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From the Editor's Desk

THERE IS NOTHING NEW UNDER THE SUN... BUT *OVER* THE SUN...

Innovation, as industrialists know, includes invention, but is something more; it is an ongoing process to improve efficiency, enhance quality, increase production and provide more jobs. In today's world, it usually requires expertise, automation, computerization, and better management.

The word "innovation" has many differing meanings to the Children of Israel, for whom the picture of a mortal striving to understand eternal Truth is an image as old as the Torah, and deeply rooted in the Talmud. Students and scholars of days gone by, firm in their conviction that the Truth was available, realized that their failure to attain it could be the result of an error in their way of thinking. So the study of thought, and the drive to find more efficient, higher-quality and more productive ways of approaching a problem became national characteristics. The Sages called it *hiddush*, and it meant "new ideas, or a different approach to established ways of thinking."

By comparison, there is little innovation on the modern Israeli industrial scene. Indeed, many areas of Israeli industry have no place for innovation or innovative thinking. One can wonder, with justification, whether industry makes enough effort to project a favorable image, to attract the kind of high-power, innovative thought so much a part of the Israeli psyche.

The result? Critics say a close look at the local market shows that prices for manufactured goods are higher here than overseas, and the quality is not always comparable. Surely they speak of low tech or no tech. A role model can be found even at modestly successful technologically based exporting companies. The high-tech industrialist relies on research and development to create an innovative product. He seeks innovation within and without.

The government makes funds available to offset and encourage expensive research and development, and if not available locally, the basic know-may be found outside Israel (see story on Probing for Cancer).

As is the trend in other countries, the technology-based industry can take a global view of research and development. By innovating, it can export. It can avoid the need to meet the needs of the local market and sell outside Israel. It plans so that its product sells on international markets in competition with the rest of the world.

Innovative products, not surprisingly, command a premium price. But in Israel, the low-tech manufacturer may feel he has little choice but to demand a premium for his goods and insist on protectionism. The generally uncomplaining Israeli consumer may thus have to subsidize unprofitable exports.

The Israeli Council for Industrial Innovation was launched last month at the house of President Chaim Herzog, with the brouhaha reserved for special events. Manufacturers Association President Dov Lautman, founder of the Council, stated its goal: economic independence for Israel by the year 2000.

"No matter how hard we work, we won't be able to achieve our goal if the Knesset and the government aren't thinking about innovation," cautioned Mr. Lautman, according to published reports.

President Herzog's remark that the initiative is a little late was surprisingly to the point. But even a late start does not mean the race is lost.

Innovation for all levels of Israeli industry would mean the universal adoption of research and development, quality assurance, market studies and

In this Issue

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fair pricing both at home and overseas. If the Israeli Council for Industrial Innovation helps achieve these goals, then economic independence is reachable and Finance Minister Yitzhak Modai's suggestion that Israel phase out America's financial support within five years is an acceptable approach.

AUTOMATION OF DIAMOND INDUSTRY BROUGHT CLOSER

Improved methods developed at the Weizmann Institute of Science for sawing diamonds with lasers may lead to the automation of the entire industry, and to routine production of unusually shaped gems.

The advance, made by Weizmann Institute Prof. Yehiam Prior, overcomes a key obstacle that has prevented lasers from being employed on a more widespread basis in diamond processing.

Despite their speed and flexibility, lasers are used only on diamonds that cannot be sawed by mechanical means. The high-tech tool is considered uneconomical because approximately 5% of a diamond's weight is lost during sawing, the process in which the rough stone is split in two.

However, the methods developed by Prior, of the Institute's Chemical Physics Department, have reduced that weight loss by more than half, making laser sawing, in many cases, comparable to the mechanical process.

In addition to being extremely fast, lasers can cut diamonds into virtually any shape, irrespective of the orientation of the underlying crystalline structure. This allows the largest possible gem from a raw stone, and the design of unusual shapes. With conventional technology, the natural crystal axes restrict the way the diamond must be cut.

"A laser has no such limits; you can cut a line in any direction," explains Prof. Prior, displaying a freshly cut diamond in the shape of a Star of David - a configuration that would be difficult if not impossible to obtain using conventional technology. Furthermore, when lasers are employed to cut a diamond, the surrounding stone remains intact, and can be used to make smaller diamonds. With conventional cutting, most of the peripheral stone is ground to dust.

Improved laser-based sawing is the result of two years of research at the Weizmann Institute, funded by the Israel Diamond Institute.

"We studied the parameters of the laser and of the interaction with the diamond, such as power, intensity, duration and geometric configuration in order to determine how each one affects the diamond. With this knowledge we were able to find an approach which, when used to saw diamonds, results in only a 2% weight loss," explains Prof. Prior.

"The idea is to make available the technology whereby a person can use a computer program to design a diamond, then transfer this information to a laser that would cut and shape the raw stone according to the computer instructions. This would lead to a CAD-CAM approach similar to that used in metal processing.

"If Israel is to compete with other countries in diamonds, it must have a high-tech edge," asserts Prof. Prior.

PINPOINTING CANCER DURING SURGERY

For more than 25 years, medical researchers have been toiling to develop systems which would enhance the detection and pinpointing of cancerous tissue. One area of research has been in the application of surgical probes to detect tumors during operations.

"Surgical probes are not a new development," states Prof. Ernst Lubin, head of the Nuclear Medicine Department at Israel's Beilinson Hospital. He points to the efforts of a group in the mid 1960's known as Nuclear Chicago. Its members developed a probe aimed at identifying radioactive materials introduced into the tumor area. Until relatively recently, work into this area did not result in any promising breakthroughs.

Last month, Dr. Shlomo Schneebaum at Beit Matti, home of the Israel Cancer Association, presented the results of a study on Radioimmunoguided Surgery conducted by colleagues at Ohio State University. The results pointed to a higher survival rate for patients who underwent cancer surgery during which the surgeon employed a unique tumor-detecting instrument using gamma radiation.

The procedure involves a proprietary, tumor-specific monoclonal antibody labeled with a radioactive isotope. The patient is injected with the isotope, which attaches itself to the tumor. During surgery the probe is passed over the area, and a computer display indicates the presence and location of any remaining tumor cells.
For some surgeons the idea is captivating.

"My plan prior to performing breast surgery would be enhanced by the knowledge that I could detect cancerous tissues over and above my present capability to see or feel," states Professor Durst, a senior surgeon at the Jerusalem Hadassah Medical Center.

Other prominent cancer specialists present included Prof. H.Brenner of Tel Hashomer and Sloan Kettering, and Dr. S. Chaitchik of Ichilov.

Radioimmunoguided Surgery (RIGS) will be commercialized in early 1994 by the American-based Neoprobe Corporation, which has received approval from the FDA to market its detection instrument. The tool is currently in clinical trials with its first-generation radiolabeled monoclonal antibody - for recurrent colorectal cancer. Neoprobe is raising capital by means of a private placement .

The company could carry out its future developments in Israel. However, that would depend on a number of factors related to the control after the current financing of $ 5.0 million is completed. The company is seeking to negotiate R&D agreements, joint ventures and other strategic alliances on a global basis. Israel possesses the key elements required to undertake clinical trials employing existing or newly developed Mabs along with radioisotopes. Radioactive isotopes such as I-125 employed by Neoprobe are produced by the Nuclear Research Development Center of the Negev. Cancer surgeons such as Professor Durst and Professor Berger of Tel Hashomer are likely candidates for involvement. Prof. Haim Aviv, founder of Biotechnology General and of Pharmos Ltd., and Yaacov Burak, a private investor and head of Evergreen, are known to be interested.

NEW APPROACHES TO ANGIOPLASTY

Angioplasty is a procedure which opens a partially or totally closed blood vessel. The overwhelming choice of practicioners today is a balloon catheter introduced through the leg and manipulated by cardiac surgeons to the area which needs to be widened. The main benefit of angioplasty is that it serves to forestall surgical bypass procedures, specially coronary or femural artery bypass. Balloon angioplasties, in the United States alone have quadrupled to 328,000 a year in the four-year period ending in 1990. By 1993 the number is expected to reach 475,000.

Though most cardiac surgeons use the balloon catheter, experimental work is opening new and exciting frontiers. Among these are the use of laser and high-speed drills. But these techniques have yet to avoid stenosis... the post-angioplasty re-narrowing of blood vessels.

A Star Trek or Buck Rogers approach beginning to be adopted by several research labs focuses on the possibilities of ultrasound. Ultrasonic energy applied to a clot may represent a new weapon in the treatment of the world's major killer - heart disease - and promises to do away with stenosis.

Dr. Hylton Miller, Director of the Catheretization Laboratory at Tel Aviv's Ichilov Hospital, considers the use of ultrasound procedures an important development.

"As soon as the last technical refinements are complete, clinical trials should begin. Ultrasound angioplassty could become an important addition to our ability to deal with clots and plaque," states Dr. Miller.

Dr. Miller and his team at Ichilov recently completed their 2,000th "cath" procedure.

ISRAELI COMPANIES ON WALL STREET

PROSPECTS FOR A PROFITABLE YEAR AT BTG

Three years ago BioTechnology General had a negative net worth of $6.4 million and few believed that it could continue to operate. Yet intensive financial restructuring resulted in most of the outstanding debt to be converted to equity at the end of 1989. Going into the fourth quarter of 1991 BTG had $ 13.7 million of cash and equivalents and liabilities of only $1.7 million.

The refinancing was the handiwork of investment banker David Blech. Mr. Blech's instincts for identifying values are legend and his intentions are to continue to extend his activities beyond the three existing investments in Israel. Pharmos recently concluded a financing led by Mr. Blech and which raised in the United States and in Israel more than $13 million.

Eleven years after BTG's inception more than $100 million has been invested in research and development. Profitability is finally firmly in sight this year.

Eskatrope, BTG's recombinant human growth hormone (hGH) is the product that many analysts believe will generate oriofits of $4.5-$ 6.0 million in 1992.

The company's licensee SmithKline Beecham has approvals for the sale of Eskatrope among a growing number of members of the EC. The global market for hGH is about $50 million a year. Europe accounts $275 million and of this sum. SmithKline Beecham could account for just over 5%. That sum would be enough for BTG to collect bewteen $4.0-$5.0 million.

The human growth hormone (hgH) for short stature

Israeli Companies on Wall Street

Selected income and earnings summaries for the quarters as noted , unless otherwise indicated. Nearly all of these companies are intensively export oriented. Prices are as of January 10, 1992 and the price changes relate to those a month ago.

Company	Revs (in $ mil.)	Net Income (in $ thou.)	Price (in $)	Net Change
ELBIT COMPUTERS Defense electronics ELBTF OTC	300,000 Q1-Q3	18,580	26.875	+3.375
ECI TELECOM Telecommunications ECILF OTC	79,462 Q1-Q3	19,076	49.000	+11.875
ELSCINT Medical imaging ELT NYSE	137,740 Q1-Q3	11,094	5.250	+0.750
FIBRONICS Fiberoptics FBRX OTC	37,900 Q1-Q3	(1,080)	8.125	+2.000
INTERPHARM LAB. Biological products IPLLF OTC	25,200 Q1-Q3	3,400	45.000	+2.000
LASER INDUSTRIES Surgical lasers LAS ASE	23,252 Q1-Q3	(270)	4.250	+0.500
OPTROTECH Electro-optical systems OPTKF OTC	53,647 Q1-Q3	862	13.875	+1.875
SCITEX LTD. Computer graphics SCIXF OTC	313,000 Q1-Q3	72,800	39.500	+4.000
IIS INTELL. Computer peripherals IISLF OTC	31,560 Q1-Q3	4,130	19.500	+3.500
TEVA PHARMACEUT. Pharmaceuticals TEVYF OTC	236,940 Q1-Q3	16,190	23.125	+7.250
ELRON ELECTRON. ELRNF OTC	26,500 Q1-Q3	15,806	16.500	+1.750

is normally produced in the body by the pituitary gland. It controls many processes necessary for normal development including maturation. BTG first cloned and expressed hGH in 1980 and after completing Phase I and II trials it began to license exclusive marketing rights. The signing on with SmithKline Beecham and its efforts in introducing and obtaining approvals are the basis of the predictions of a profitable 1992.

In addition to hgH BTG R&D has created a pipeline of potential products with varying longer term potential. These include bovine growth hormone, hepatitis-B vaccine, vitamin-D psoriasis treatment, hyaluronic acid and porcine growth hormone.

Based on the anticipated sales and a new products 1992 could be a dramatic year for BTG This biotechnology company with a current market value of more than $200 million could experience an upward revaluation as sales of hGH develop and other products near the market place.

IIS IS MEETING ITS GOALS AND EXPANDS

IIS Intelligent Systems the Yokneam based company which specializes in the development, production and sales of IBM environment computer and peripherals continues to diversify into communications equipment. It is planning major budgetary research and development allocations of about 10% of future sales, o $4.0 to $5.0 million to expand its position in this field. This effort will expand the company's lines of products and will provide its enlarged U.S. sales force with additional sales possibilities. IIS will expand its line of controllers enabling communication from its equipment with large and medium range IBM units. IIS maintain a low profile but it has solid growth and good management. This month it will double its space at Yokneam and only its R&D facilities remain at the Technion. Consolidation of activities will streamline operations and provide cost efficiencies.

In IHTR August 1990 issue *IHTR* featured the performance of the shares of IIS. Between the end of May and July 19, 1990 the shares had doubled to the $10 area. By the end of 1991 the company's market valuation of under $70 million was based on a $17 share price..For all of 1991 we estimate that IIS sales will be in the order of $40 million. A 10% margin on sales is a possibility. The accelerated R&D program should provide the new product introductions which could lead to a further improvement of sales and margins over the next two years. In a year where other computer companies have reported contracted sales and profits IIS is proving its ability to perform in a depressed environment. The company's positive development should result in higher market valuations as investors warmup to its performance.

TEVA SHARES ADVANCE DRAMATICALLY IN RESPONSE TO FDA APPROVAL

A $3 jump to the $20 level occurred in the aftermath of Teva's announcement that its U.S. subsidiary, Lemon Co., received approval from the FDA to manufacture and market Fluocinonide ointment, a generic version of an existing product bein sold by Syntex.Ordinary share holders were delighted with the news but holders of options which lapsed just before the announcement reportedly are considering legal action.

ENVIRONMENTAL & ENERGY RESEARCH AT WEIZMANN

Throughout the history of the planet, fluctuations in the environment have led to the extinction of many (and sometimes most) species. In the past, these changes occurred over tens of thousands of years. Today they are happening within a century – the result of man's impact on the environment. Rapid industrial and agricultural development has taken its toll in acid rain, toxic waste, water pollution, smog and the greenhouse effect. These 20th century products endanger our children, the crops we grow, the water we drink, the air we breathe. They are causing the earth's protective atmosphere to dissipate, and may be playing havoc with the global climate.

By better understanding the processes responsible for environmental problems, scientists can devise strategies for halting or even reversing the deterioration of the planet. The Weizmann Institute plays a leading role in this endeavor.

Closely related to these efforts are the institute's advances in exploring and developing clean energy sources. The pollution caused by fossil fuels – coupled with the slow but inevitable depletion of these fuels – makes it imperative that other sources of energy be developed. New technologies, particularly those drawing on solar energy, are being pursued vigorously. Spearheading the work is the Department of Environmental Sciences and Energy Research. Researchers from a dozen other departments are also involved.

Here are some of the areas in which institute scientists are active.

Water: The Endangered Resource

Israel has never been blessed with an abundance of water, as is clear from the Biblical accounts of

devastating droughts. But in spite of a terrain that is one-third desert, modern Israel has managed to make much of this limited resource.

Institute research into water pollution has three main targets: purifying contaminated water, monitoring and projecting pollution levels, and preventing water pollution through the development of ecologically-friendly approaches to agriculture.

Enhancing rainfall

The most economical way to increase water resources is to enhance rainfall. The old adage that every cloud has a silver lining is particularly apt in Israel, where every year about 13% of the country's rain is induced by seeding clouds with silver iodide particles. Materials that may prove more effective are being investigated by Prof. Meir Lahav, Prof. Leslie Leiserowitz and Dr. Ronit Popovitz-Biro of the institute's Department of Structural Chemistry.

When silver iodide is employed, water mists freeze at temperatures of -8 C, leading to precipitation. Weizmann Institute researchers have identified certain long-chain alcohols which, when used to coat water droplets, induce ice formation at temperatures close to 0 C. The ability to trigger ice formation at these temperatures would enable rain-makers to take advantage of lower-lying, warmer clouds to increase precipitation in a particular region.

The team is now studying the properties of alcohol-water suspensions. While long-term prospects are encouraging, practical application must await field evaluation - a complex and time-consuming process.

Long-Term Effect of Saline Irrigation

Another aspect of Prof. Mordeckai Magaritz's research concerns the effects of saline inigation on the soil. Farmers who rely on saline irrigation usually apply gypsum to the land in order to counteract the effects of salt. However, Magaritz, working together with researchers at the Volcani Center, found that gypsum does not prevent the accumulation of salt; it only pushes it three to five meters underground. This layer of salt will build up until it reaches the surface, causing irreversible damage to the soil.

Energy Research

With the gradual depletion of fossil fuels, the search for alternate sources of energy is being pursued vigorously at the Weizmann Institute. Much of the basic research takes place within the framework of the interdisciplinary Energy Research Center, established in 1980 under the direction of Prof. Israel Dostrovsky, and more recently headed by Prof. Amnon Yogev of the Department of Environmental Sciences and Energy Research. Large-scale experiments aimed at testing new solar technologies are conducted under the auspices of the Solar Research Facilities Unit, managed by Michael Epstein.

EXPLOITING ISRAEL'S MOST ABUNDANT RESOURCE

With an average of over 300 sunny days a year, Israel is an ideal laboratory for testing solar energy. In contrast to fossil fuels, the sun provides a clean, free, and inexhaustible source of energy. For all its potential – every 43 minutes as much energy strikes the earth in the form of solar radiation as is used in a whole year by every human being – solar energy has barely been exploited. There are three main stumbling blocks. Since solar radiation arrives in dilute form, large areas are required to collect significant amounts. Secondly, the sun provides an intermittent source of energy, available only in daytime and in clear weather. And thirdly, while solar energy can easily be "harvested" in deserts using collectors, it is usually not needed there, but rather in population centers where empty terrain is not readily available.

Solar Energy Research Facilities

In order to overcome these obstacles, the Weizmann Institute, under the leadership of Prof. Dostrovsky, set up two state-of-the-art solar energy research facilities. Both test promising new technologies under realistic conditions. This is essential in solar energy research, where the leap from lab to life is especially large.

The Institute's Schaefer Solar Furnace can provide 20 kilowatts of solar radiation at concentrations of more than 10,000 times the intensity of the sun. This is accomplished by means of a 110-square-meter mirror that reflects sunlight onto a seven-square-meter concentrating dish.

A 3,000-kilowatt facility – the Canadian Institute for the Energies and Applied Research (CIEAR) – enables technologies to be tried on an even larger scale. The CIEAR consists of a field of 64 large computer-controlled mirrors, each measuring seven by eight meters, which track the sun and concentrate its energy onto a 54-meter-high receiving tower. The mirrors follow the sun's movements by means of a computer that calculates the sun's position relative to the earth for every second of the year. The energy collected can be directed to four separate experimental stations located at various heights

within the tower. The ability to conduct four different experiments simultaneuusly makes this facility particularly effective and flexible. The fact that it is located on the campus of a major scientific institution underscores another distinctive aspect of the CIEAR – its research-oriented nature.

More specifically, the facility differs from others in that its objective is not limited to the production of electricity, but is directed towards the exploration, development and testing of any sophisticated way of exploiting solar energy on a large scale. The rationale is simple: most industrial countries, including Israel, use only about one-third of their energy for the production of electricity. The remaining two-thirds is devoted to non-electrical forms: namely, heating homes, fueling vehicles and running industry. In developing countries the proportion of non-electrical uses is even higher. Despite this, most solar energy research has been devoted to the production of electricity, possibly because this form of energy is easier to produce and deliver than others. One of the goals of researchers at the institute is to develop and test new technologies for converting solar radiation into nonelectric forms.

Solar-powered Lasers

One approach being explored at the institute is the photochemical option: using direct absorption of light to transform chemicals into more useful materials. In essence, this is what plants do by using direct sunlight to convert carbon dioxide into a multitude of organic components. Plants draw from the broad spectrum of sunlight only a fraction needed to transform one chemical into another; the overall efficiency of these natural processes is low.

The ideal way to mimic this process in the lab at higher efficiency is by using the high-powered, monochromatic light of a laser. However, present methods of generating laser light are themselves prohibitively expensive.

A team led by Prof. Amnon Yogev of the Department of Environmental Sciences and Energy Research is experimenting with a potentially economical way to generate laser light: using solar energy. Their objective is to convert broad-spectrum solar radiation into monochromatic, coherent laser light. Initial experiments conducted at the Schaefer Solar Furnace show that this is feasible. Using sunlight, Prof. Yogev and his team were able to generate over 100 watts of continuous laser power - a level not often surpassed by existing electrically driven lasers. They hope to improve the efficiency of the laser and increase its power to several kilowatts in two experimental stations at the CIEAR: the W.A. Minkoff Laser Installation and the Hilda and Cecil Lewis Solar Laser Laboratory. Solar-driven lasers might eventually be used to drive photochemical reactions in the chemical industry, and to break down various chemicals into their components. An additional application would be for communication and power transmission between space satellites.

Chemical Heat Pipe

Another technology being developed at the institute may one day enable vast amounts of solar energy from desert regions to be transported to energy-thirsty industrial areas. In this approach, being developed by Prof. Moshe Levy of the Department of Materials Research, methane is mixed with carbon dioxide at solar-generated temperatures of around 1,000 C, and exposed to a suitable catalyst. During the resulting reaction, large amounts of heat are absorbed, producing a mixture of stable, energy-rich chemicals – hydrogen and carbon monoxide. When these products are exposed to the right catalyst, the reaction can be reversed, releasing heat at up to 700 C – more than enough for most industrial processes.

The process being developed by Levy and his colleagues addresses two of the main obstacles to large-scale exploitation of solar energy - storage and transport. The reaction could form the basis for a chemical heat pipe in which high-energy gases are transported hundreds of miles before their energy is released. The fact that the reaction is reversible means that the products released at the users' end can be sent back via another pipe for reprocessing, making it a closed system. This is a significant asset in terms of economic efficiency and environmental safety (since no gases are released into the atmosphere).

Another advantage of the system is that the gas mixture used - hydrogen and carbon monoxide - has been widely applied in industry (under the name "synthesis gas") so that technology for its storage

Israel High-Tech Report Index*

100

*ISRAEL HIGH-TECH REPORT INDEX is a weighted index made up of the shares of leading high-tech companies.
BASE=100 AS OF Jan 10, 1992

and transportation is well known.

While the idea of a chemical heat pipe has been studied by a few other research teams, the Weizmann Institute scientists were the first to carry out the reaction under real solar conditions, with daily start-ups and shut-downs and frequent changes due to cloudy conditions, and they are the only ones who have worked with a closed loop, circulating the gas mixture for many cycles.

In these trials, performed in the Schaefer Solar Furnace, the reaction was conducted on a scale of 10 kilowatts. The scientists are now installing a new station in the solar tower where the process will be operated on a scale of 400 kilowatts.

This unit will consist of a solar reformer, now under construction, and the William Davidson Methanator, already in operation. The latter, the first methanator built for solar applications, was designed by institute engineers Michael Epstein and Isaac Spiewak. This experimental station will supply the engineering information required to scale the process to commercial size.

Extracting Fuels from Oil Shale

The use of solar energy to create energy-rich chemicals is the principle behind another project being conducted by Prof. Levy. It involves the exploitation of Israel's large reserves of oil shale, which contain about 14% organic matter. Most processes aimed at extracting that oil require a large investment of energy, and end up with an overall energy efficiency of only 40 to 60%. Levy and his group are the first scientists attempting to extract fuel from shale using solar energy. By exposing the shale to concentrated solar radiation and a catalyst, they gasify the shale and produce a mixture of hydrogen and carbon monoxide - the same energy-rich synthesis gas used in the chemical heat pipe. When this gas is burned, it produces twice as much energy as is contained in the oil extracted from shale via any other process.

The synthesis gas can also be used to produce high-octane gasoline by established processes. This could provide a new energy option for those countries which, like Israel, have no conventional oil reserves, but have large deposits of shale and plenty of sunshine.

Solar-Driven Gas Turbine

At another station, air is being heated to about 1,000 C with the aid of a ceramic receiver designed to withstand such temperatures. The solar-heated air will then be used to drive a gas turbine for high-efficiency generation of electricity. This marks the first time that solar energy is being used in this way. The experiments are part of a joint project between the institute and two Israeli companies: the Israel Electric Corporation and Ormat Turbines. The collaboration is indicative of some of the short-term industrial and commercial applications which could result from experiments under way at the solar tower.

COURTESY OF THE WEIZMANN INSTITUTE

SPACE AND THE GULF WAR

As more information concerning the Allied armies' operations in the Gulf War is published, it is obvious that space-based support systems were vital in all the defensive and offensive activities before, during and after the actual hostilities. A short survey of the systems used shows the following:

1. Intelligence collection was conducted using KEYHOLE and LACROSS military reconnaissance satellites, as well as the SPOT and LANDSAT commercial systems. ELINT and SIGINT satellite systems were used to locate radar, communications, and other electronic emission centers, and to monitor these activities.
2. Communications satellites - military and commercial - were used extensively for communications between the forces in Saudi Arabia. and their military commands and governments in the U.S., Europe and the Middle East.
3. Meteorological satellites were used for operational planning.
4. Defense Early Warning satellites of the Defense Support Program (DSP) were used for detection of SCUD missile launches.
5. Navigation and target location were carried out using Global Positioning Systems (GPS). Thousands of GPS ground receivers were distributed to ground forces, and were installed in all aircraft, ships and missiles.
6. Operations were using all the above for air, ground and marine operations, in the planning, operational and damage assessment stages.

The Gulf War was the first in which space was used to this extent, and the success of these systems and their integration with others has magnified their importance.

On the other hand, almost no space-based systems were available to the Iraqis. Commercial satellite companies restricted or delayed sales to them and their allies and also to the media, through which the

Iraqis could receive intelligence. Meteorology forecasts stopped showing images of the Middle East and, of course, Iraq has no satellites of its own.

The overwhelming importance of space-based systems is a lesson to be profoundly studied.
COURTESY ISRAEL SPACE RESEARCH & TECHNOLOGY BULLETIN

BTG TESTS CLOT IMAGING AGENT

Clotting is a process essential for the arrest of bleeding and the healing of wounds. But if you're a candidate for a heart attack, this very same process may turn out to be lethal.

Blood clot formation involves many intricate steps. When a blood vessel is injured, collagen (an insoluble fibrous protein that accounts for much of the body's connective tissue) on the surface of the blood vessel is exposed. As a consequence, platelets – the smallest cllular elements in the blood – are attracted to the area, and a network of a tough, strongly elastic protein called fibrin is formed.

When life-endangering blood clots are discovered – often following a heart attack – immediate steps must be taken to dissolve them. Under normal conditions, blood clots in circulation are dissolved by an enzyme called plasmin.

The human body has developed a system that enables it to regulate the amount of plasmin available; a shortage of plasmin may cause thrombosis (clotting), while an excess leads to hemorrhaging.

Plasminogen, an inactive form of plasmin, is generally present in the body and, when necessary, is rapidly converted to plasmin by other proteolytic enzymes called plasminogen activators (PA's). These can be of two types:tPA (from human tissues) and ùPA (found also in human urine).

Although scientists ahve long been aware of the causal relationship between atherosclerosis, blood clots and heart attacks, they have not clearly established what triggers acute myocardial infarction (AMI). Patients may maintain the same amount of blood vessel atherosclerosis for years without developing AMI; on the other hand the disease may appear overnight, without warning.

Blood clots are not the only culprits in AMI; vasoconstrictor agents such as leukotrienes are another important factor. These unsaturated fatty-acid derivatives act as a defense mechanism released in the body when a person is sick, injured or under stress.

Bio-Technology General Corp. (NASDAQ:BTGC) has announced the initiation of a pilot clinical trial of a radio-imaging agent to detect clots. Clots in veins (i.e. venous thrombosis) and lung clots (i.e. pulmonary emoli) result in 100,000 deaths each year in the United States, and are a contributory factor in the deaths of another 100,000 annually.

The vast majority of pulmonary emboli arise from deep venous thrombosis (DVT). At present, standard DVT diagnosis relies on an invasive procedure (i.e. ascending contrast venography). While this technique is highly precise, the procedure itself can cause DVT and has a high incidence of side effects.

Moreover, it is uncomfortable for the patient and is sometimes technically difficult to perform and interpret. Alternative non-invasive methods (impedance plethysmography and Doppler ultrasound techniques) detect thrombi only indirectly. These methods are not sensitive, and may often produce false negative diagnoses.

The recombinant radio-imaging agent developed by BTG combines high specificity and affinity in detecting clots. The agent is a genetically engineered fragment of fibronectin that binds strongly to fibrin. Since fibrin is found only in clots, BTG's agent should provide a clearly defined localization of clots.

The convenience and rapidity of clot detection by this agent could permit early medical intervention in DVT and pulmonary emboli patients,'and reduce both mortality and morbidity. The unique properties of the company's product are being tested in a clinical study aimed at the detection of clots and thrombi in patients with deep vein thrombosis.
COURTESY OF THE WEIZMANN INSTITUTE

RECENT DEVELOPMENTS

MAGIC SOFTWARE

Late in 1991, Magic Software Enterprises Inc., a wholly owned subsidiary registered in Delaware, commenced operations in the marketing and sales of MAGIC products in the United States. The company completed its Initial Public Offering on August 28, 1991.

Magic Software Enterprises Ltd. develops, publishes, markets and supports a family of software tools used to create software programs without writing any lines of computer code as is requried in conventional programming languages. The company's products, which operate on a wide variety of computers and operating systems, automate the programming cycle, increasing the productivity of analysts and programmers, and provide end-users with the ability to indepenently access, analyze and present corporate data.

DESERT DELIGHT

Truffles are usually associated with European forests and four-star restaurants, but they may be grown commercially in the Israeli desert as a result of research being conducted by two scientists at Ben-Gurion University of the Negev.

Prized for their unique aroma and taste, truffles grow in symbiosis with various plants. The European variety (tuber) grows near the roots of trees in France, Italy, Spain and Yugoslavia, and is traditionally located by smell and rooted out by dogs and pigs. Though it commands up to $2,000 a kilo, it has not been cultivated intensively as a commercial crop.

Dr. Nurit Bejerano of BGU's Life Sciences Department, and Dr. Varda Zur of the Institute for Applied Research, have succeeded in infecting a native Israeli plant, the *cistus*, with the European tuber fungus, and hope Israel may some day be able to add this costly delicacy to its agricultural export crops.

Other, lowlier varieties of truffle (*Terfezia*) grow in various hot countries, and are collected by native desert-dwellers, including the Bedouin of Israel's Negev and the Botswanan tribesman of the Kalahari. The two BGU researchers recently received a three-year grant from AID-CDR (The US Agency for International Development), in collaboration with a research institute in Botswana, to study the Botswanan *Terfezia Pfeilii*. The aim is to cultivate these truffles as an agricultural crop, and as the basis for an export industry.

Dr. Zur visited the Kalahari last spring, and brought back local truffles and seeds of two possible host plants for research purposes. A young Botswanan trainee will be arriving shortly to spend a year in the Beersheva laboratory.

CHERNOBYL VICTIMS TESTED AT BGU

Tests conducted at Ben-Gurion University of the Negev on immigrants from the Chernobyl region, who came to Israel during 1991, indicate that the radiation they absorbed from radioactive caesium released into the atmosphere as a result of the 1986 reactor accident is unlikely to constitute a health hazard.

Responding to the hundreds of requests for testing received from immigrants concerned about the long-term effects of exposure to this radiation, Professor Michael Quastel of BGU's Faculty of Health Sciences and Head of the Nuclear Medicine Institute at the Soroka Hospital decided to undertake widescale testing. He approached Canadian colleagues Dr. E. Letourneau and Dr. G.H. Kramer of the Bureau of Radiation and Medical Devices of the Canadian Department of National Health and Welfare, which has carried out similar tests for many years on the native population of Canada's north. The Canadian government agreed to loan a portable whole-body counter for the project. The visit to Israel of researcher Dr. Gary Kramer and technician Leo Noel of the Bureau was financed by the United Jewish Welfare Endowment Fund of Toronto, on the initiative of Sam Helfenbaum. The Beersheva research team consisted mainly of Russian immigrant physicians and students and a Russian-speaking social worker, together with internationally known epidemiologist Professor John Goldsmith of BGU's Health Sciences Faculty.

In three weeks of intensive measurements of recent arrivals from the Ukraine, Byelorussia and Russia, more than 1,200 men, women and children responded to advertisements in the Russian-language press and were examined.

Preliminary estimates indicate that radiocaesium levels in the immigrants are lower than had been earlier suspected, and are unlikely to result in any health hazard. Professor Quastel cautions, however, that the total radiation doses received at an early stage from short-lived radioisotopes, as well as those due to longer-lived emitters persisting in the environment, are not known, so further studies will be necessary.