

ISRAEL HIGH-TECH & INVESTMENT REPORT

A MONTHLY REPORT COVERING NEWS AND INVESTMENT OPPORTUNITIES

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Ofeq-3 in Orbit

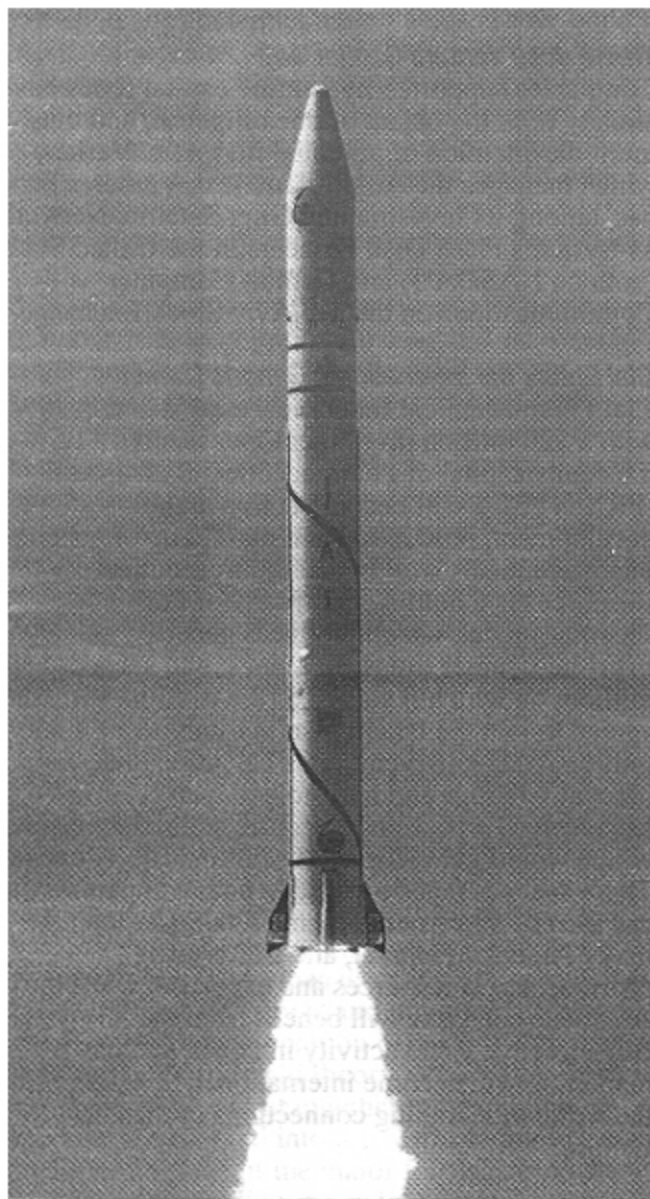
In the first week of April, Israel successfully placed Ofeq-3 in orbit. This satellite, a further development of technologies used in two satellites launched in September 1988 and April 1990, was sent aloft by "Shavit" a three-stage launcher manufactured by Israel's leading high-tech companies. Israel Aircraft Industries (IAI), which carried out the launch, was

one of the high-tech companies involved in the development of Ofeq-3. The third-stage motor weighed two tons, but the total weight of the Ofeq-3 satellite was only 225 kg.

IAI has announced that Ofeq-3 is suitable for various commercial, scientific and technological payloads. However, the satellite, which includes communication systems, has been called "The Spy Satellite" by foreign sources, and Israeli government officials, when questioned about the satellite's capabilities, did not deny that its cameras could read license plates in the streets of Baghdad.

The satellite orbits anywhere between 180 - 420 miles above the earth, and completes an orbit once every 90 minutes, or 16 times every 24 hours. The device has a life expectancy of one year, though it could stay aloft much longer.

Whatever its commercial potential or scientific value, Ofeq-3 can serve as an advance warning system and a possible deterrent for those of Israel's neighbors which might otherwise consider aggression. In the *IHTIR* issue of May 1990 it was pointed out that Israel possesses a highly developed expertise in the field of optical lenses, as well as a leading position in infrared technology. These technologies were applied to defense as well as civilian sectors. The application of these two technologies to "optical telescopes" resulted in the ability to discern minute details, day or night. Unofficial estimates of the cost of the developing and launching Ofeq-3 was \$45 million. At the time that Ofeq-1 was launched, a figure of \$200 million was mentioned as the initial cost.



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Genetic Engineering for Plant Survival

Five percent of the world's agricultural land is beset by parasitic weeds. Two major parasitic flowering plants, broom rape and witchweed, attack the roots of important crops and dramatically reduce the crop yield. These parasitic weeds remain underground and only emerge when flowering. Broomrape endangers vegetables and sunflowers in the Mediterranean area. Witchweed attacks and destroys grain crops in Sub-Saharan Africa.

The weeds are susceptible to pesticides -- primarily methyl bromide -- but the problem was that herbicides damaged the crops while destroying the parasitic weed.

Prof. Jonathan Gressel, Weizmann Institute plant physiologist, and Dr. Daniel Joel initially engineered several crops with herbicide-resistant genes. They were subsequently able to prove that these crops not only withstood the herbicide but that the herbicide remained effective in fighting the parasitic weeds. Tobacco and oil seed rape plants were provided with genetic resistance to herbicide. The use of herbicide left the plant unaffected but the broomrape was completely controlled.

Experiments with normal tobacco and oil seed rape plants showed that the unaltered forms suffered damage when exposed to herbicide. Plants which did not have genetic resistance and were not treated with a herbicide were severely damaged by the pest.

The genes engineered into tobacco and oilseed rape plants allowed the enzyme normally effected by the herbicide to resist it. Herbicide applied to fight the weed moved through the plant without affecting it, reached the root and then attacked the destructive weed.

The study was part of a project backed by the U.S. Agency for International Development Trilateral Egypt - USA - Israel Program.

"The doubled yields afforded by control of the parasites will more than offset the added cost of the transgenic seed and the small amount of herbicide needed, even in developing countries," the researchers write in the March 16 issue of *Nature* magazine.

The next stage will be to create resistant genes in other major crops. The resultant seeds will be made commercially available. The transgenic seeds will be especially welcome in countries that are ready to use advanced technology to feed their populations.

New Cancer Drug Compound for Humans

The problem with many anti-cancer drugs is that the body's defense system absorbs and excretes them before therapeutic levels can be reached. A new compound developed by Prof. Abraham Nudelman, Chairman of the Chemistry Department at Bar-Ilan University involved the development of a delivery

system which enables the drug to reach the target tissues without being eliminated from the body at undue speed. The U.S. Food and Drug Administration has approved human clinical testing of AN-9, and worldwide patent rights have been obtained for it and its analogs.

Some early results in animal models revealed that AN-9 is effective in the treatment of lung cancer and melanoma. Moreover, the easily prepared compound has displayed very low systematic toxicity.

AN-9 was developed in close collaboration with Dr. Ada Rephaeli and Professor Mati Shklai of Beilinson Hospital in Petach Tikva.

ANSAN of California, a bio-tech subsidiary of the Titan Corp., has obtained license rights to AN-9, and will supervise the compound's FDA-approved clinical testing in the U. S. Plans are also underway for future testing in Israel.

Where does Venture Capital Go?

Companies supported by venture capital funds have already been the object of due diligence, and thus merit the attention of potential investors. Veritas, which manages the Anglo-American Ventures Fund, has, among its investments, Gilat Satellite Networks, M-Systems Flash Disk Pioneers in the United States (both on NASDAQ) and Gambit Computer Communications on the Tel Aviv Stock Exchange.

Clal Enters the International Generic Market

Clal Pharmaceutical Industries, established in 1994 with a \$20 million investment that secured 11.5% of the equity capital of Pharmaceutical Resources (PRX:NYSE), will become active in the development, production and marketing of generic pharmaceuticals worldwide. Pharmaceutical Resources is a holding company for Par Pharmaceutical, which produces generic over-the-counter drugs. In 1994 it had sales of \$69 million, on which it earned \$18.8 million. PRI has agreed to join the Israeli firm in establishing a \$50 million R&D joint venture in Tel Aviv, to develop innovative drugs and hard-to-produce generics. Clal has received an option to acquire additional shares, which would give it up to 19% of the equity capital. There are apparent benefits for both companies. Clal has thereby shortened the time it takes to enter the major American market, and is acquiring pharmaceutical resources and expertise, while the American company will benefit from the cost-effective R&D activity in Israel, and its marketing will become international, benefiting from the worldwide trading connections of the Clal Group.

Scitex Urvells Inkjet Digital Color Press Technology
Scitex Corp. Ltd. (NASDAQ - NM: SCIXF)

unveiled its inkjet *Digital Color Press* technology at its pre-DRUPA event (DRUPA '95, the major prepress and printing exhibition held every five years, will take place in early May in Dusseldorf, Germany.)

The inkjet *Digital Color Press* is intended for large-volume personalized printing, and is designed to run at speeds of over 400 pages per minute with quality color, text and line art. Arie Rosenfeld, Scitex CEO, commented: "With quality high-speed long runs in which every copy can be personalized, this press addresses the very large market for direct mail, newspaper color inserts and personalized catalogs."

Increasing Plants' Nutritional Value

A major nutritional drawback of many crop plants - including most grains, potatoes and legumes - is their low content of essential amino acids. These building blocks of proteins cannot be synthesized by humans and many livestock species, and must therefore be supplied by other foods. Since plant-derived foods account for the bulk of human and livestock diet, overcoming the scarcity of essential amino acids is of utmost importance.

Using genetic engineering techniques, Prof. Gad Galili, a Weizmann Institute geneticist, has developed potatoes with significantly higher amounts of two particularly important essential amino acids - lysine and threonine. This was achieved by engineering plants with two bacterial genes that enhance the efficiency of amino acid synthesis. Galili's team is currently seeking to apply the same approach to various cereals and legume crops. They are also aiming at engineering plants in which enhanced amino acid production is concentrated in the plant tissues that are eaten, such as the grains of cereals or the tubers of potatoes.

Wheat has been targeted as the next grain for amino acid enrichment.

Thirty Years on a Theory Provides Basis for New Profession

Some thirty years ago, when Weizmann Institute scientist, Prof. Schneur Lifson, began to develop his empirical force field theory, describing the energy and structure of molecules, he was sure no one would be examining its practical applications. However, this theory has dramatically speeded up the search for new drugs and other useful chemicals, and has spurred the creation of several companies worldwide. Force field theory, which attempts to explain how atoms fit together to form large molecules, emerged into the world of big business by becoming one of the major forces behind the creation of three-dimensional models. For scientists developing new drugs, food additives,

pesticides or a variety of other chemicals, these models save years of poking around in the dark by allowing researchers to examine new compounds on a computer screen before launching costly and time-consuming experiments. The molecular models help scientists weed out sure losers and zero in on likely winners from the huge list of potentially useful molecules. Over the past two decades, companies specializing in molecular modeling have been created in various countries, some of the most successful ones owing their development to Prof. Lifson's theory.

One of the first such companies was founded by Dr. Arnold Hagler, who helped Lifson develop the force field theory in the 1970s while working as a member of his research group at the Weizmann Institute. Today his Biosym Technologies Inc., of San Diego California, a subsidiary of Corning Inc., is a leading provider of computer-aided molecular design software, and lists major pharmaceutical companies among its clients.

Biosym recently became involved in a joint venture that closed a circle of sorts by bringing together force fields-based developments originating in the U.S., Latvia and Israel.

This undertaking stems partly from an idea conceived by Dr. Valery Golender while working in a Latvian research institute. In 1991, upon immigrating to Israel, Dr. Golender took his idea to Herzliya-based DCL Systems International Ltd., which encouraged him to develop his project. The work resulted in software that is now integrated and marketed into Biosym's. While Biosym's products make it possible to create computerized 3-D models of compounds, DCL's new software -- already used by nearly 100 clients -- predicts these compounds' activity.

Geotek Sales Rise Sharply

At the beginning of April, Geotek published its results for 1994. Geotek Communications (NASDAQ: GOTK), the cellular communications company, reported a net loss of \$42.4 million as compared with a loss of \$53.6 million in 1993. Sales rose 49% to \$72.9 million as compared with \$48.9 million in 1993. The company's R&D expenditure rose to \$19.4 million, compared with \$10.9 million in 1993. Yaron Eitan, Geotek's President, expects that losses will continue till the networks are fully operative. Smith Barney, investment bankers and brokers, are including Geotek for coverage by their research department. They have rated the company's shares as having "venture capital characteristics suitable for sophisticated investors with a high tolerance for risk and broadly diversified investment portfolios."

Geotek's products are derived from developments in

Israel's defense industries. Smith Barney projects that the share price will rise from a recent \$8.75 to \$12 a year from now. The firm's mobile radio systems are due to begin operation in the second half of 1995. Recently the company announced an agreement with General Motors Hughes which could be worth several million dollars.

Ampal-America Israel (AS: AISA) Profits Up

Though profits in the fourth quarter of 1994 were \$295,000 as compared with \$1.8 million in 1993, Ampal's returns for the year were considerably higher. For all of 1994 the company earned \$7.3 million, compared with \$226,000 in 1993. Management considers the market price of about \$6 to be below the true value, and has decided to purchase up to two million A shares of the 20.8 million shares outstanding. The value of the company's investment holdings total \$343 million, compared with \$304 million in 1993.

PEC-IEC (IEC:NY) Profits Decline

PEC Israel Economic Corporation has reported profits for 1994 of \$32.6 million, compared with \$49.1 million in 1993. In December Celcom, one of IEC's investments in Israel, began operations as a second cellular telephone company in Israel.

Healthcare Technologies and Orgenics to Merge

A memorandum of understanding detailing the merger of Healthcare Technologies (HCTLF: NASDAQ) with Orgenics Ltd. was announced on April 4. Healthcare will issue to Orgenics 40% of its outstanding share capital. After the merger is completed, the joint entity will be Israel's largest diagnostic kit company.

Orgenics produces the ImmunoComb line of kits, which allow the analysis of blood and saliva for evidence of infectious diseases including AIDS, hepatitis and chlamydia. In 1994 it had sales of \$7.1 million and profits of \$770,000. Healthcare's sales for 1994 were \$7.8 million, with only a marginal profit of \$94,000.

Healthcare produces a line of kits for the detection of sexually transmitted diseases and diseases of the urinary and respiratory tracts. Orgenics' Israeli facility in Yavneh will be moved to Healthcare's larger premises in Ashdod, less than five miles distant. Dr. Max Herzberg, founder of Orgenics, will be active chairman and Dr. Yeshayahu Yakir, president of Healthcare, will be the president of the entity. Dr. Yakir stated that "besides the saving from consolidation, the new company will benefit from complementary product lines." Dr. Herzberg was pleased with the merger, since "it will create the largest diagnostic kit company in Israel and provide liquidity for Orgenics' shareholders, since Orgenics

is a privately held company while Healthcare is a public company whose shares are traded on NASDAQ.

Pharmos is Buying Oculon Corporation

Pharmos Corporation (NASDAQ: PARS) has agreed to acquire Oculon Corporation, a privately held ophthalmic drug development company with anti-cataract technologies and approximately \$4 million in cash and cash equivalents.

Pharmos will issue up to six million but not less than 5,500,000 shares of its Common Stock to the stockholders of Oculon. "We are acquiring significant cash reserves as well as technologies with potential ophthalmic applications," stated Dr. Haim Aviv of Pharmos.

The company has also filed a request for approval for marketing from the FDA for its ophthalmic drug Lotemax

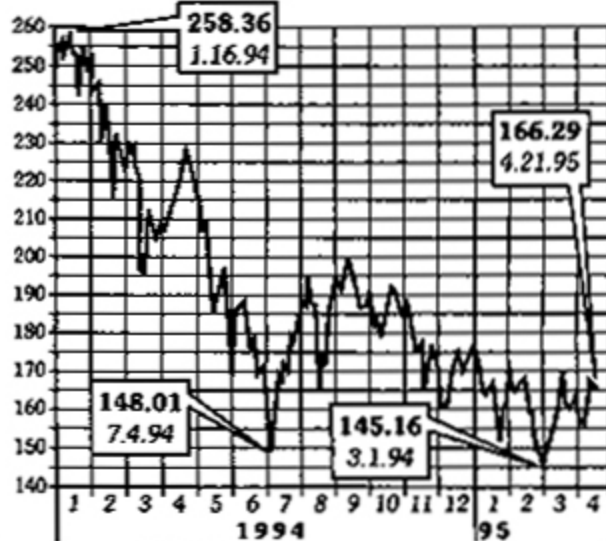
Teva's Sixth Approval in 1995

Teva Pharmaceutical Industries Ltd. (NASDAQ: TEVIY), Israel's largest pharmaceutical company, has received approval of the U.S. Food and Drug Administration to manufacture and market Nortriptyline Hydrochloride capsules, an anti-depressant product, and its sixth generic drug approval in 1995.

Tel Aviv Stocks Exchange Data

Tel Aviv Stock Exchange trades the shares of more than 600 companies. At the end of 1994 the total market capitalization was about \$32 billion. The three largest capitalized issues included two banks and one industrial company, namely Bank Leumi, Bank Hapoalim and Teva Pharmaceuticals.

Two Sided Index (Mishtanim)



Joint Israel-Jordan Research

Israel's Minister of Science and Technology has announced its intention to create a new Research Institute to encourage co-operation between Israeli scientists and those from Arab and European countries. The institute will be situated on the Israeli-Jordan border, and invitations will be sent to Egyptian and Palestinian scientists. The institute, to be known as "Science for Peace," will deal with the genetic development of plants grown in the Mediterranean region. The projected budget for the first six years is \$59 million. Financing for the first six years of operations will be provided by the European community of nations. William Gates, founder of Microsoft, and Hollywood director Steven Spielberg, who recently formed a partnership, have announced that they will assist in financing the project.

Diabetic Medicine Found Effective

Parmdase, developed by the German Bayer company, has been tested and found suitable for diabetic sufferers. Testing was conducted by Prof. Hanoach Baron, head of the diabetic department at Hadassah Medical Center, Jerusalem.

The new medicine acts differently from existing drugs, being active solely in the digestive system. Researcher Dr. Miriam Kidron explains that "food eaten consists of proteins, fats and carbohydrates. So that these food components can be absorbed by the digestive system, there are appropriate enzymes which break them into small molecules. The Alpha-Glucosidase enzymes are responsible for breaking down carbohydrates into sugars such as glucose. They are located in the lining of the small intestine. The medicine restrains the enzymes Alpha-Glucosidase from carrying out their function. As a result, most of the sugar is broken down more slowly, and the absorption of glucose by the blood after meals is also slowed, preventing a sharp rise in the sugar level."

The medicine is recommended when the diet of diabetics is ineffective.

The three-month trials at Hadassah indicated that most of those treated exhibited lowered and satisfactory levels of sugar in the hemoglobin. Israel's Ministry of Health has approved the drug's sale.

Dental Innovations '95

Dental Innovations '95 -- the first of its kind in Israel -- was a three-day conference held recently at Tel Aviv University's Goldschlager School of Dental Medicine. Organizer Dr. Mel Rosenberg explained that the conference aimed to be a showcase for Israeli innovations in dental science. The more than 80 participants included academics and representatives

of industry from Korea, the United States and Germany. Several Israeli companies displayed their innovative dental systems which not only sell well in Israel but are exported to up to 70 countries. Products which are experiencing good international demand include innovative toothbrushes, a uniquely formulated bonding adhesive and an autoclave for dental equipment.

Colgate-Palmolive is active in utilizing Israeli research as well as marketing its dental care products on the Israeli market. "We support Israeli research and use local scientists for clinical trials. The researchers have good academic credentials, there is a good infrastructure, and there is good chemistry between ourselves," said Reuven Sacher, visiting Vice President, Oral Care, at the New Jersey Research and Development Division of the multi-national Colgate-Palmolive Company. The American company has ordered more than \$1 million worth of sponsored research over the past eight years. Israelis apparently like Colgate products. Colgate Palmolive's toothpaste has captured part of the market in Israel.

High Q Bond - The Universal Dental Adhesive

DBAS in the dental industry refers to Dental Bonding and Adhesive Systems. Whether a dentist is drilling a tooth, repairing a filling or setting a crown, the material he uses requires a strong bond to keep it in place. The use of adhesives in dentistry, as is known today, is only 30 years old. Six companies sell a line of adhesives for these applications.

A small Israeli company, B. J. M. employing six people, has developed a fourth-generation Universal Bonding Covering System. Its aim is to establish a foothold in the international market.

Development

In 1991, two new immigrant researchers from Russia, Irena Epplebaum and A. Waldman, began to research and develop a novel bonding and adhesive product at the Haifa-based Technion Center for Plastics and Rubber. Epplebaum, who had worked at a large research center in Moscow, says working in Israel is much simpler. "Materials and scientific literature are more available. I was able to check all the existing patents in one day. In Russia it took us eight years." The group was joined by a specialist in adhesives from Raphael, Israel's armament development company.

The research expense was funded by the Office of the Chief Scientist of the Ministry of Industry and Trade.

Three and a half years of R&D resulted in a new acrylic polymer adhesive whose formulation can be adjusted for a variety of dental applications. It was named the Universal Bonding Covering System (UBCS): a multi-purpose, simple-to-use product

compatible with enamels, various alloys, amalgams, porcelain and composites, chemically self-curing or cured by exposure to light. The materials, mixture and method of preparation are of course trade secrets. "It was never a question of cost, because the raw materials are inexpensive. What we worked on was to have the proper end product," says Eppelbaum.

Israel has adopted UBCS, first at the Tel Hashomer Hospital and then at clinics in other parts of the country. The material, known as High O Bond, is available in four formulations, and is sold in kits which contain other items necessary for dental procedures.

The adhesives were tested at the Zurich Dental Clinic and in England, and have withstood comparison trials against top sellers Permabond and SuperBond. Sales followed in Switzerland, England and Italy as management actively seeks to sign up additional distributors.

Oral Line Innovates With Spring-loaded Brushes

Toothbrushes come in different sizes, bristle densities and hardness, and are sold on the basis of their effectiveness in maintaining healthy teeth and gums. A five-year-old company, Oral Line Ltd., has developed what it claims is a "better toothbrush" by adopting a totally new concept. The original idea came from a young hygienist who spoke to an investor about the concept of a "dynamic" toothbrush -- one that "would be more effective and clean better without changing the consumers' brushing habits." The idea of a "dynamic" spring-loaded brush was known in patent literature, but no one had devised the technology necessary to produce it. An R&D team developed the prototype and equipment was designed which inserted the spring into a metal plate, and arranged bunches of bristles above each spring. The technology was rewarded with product and technology patents worldwide. The claim for Oral Spring, as the toothbrush is tradenamed, is that it is the only spring-mounted toothbrush capable of adapting itself to the contours of the mouth. The spring allows the bristles to retract as they brush while other bristles enter and clean the spaces between the teeth. The product is easy to clean, with a combination of soft outer and harder inner bristles, and has a polycarbonate handle which is break resistant.

Oral Line's owners include Kibbutz Revivim, the investment banking firm Dovrat-Schrem, and the public which owns a part of the equity. The shares are registered for trading on the Tel Aviv Stock Exchange.

The company's production facilities are located in the development town Sderot, and its 200 employees work three shifts. One of the important export

customers is Wall-Mart, the giant American retail chain.

The Counter and Rotating Oscillating Brush

All of us know that plaque is an invisible, bacterial deposit which accumulates on teeth and which, if not removed daily, can cause tooth decay and gum disease. A small company, "A To Z Technologies Ltd.," located in Kfar-Saba, near Tel Aviv, is an innovator in this field. The company's founders have engineered a novel toothbrush called the "Plaque-Buster" which, they claim, removes plaque more efficiently than regular brushing. There are two models -- a manual and a battery operated brush. Israel Ramot, innovator and managing director of the company, points out that his product is distinctive because of its two counter-rotating bunches of bristles. Besides the novelty of their rotation, each minute of operation of the electric brush results in 3,600 linear strokes, or 1,800 elliptical oscillations by each bunch of bristles. The unusual motion of the bristles, according to the company, results in the world's first dual-action electric toothbrush which imitates the brushing technique recommended by dentists. Mr. Ramot takes pride in the fact that his product is made of components manufactured in Israel. The company's 20 employees all come from Russia or the CIS nations, and all parts are made on molds and with tooling engineered by A To Z's personnel. The American Dental Association has examined the product and given its approval. Worldwide patent applications have been filed. The company commenced operations only a year ago. It has entered overseas markets, including the US, Spain and S. Africa.

AGRICULTURAL NEWS

Progress with Gene Engineering

The American regulatory authorities have found genetically engineered plants to be safe for consumers. The Agricultural Research Organization's Drs. Y. Gafni and T. Kunin, in the Department of Plant Genetics, have produced a tomato that resists tomato leaf curl virus, the worst enemy of Israel's most important vegetable crop. The virus has also struck and destroyed crops in California and Europe. It acts by limiting the plant's photosynthetic system. As a result, leaves turn yellow and curl up. Neither insecticides nor the use of finely meshed netting afford protection from the virus. Isolating and cloning the gene that encodes the virus's coat protein, scientists at Hebrew University worked with two agricultural researchers to make the plants virus-resistant. The coding created by the modified plant effectively stops the virus from spreading.

Illinois Contingent Visits Israel

Led by Jim Edgar, Governor of the State of Illinois, 40 businessmen recently toured the country to investigate business opportunities. They visited high-tech plants including Motorola.

Motorola-IT&T Joint Venture

The military electronics group at Motorola has signed an agreement for cooperation with Aerospace & Communications, the Defense Group of IT&T to develop and market tactical military communications systems. According to the agreement, the two groups will develop tactical systems for infantry forces throughout the world. IT&T is hoping that by using Israel as a strategic partner, it will be able to enter the market in the Middle East. The local Israeli Motorola unit is also interested in entering the field of military communications. IT&T is one of the world leaders in this area.

Argomed Receives Ministry of Health Approval

Argomed Ltd. (IHTIR 12/94) has developed a system suitable for males suffering from benign enlargement of the prostate. The Thermoflex system has been recently approved by the Israeli Ministry of Health for marketing in this country. The company has begun international marketing. Its most recent order has been from an East European country.

LOOKING TO INVEST? HERE'S A STARTUP TO WATCH**Combact Diagnostic Systems**

Combact Diagnostic Systems Ltd. is a two-year-old startup in the medical diagnostic field. The company has developed a machine which represents a major breakthrough in the rapid analysis of bacteria and other microorganisms for hospitals, public and private labs and clinics. Management has decided to speak to IHTIR first, since it will be expanding shortly and is prepared to negotiate either a corporate joint venture or seek individual investors, who will be offered equity investment of \$3-\$5 million.

Background

Before a specific drug can be prescribed to cure a bacterial disease, the bacteria must be identified. With over 4,000 known strains, this is no easy matter. Commercial testing of bacteria began in earnest only 30 years ago, and today there are 20,000 labs in Europe, the US and the Far East. Their methods may vary somewhat, but the procedures used are all labor-intensive and time consuming. Current methods are based on culturing bacteria in petri dishes and exposing the resultant samples to numerous antibiotics until a definite

identification is made.

Some laboratories use only manual procedures, while others employ automation to complement the work. Even so, the tests take anywhere from 36 to 48 hours. What's more, disease-causing bacteria are constantly changing. Therefore, it is vitally important for the attending physician to rapidly identify the pathology and determine the anti-microbial drug which will work. In acute cases, the delay in diagnosis often necessitates guesswork on the part of the physician. In some instances incorrect medication may be prescribed until the correct identification is obtained, and this results in longer hospital stays and greater expense.

In 1988, three scientists started an incubation program at Tel Aviv University. Their goal was to apply biotechnology and computer analysis to create a system which would change the way testing is done. A private company sponsored the research, and additional funding was provided by the office of the government's chief scientist. Clinical testing at Tel Hashomer Hospital showed promising results, but the project was stopped because of lack of funds. At that time, Rafi Herzog, a marketing manager at Optrotech, a high-tech firm specializing in electro-optics applications, was considering a job change. He came across the Tel Aviv University project and decided to investigate its commercial potential. Market research in the United States evoked an enthusiastic response from hospital management, and Combact Diagnostic Systems was founded in 1993. Mr. Herzog became its chief executive officer.

In the summer of 1994 the company, which had meanwhile obtained the services of the three original scientists from TAU and an additional team of 45 scientists, began to work on the creation of a prototype named the BIPAR system. Research consultants rounded out the research and development team. They included the top microbiology personnel in Israel, as well as consultants from the Planck Institute, the Mayo Clinic and the Catholic Medical Center in the US. Nine months later, the prototype is ready for trials.

Financial Structure

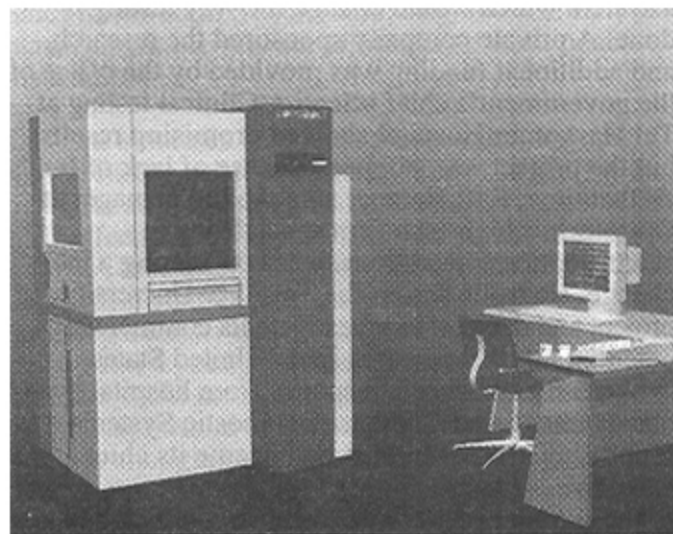
Staff salaries, materials and premises have been financed from two sources. One is a group of institutions and investors who participated in a \$2 million private placement in 1994. Recognizable names include Agis, Israel's second-largest pharmaceutical concern, Primavera Investments, Koor Industries, Phoenix Insurance, Clal Investments, Yalal Investments, the Clal Venture Fund and the United Mizrahi Bank. A royalty-bearing R&D grant of \$900,000 was extended by the Office of the Chief Scientist of the

Ministry of Industry and Trade.

An additional round of financing is easily obtainable from existing shareholders, but the next step will be an equity offering of \$3-\$5 million. This will provide an opening for either a strategic partner or a private investment group. Johnson & Johnson has expressed serious interest in BIPAR and its technology. J&J was impressed with the speed with which the prototype was developed. The American giant said that to achieve the same results would have taken it three years and cost \$30 million.

The BIPAR System

Tests are carried out directly on the sample, without culturing; screening, identification and antibiotic



susceptibility tests are all performed in one unbroken cycle. The claim is that screening will be completed in minutes, and the susceptibility and identification within three hours. More than 200 urine samples can be processed in one eight-hour shift. Sensitivity is good to 10,000 bacteria per ml. and the testing embraces 40 antibiotic drugs. The procedure is completely automated.

Other Data

The company is situated in the Herzliya Industrial Center near Tel Aviv. The 250 sq. meter offices are used by a staff of over 50, and house microbiological labs for the testing of bacteria by conventional methods as well as by the BIPAR prototype, which was commissioned in mid-April, and involves a mixture of optics, robotics, software and electronics. The prototype is the size of a conventional bridge table -- impressive, when compared with full-service labs that require hall-sized spaces.

At first only urine samples are being tested, but the

technology will later be applied to blood, cerebrospinal fluid and other body fluids.

The present and the future

Sometime this summer, a BIPAR unit will be sent to the Rochester Minnesota Mayo Clinic for six-months of "beta site" (practical) testing. Marketing will begin at the same time, with shipments to follow in the summer of 1996. The company projects 1996 sales of 45 units, and 120-150 units the following year. If the projections hold up, Combact will reach \$15 million in sales in two years.

Some market data and expectations

In the average laboratory, 50% of all tests processed are urine analysis. Management has pinpointed 15,000 labs around the world as the potential market, valued at \$1.5 billion.

One of the system's competitive aspects is the throughput of specimens ("two days by the laboratories versus three hours by BIPAR," comments Mr. Herzog), and the final cost per test. In Israel the cost of one urine test is \$10. In the US it is \$18, and in Japan \$40. Management expects that the cost of one BIPAR test will be less than \$10. Along with the BIPAR systems, a comprehensive line of reagents will be offered. Depending on the final configuration, the price per unit will be about \$100,000.

Patents are pending, and in due course the company will ask for FDA approval. In Europe and other countries, such certification may not be necessary, but the American stamp of approval is considered helpful in speeding up acceptance by other countries.

What are the caveats?

The American microbiological market in hospitals, including equipment and reagents, was \$1.7 billion two years ago. Top suppliers included Becton Dickinson, Abbott Diagnostics, Bio Merieux Baxter and Difco. They will probably put up a stiff fight against any newcomer selling a brand new technology; prices are likely to be brought down and refinements may follow. But the establishment may decide to 'join 'em' if it can't 'beat 'em.' This is a likelihood, in fact, as some of the major diagnostic companies have already expressed an interest in joint marketing.

Management will also have to combat the conservatism of the diagnostic lab industry, and the natural resistance faced by any small company without a market reputation.

High-tech startups are risky until they are firmly in the market. Combact, however, appears to have more going for it than most.