Haemek started operations. It is an advanced factory developing micro-electronic technologies and processes for future applications.

Satisfying a Demand for Agricultural Technology

Local farmers have been unusually successful in raising livestock. The Israeli cows have been credited as world leaders in milk production, yielding on average 20% more than their American counterparts. Milking cows by remote control is drawing close to reality. Recently attention is being paid to the problems of efficient and effective dairy herd management.

AFIMILK from S.A.E. Afikim, the agro-industrial enterprise of Kibbutz Afikim, is a herd management system based on management by exception. This means that a norm for each cow is established and any deviation from this norm is immediately noted, enabling the dairy farmer to act accordingly. At every milking, AFIMILK collects and analyzes the following data for each cow in the herd: milk yield; electrical conductivity of the milk and cow activity.

Naan, Israel's leading manufacturer of drip sprinkler and micro-irrigation systems

Greenhouses for flowers are commonplace in the Jordan Valley. The scores of flower greenhouses benefit from the special climate making it possible to export flowers of an excellent quality during the winter to European markets, before the competition arrives on the scene. The export quality flowers are innovatively grown on a network of disconnected tuff beds. The complete irrigation production in the greenhouses was carried out by NAAN Irrigation products. The experience has been translated into business opportunities and has resulted in Naan's equipment being sent to the USSR. The first shipment of irrigation equipment manufactured by Naan Irrigation Systems was sent to the Soviet Union in March 1990. The equipment was sent to Suvhoz, a government farm near the city of Smolensk and will cover some 70,000 dunams. The site will serve as an

experimental station with a group of Naan experts leaving shortly for the USSR to demonstrate to the Soviet farmers how to use technologically advanced methods of growing vegetables.

The shipment is part of an agreement signed between Israel's Ministry of Agriculture and the Republic of Byelorussia and the Moscow Institute for Irrigation which is responsible for the growing and irrigation of vegetables throughout the region.

Another proof of the economic viability of applying irrigation technology to farming is the doubling of greenhouse tomato yields. At the experimental greenhouse system at Kibbutz Saad in the Negev desert, tomatoes are grown in buckets filled with a special mix of organic and other materials, while the system controls and releases the exact amount of water and fertilizer needed for each plant. The new system extends the life expectancy of plants and enables them to grow to heights of up to six meters. It also lengthens the picking season to six months and increases yields up to 30 tons per dunam (1000 sq.meters). But quality is not sacrificed. The new method results in top export quality produce that is firmer, tastier and has a longer shelf-life than other greenhouse tomatoes. The system has also proven to be cost-effective.

At another greenhouse located at Moshav Ein Hab'soer, also in the Negev, a closed drip-irrigation system recycles the water and completely controls the amount of fertilizers and minerals. Both systems use the well-known "Naantif" integrated drip system which distributes the daily irrigation solution in small portions through a pulse system.

A greenhouse system cools plants directly by misting them either by sprinkling or micro-irrigation.

As a result of these techniques exports of winter greenhouse tomatoes is expected to reach 15,000 tons, most of them to be sent to Europe and the US. This represents a three-fold increase compared to the previous year.

Improving on the Awassi

Kibbutz Ein Harod Ihud claims to rear the best flock of Awassi sheep in Israel, if not in the entire world. The Awassi is the most numerous and wide-spread breed of sheep in southwest Asia. It is the dominant type in Iraq, the most important sheep in the Syrian Arab Republic and the only indigenous breed of sheep in Lebanon, Jordan and Israel. In the north of Saudi Arabia it is bred under desert conditions. In Turkey the breeding area is situated along the southern border. In recent years the

Awassi has been exported into several countries of Asia, Africa and Europe. The founders of the flock at Ein Harod purchased their first sheep in 1936 and since then have invested more than fifty years in obtaining the desired quality. In 1937 a ewe yielded 250 kg of milk in one season. By 1984, this figure reached 1300 kg.

Ein Harod farmers attribute these achievements to "methodical and dedicated labor involving genetic breeding, accurate recording, scientific feeding, strict veterinary supervision and modern techniques of mechanized milking". The Ein Harod bred sheep are in demand by breeders in various countries and are exported to: Spain, Yugoslavia, Bulgaria, Hungary, Rumania, Cyprus, Iran, Ethiopia, Kenya and Burma.

Besides its usefulness for its wool which is used for carpets and its meat the Awassi sheep possess a high potential for milk production. Very high yields have been recorded in Israel where the breed has been selected for milk during the last fifty years. In many flocks average yields exceed 400 kg per lactation, and in the flock at Ein Harod Ihud the lactation yield of all ewes is above 500 kg on average. Several ewes have record yields of 1100-1300 kg per lactation. The fat content of the milk ranges from 6 to 7%.

ECI-TELECOM LTD. a company report

Summary:

In 1989 ECI-Telecom achieved record results. As early as February 1989 we projected for all of 1989 a 40% advance in sales to \$ 50 million and even a sharper rise in profits to \$4.0 million. At the time these projections were considerably above those of several major Wall Street investment bankers. During calendar 1989 we found ourselves continuously revising upwardly the full year estimates. ECI did not disappoint. It exceeded our expectations with 1989 sales of \$52.7 million and a major gain in profits to \$5.28 million. Over the past three years ECI's sales have more than doubled and earnings have increased at an even faster rate. Looking ahead for all of 1990 the prospects are equally good for another quantum leap forward. A sales advance of 40%-45% is a real possibility and a jump in profits of more than 100%. ECI for many years has been operating under adverse conditions. These included geographically scattered operating facilities; and less than satisfactory cash flow. These problematic conditions were resolved last year with the consolidation of all production and management under

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 April 19, 1990 and the price changes relate to those a month ago.

<u>Company</u>	<u>Revs</u> (in\$ mil.)	<u>Net income</u> (in \$thou.)	<u>Price</u>	<u>Net</u> <u>Change</u>
ELBIT COMPUTERS Defense electronics	117,200.	8,750.	9.875	+1.375
ELBTF OTC				
ECI TELECOM Telecommunications	38,745.	3,671.	13.75	+2.00
ECILF OTC				
ELSCINT Medical imaging	108,000.	0,987.	2.50	-0.125
ELT NYSE				
FIBRONICS Fiberoptics	34,160.	1,450.	7.125	+0.50.
FBRX OTC				
INTERPHARM LAB. Biological products	7,812.	0,236.	2.75	n.c.
IPLLF OTC				
LASER INDUSTRIES Surgical lasers	na	na	3.375	-0.375
LAS ASE				
OPTROTECH Electro-optical systems	52,920.	3,330.	10.375	+1.625
OPTKF OTC				
SCITEX LTD. Computer graphics	170,550	21,687.	26.625	+5.625
SCIXF OTC				
IIS INTELL. Computer peripherals	8,173.	2,007.	4.50	-0.125
IISLF OTC				
TEVA PHARMACEUT. Pharmaceuticals	191,250	11,980.	11.25	+0.50
TEVYF OTC				
ELRON ELECTRON. Investment in hi-tech			6.75	+1.0
ELRNF OTC				

one roof. The companies received \$13 million in cash when it sold 1,000,000 new shares to Claridge for \$11 million and from the exercise of options. The company now is market responsive and should be able to continue to maintain forward progress by building on ECI's exclusive digital speech processing, switching and Integrated Services Digital Network technologies. Demand is growing and in 1991 sales could surpass \$ 85-\$90 million.

New products, a solid cash position and strong demand for its basic products are the key elements which are fundamental to the surge in sales growth and profitability. ECI's basic products are not showing any signs of obsolescence as the company expands their performance while adding new systems. In 1989 Research and Development accounted for 8% of sales. In 1990 the R&D outlays will jump to 10% of the higher sales. ECI's new production facilities leave adequate room for expansion of production to meet rising sales without the need for major new capital outlays.

Products:

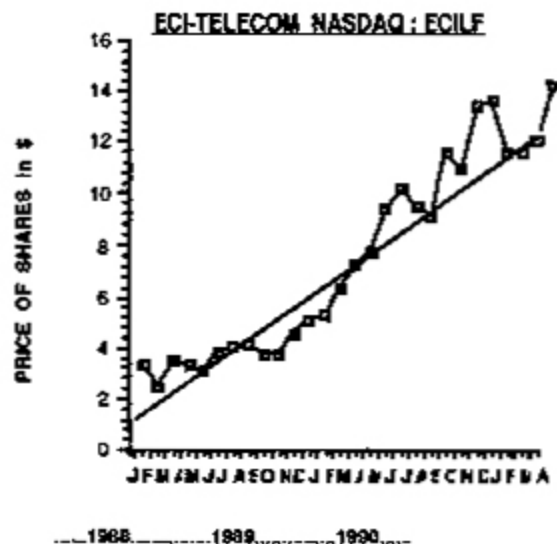
International telecommunications carriers are experiencing a remarkable jump in the use of FAX calls. Moreover, the growth in FAX communications is expected to advance exponentially into the foreseeable future. The company's DTX-240 F is proving that it can maintain a 6:1 circuit multiplication ratio of the system. This creates a new important advantage for the company's customers who are relying for such cost effective solutions.

ECI's Digiloop systems which have been so successful in Europe are expected to make an initial entry into the U.S. market. These smart systems upgrade subscriber loops to provide full digital or analog services. Single twisted pair copper subscriber loops, can carry at one time two voice or data calls. The resulting cost effectiveness is a major attraction for international telecommunication carriers.

Evaluation:

Investors have placed a relatively modest market valuation of ECI Telecom. They are reacting with a growing enthusiasm as quarterly announcements exceed projections.

Major investment companies who are essentially invested for the longer term are holding more than 75% of the ECI outstanding shares. Both on fundamental and technical grounds there is room for an upward market valuation.



IHTR Index

In the past year the IHTR Index has advanced sharply. On April 14, 1989 it was 55.26 as compared with 96.15 on April 18, 1990. Leading the rise in the index are Scitex + 169% and ECI Telecom which advanced by 86%. Among the lower priced shares Elscint doubled in price to \$ 2.50.

Recent Developments

VISONICS LTD. has exported \$22.5 m. in 1989. 50% of the company's market for its home security infra-red vision products is in the United States

Soviet Business Cooperation

Promising fields of cooperation include medical equipment, electronics and engineering, recently said Soviet Chamber of Commerce Chief Vladislav

Israel High-Tech Report Index*

96.56 + 15.61 %

*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

Malkevich.

The Soviets also hope to use the Israeli method of drip irrigation and to import Israeli agricultural productions. Several joint Soviet-Israeli ventures are already underway in the Soviet Union, including a medical equipment company in the Ukraine.

ICN Biomedicals is marketing Savyonon Chlamydia kit.

Chlamydia is the number one sexually transmitted disease in the US, and is a major cause of female infertility. Savyon, an Israeli firm headquartered in Beersheba has developed a new chlamydia diagnostic kit which recently received FDA approval.

Startup Offers Frogs Legs

In the United States alone the annual consumption of frogs legs reaches some \$60 m. Frogs legs sell for approximately \$10 per kg. In addition, an unprocessed skin is sold for \$1 per skin, and frogs for laboratories are sold for anywhere from \$2 to \$8 per frog.

The potentially vast overseas market for frogs, including frog meat for gastronomic requirements, frog skins for the fashion and accessory market, and live frogs for research and laboratory applications, is now being tapped by a science-intensive new Israeli company. GRANACO Aqua Culture Ltd., a 1989 startup, has developed and is implementing a cost-effective frog breeding process.

Intel Israel Ltd., specializing in integrate circuits for microprocessors and software, exported \$127 Million worth of goods in 1989, representing an 18% increase compared to 1988. Of this, \$104 Million was exported by Intel Electronics Jerusalem, \$22 Million via the Planning Center and \$1 Million by the Programme Performance Division.

The Sheep Insemination Center at Moshav Illaniya is the only insemination station for sheep in Israel and has a capacity to inseminate 100,000 sheep a year. The rams are stationed at Illaniya in the Lower Galilee. They are able to supply frozen semen in straws or pellets from various breeds including the following rams: Assaf-Awassu-Mutton Merino; Charolais-Romanou-Cambridge Dorper. The rams are progeny tested.

Novel Packaging System

Three companies have jointly developed an

innovative plastic pallet which is expected to have a good market reception in the field of materials handling. The new pallet is unique in two regards. Unlike the traditional wooden pallet, it is re-usable. At the same time, the pallet is the first in the world to be manufactured from waste and recycled engineering plastics.

A trial order, placed by GEP - General Electric Plastics, is presently being filled.

The pallet, dubbed OMNI, is the product of a joint development project between Su-Keet Ltd., which represents GEP in Israel, ZAG Project Development Ltd., and , the plastic pallets manufacturer belonging to Kibbutz Geshar Haziv. The pallet development was undertaken with the cooperation of the Chief Scientist of the Israel Ministry of Commerce & Industry and the technical support of GEP.

An End to Dangerous and Expensive Chemicals

Klayman-Meteor, Israel's leading producer of agricultural netting, is marketing a new product which can put an end to costly and hazardous chemical use in greenhouses. The Bemisia-Tabaci insect, carrying the tomato yellow leaf-curl virus, causes extensive damage to tomatoes, cucumbers and many other vegetables. To date, the only alternative has been insecticides, which lose their effectiveness as the insects acquire resistance to chemicals.

The Virus-proof 50 mesh meteor net, using a physical barrier of special white netting, prevents small insects and flies from entering the greenhouse. In tests carried out by the Department of Plant Projection of the Israel Ministry of Agriculture, the net has been shown to completely block the penetration of Bemisia-Tabaci insects.

Pectin to USSR

Yakhin Hakal is marketing pectin directly to the Soviet Union in a deal valued at several hundreds of thousands of dollars. The firm's exports of pectin totaled \$2.8 m. last year. Yakhin is one of only eight plants world-wide that manufacture pectin, which is produced from citrus fruit peels and used in jams, jellies and pharmaceutical products.

Elscint Ltd. which has been taken over by Elbit Computers, announced \$3.1m. profit for 1989 and sales of \$147.5m.. Management reported, for the first time in six years, a positive cash flow from operations throughout calendar 1989. R & D spending was about the same as in 1988 at about \$12m.

The new line of nuclear medicine gamma cameras out on the market for half a year, has received

enough orders to keep production lines going into the third quarter. Elscint reports that its CAT scanners continue to be well received by customers. In the current quarter the company will begin shipping its Gyrex V magnetic resonance system.

Teva Pharmaceuticals Ltd. is finally ready to spin off its 98% own subsidiary Paca Industries Ltd. The company produces yeast and alcohol. However, as Teva's line of business has changed in recent years, it no longer has an interest in controlling Paca with its relatively small manufacturing facilities in suburban Tel Aviv, and according to a recent Teva report, employs 54.

Elron in Turnaround

Elron Electronics Industries Ltd. has achieved a notable turnaround when it reported that it earned \$17.5m. in 1989. In 1988 Elron lost \$8.6 m. and in 1987 it suffered a \$4.7 m. loss.

A onetime 70% owned medical subsidiary, Elscint Ltd. nearly bankrupted in the mid 1980s has been completely restructured.

Elbit Computers Ltd. has purchased all of Elron's holding in Elscint as part of an overall business strategy furnished by Uzia Galil, Elron's chairman. While Elron may not be cash rich, nevertheless it is now poised to carry out its primary function of investing in seeding and nurturing high tech companies.

In 1989 Elron Electronics Industries made additional investments in the aggregate amount of \$1.2m. in several of its privately-held companies, as compared with \$500,000 so invested a year ago. Due these companies still being in their early stages of growth and development, Elron recorded current losses for the year of \$1.4 m with respect to such companies.

News and Developments from Institutes of Higher Learning

Award for Excellence.

Israeli horticulturists and Israeli trickle irrigation producers were pleased to hear what they have been saying all along about being pioneers in the field of crop irrigation. A 1970 article titled "Drip Irrigation: A Method Used Under Arid and Desert Conditions of High Water and Soil Salinity" has been cited as one of the twenty classical papers on Horticultural Sciences that were ever published. The articles were

picked by the American Society of Horticultural Science and published recently in the book "Classical Reports on Horticultural Science". Drip or trickle irrigation is an accepted and a highly expanding irrigation method used worldwide and as a result millions of acres of land in the world are being irrigated with the system. Professor D.C. Elving of the Horticultural Research Institute of Ontario cites the The Goldberg-Shmueli team from the HU's Faculty of Agriculture who penned the 1970 article as "the first comprehensive, widely disseminated, journal type article in English on the application of modern trickle irrigation methodology under field conditions".

Yeda Research and Development Co. Ltd. is proving that the business of the commercializing of applied research of the Weizmann Institute of Science is a good idea. Yeda focuses on identifying research products at the WI which appear to have industrial and commercial potential Yeda tries to obtain funding for ongoing research projects in exchange for rights to commercialize their results. Along the way it may resort to obtaining patents which enhance the prospects of licensing out these inventions.

ISRAEL HIGH-TECH REPORT

NEWS AND INVESTMENT OPPORTUNITIES

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Yeda licensed Koor Foods Ltd. which proceeded to grow Dunaliella algae commercially. The Dunaliella algae, as two WI researchers had learned earlier, flourished in saline ponds and produced a red colored single cell algae which in its concentrated form known as beta-carotene yielded a highly valued health food product.

One of the fallouts of the Koor Industries debacle was that the conglomerate was put into a position of selling off valued assets. One of the assets put up for sale was Nature Beta Technologies which was owned by Koor Foods Ltd.

Niken Sohonsa, a Japanese company which was a major customer for the beta-carotene moved in and paid several several millions of dollars in acquiring majority control of NBT. The Japanese company invested so as to protect its source of the algae which was beginning to sell in sufficiently large quantities.

Technology transfer is not always desirable but in this case it may still work out reasonably well.. David Schlachet, general manager of Yeda assures us that that under the new ownership Yeda will continue to get royalty payments and that a research contract, valued in the five figure bracket, is being maintained with the Weizmann Institute.

The algae which evolve into beta carotene can not be moved. They thrive in the Eilat area environment with its abundant sunshine and salty water. Beta-carotene is a money spinning product. In addition to it being a valued health food product, it is also a commonly used food dye due to the belief that it may possess important cancer-preventing properties

New Genes for Undernourished Bread

Bread is the staff of life assures us Jonathan Swift and Ecclesiastes suggests that it be cast upon the waters. At the Weizmann Institute researcher Dr.G.Galili thinks that he can improve on the nutritional value of wheat grains with genetic engineering techniques. . Not satisfied with the nutritional value of wheat grains, due to the wheat's inherent shortage of essential amino acids the WI researcher is modifying the DNA sequences of cloned wheat storage protein genes.His aim is to enrich the content of essential amino acids in storage

proteins. Most grain proteins are "storage proteins" and these provide the seed with the nitrogen, amino acids and energy needed during germination.

The genetically modified genes will be introduced back into the wheat plant. The new DNA sequences of cloned wheat storage grains result in not only more nutritional bread but also a bread which is tastier.

Award for Bringing Severed Nerves Closer to Each Other

The inducing of regenerative growth of severed nerves of the central nervous system was considered as unachievable in higher animals. Neurobiologist Michal Schwartz. A technique which showed promise on rabbits was first reported two years ago. By exposing injured nerves to laser light and to specific mammalian or fish nerve growth factors a growth of as much as 7 millimeters has been achieved.

Recovery of nerve function is yet to be demonstrated but it is hoped that the current research will allow, at in the future to overcome disabling injuries to the optic nerve, the brain and even the spinal cord.. At the 26th International Congress of Ophthalmology the research was the object of a Merit Award and a silver medal.

Waste Management Specialists Discuss Problems of Toxic Waste Disposal

The disposal of industrial toxic wastes was the subject of a week long study session at Ben Gurion University. Underground water resources are potentially endangered by toxic waste disposal sites. Israel similarly to other industrial nations has a growing problem related to to waste disposal.

The present site near to Beersheba has been judged to pose dangers to underground water supplies. An alternative site for concentrated extracted hazardous waste has been pinpointed near the Dead Sea. Specialists in this field were present from the United States, Czechoslovakia and the German Federal Republic.