Symington (D–Mo.). Symington and Margaret Chase Smith (R–Me.), both members of the Armed Services Committee, have expressed grave doubts about the deployment of the "thin" Sentinel ABM system.

Rallied by their April show of strength, the Senate critics plan to stage new fights against items in military authorization and appropriation measures in forthcoming weeks. The opportunity to try to eliminate authorization of construction funds for the ABM system will probably come in June, and the Senate critics are mobilizing their forces now. There is even some talk that the administration will not fight hard against an ABM cut.

There is nothing like a "revolution" against military expenditure in the Senate, but there are signs of a small-scale uprising. Although the House has often been more conservative on such matters, the demonstration of a Senate desire to cut military funding may even have some effect on the House in this budget-conscious year. In criticizing the Senate for not slashing more from the April authorization bill, Mansfield said that the Senate had "failed to make a sufficient stab at fresh value judgments demanded by these times." Perhaps so, but from all indications the Senate is getting ready to make another stab.

—BRYCE NELSON

Israel: Science-Based Industry Figures Large in Economic Plans

Tel Aviv. The Israelis want progress, and, in the struggle for it, no strategy is more popular here than that of applying the country's considerable scientific talents to the development of industry.

Signs of this determination are everywhere:

► The three oldest, most respected academic institutions—the Hebrew University in Jerusalem, the Weizmann Institute in Rehovot, and the Technion in Haifa—have become enamoured of the "route-128" concept and have decided to copy it. The Technion (Israel's M.I.T.) and the Weizmann Institute (which grants graduate degrees and concentrates on fundamental research) are establishing industrial centers near their campuses. Both hope to share their personnel and their equipment with new science-oriented firms.

► The government has sponsored its own company to boost Israel into the computer "software" market—the lucrative business of programming and computer applications. This area of computer technology yields as much as—or more than—the actual sale of new machines, the "hardware." Israel, with 80 to 100 computers for its own needs and a good supply of skilled operators, analysts, and programmers, naturally wants to stake out a portion of the growing market. The government company, called Iltam, is now searching for "software" contracts and plans to establish an American office soon.

► One new electronics firm, Elron-Elbeit, located in Haifa, has just started exporting Israel's first commercial computer. A small desk-size machine that sells for just under $5000, it is said to be extremely sophisticated for its size and price. More than 50 have already been ordered, though the company started active marketing only in the last 6 months. Meanwhile, Elron, which makes a variety of other specialized electronic instruments, has raised its sales by more than 25 percent in the past year and expects an even larger rise next year. Employment should jump, to 300 or 400 employees. That may not precipitate corporate panic at I.B.M., but, for Israel (population 2.6 million), Elron is already a sizable enterprise.

► Science-based industry emerged as one of the "stars" of a recent Economic Conference held in Jerusalem for high government officials, the elite of Israel's private businessmen, and more than 500 wealthy, influential foreign investors. Without minimizing problems, many of the conference's participants came away convinced that Israel offers a hospitable atmosphere for research-oriented firms. The conference also generated contacts between foreign investors and Israelis, and a number of new Israeli-based companies may be formed as a result.

None of this means that Israel is about to take on Du Pont, Boeing, or RCA. With an annual gross national product of about $4 billion, the country simply does not have the resources to be competitive in most large markets. Instead, many firms have adopted the strategy of finding an area that has been overlooked, or deliberately bypassed, by large American and European firms, and then exploiting it.

A good example of this approach is the production of a small, two-engine, propeller-driven plane now being designed by the Israel Aircraft Industries. Called the Arava, the plane will fly average ranges of 100 to 500 miles (160 to 800 kilometers) and cruise at speeds up to 225 miles per hour. It will be capable of carrying 20 passengers, or, after a quick conversion, 2 tons of cargo. Demand for the Arava is expected to come from companies that operate shuttle services from outlying airports to major terminals, and from underdeveloped countries that do not need larger planes. Accordingly, Israeli engineers have designed the plane to operate from 1000-foot runways and have tried to keep operating expenses low by making the plane as simple as possible.

Similarly, many electronics firms hope to concentrate on the manufacture of small instruments. And highly specialized pure chemicals, used in small quantities in laboratory work in various parts of the world, can profitably be produced in Israel because the final product is so expensive that the extra transportation costs from Israel are insignificant.

In addition to its talent for specialization, Israel's major assets are the existing pool of scientific manpower and the relatively low labor charges. For a country so small and so young, Israel's scientific tradition is indeed well developed. Quality is high, and Israeli institutions have consistently received grants from U.S. research agencies.

In the conduct of research, cost comparisons favor Israel. For example, a study made by the Israel Financial Research Institute shows that a research Ph.D. in the Israeli pharmaceutical in-

dustry would earn approximately $450 a month; in the United States, such a researcher would make more than $1300 a month, and in West Germany, more than $740.

That Israel is only now attempting to create a genuine research-oriented industry may seem puzzling. Why not 20 years ago?

The most obvious answer is that these things take time, and Israel has been busy with much more pressing problems—such as survival and the absorption of hundreds of thousands of new immigrants.

Most of the newcomers, who originated in Arab countries, were without savings or skills. They had to be housed, fed, and given jobs. As a result, government investment went into industries which employed many people and thus could meet the needs of the new residents; building and textiles are prime examples. Technologically advanced firms simply did not fit into the picture; they didn't make the right things or employ enough of the right kind of people.

The new interest reflects an important shift in economic thinking here. An old problem—an adverse balance of trade—is being given new attention. Ever since achieving independence, Israel has imported more than it has exported; this situation stems from the country's large defense needs, the capital equipment demands of new industry, and the consumer preferences of a large middle-class population. The import excess has long been covered by large inflows of private capital—German reparation payments, charitable contributions, and investments. But, as the country progresses, the import bill grows, and some sources of foreign funds, such as reparation payments, end; the effect of this is an increased need to earn more abroad, and this, in turn, focuses attention on science-based industry.

A dismal trade picture 3 years ago prompted the government to initiate a "slow-down" policy which eventually turned into a severe recession. According to some economic observers, that slump, now ended by economic expansion after the Six Day War, prompted many investors to reevaluate the direction of the Israeli economy and turned them toward export-oriented industry. Simultaneously, government policy, based on a labor-socialist political philosophy, rapidly changed to become more hospitable toward the private sector.

Both these trends have undoubtedly helped science-oriented industry. Even so, the generally bright picture has more than a few dark spots. One particular problem is a traditional reluctance by Israeli industry to engage in R & D.

Significantly, in a country so strong in fundamental science, industrial R & D has always been something of a retarded child. Statistically it accounts for only 8 percent of the nation's total research and development bill. A number of theories are advanced to explain the backwardness.

Company size is said to be too small to support extensive research operations; in Israel, a firm with 500 employees is large. According to another theory, the current executive-producing elite is not sufficiently "research-conscious." Because of the government's prominent role in the economy and the powerful position of the central labor organization (the Histadrut, which also owns some of the nation's largest firms), many managers are said to have been appointed for "political" reasons; they are attuned to solving "social" problems (for example, absorption of immigrants) but not to profit-making or to planning research. Finally, Israel's basic-science tradition is said to be too strong; an influx of highly skilled scientists from eastern Europe in the 1930's started the tradition, and now the large majority of good students want to follow their teachers into academic laboratories and engage in research that will eventually lead to publication.

Did They Find "Cro-Magnuson" Man?

In what may be a continuing trend to "share the glory" of scientific discoveries with the public officials who make them possible, scientists from Washington State University announced a major archeological find to reporters assembled in U.S. Senator Warren G. Magnuson's office recently.

Geologist Roald Fryxell, assistant professor of anthropology, and Richard D. Daugherty, professor of archeology, announced the discovery of the "oldest human remains ever found in the Western Hemisphere" at an archeological site in southeastern Washington which will soon be flooded by waters of the Lower Monument Reservoir. The scientists said charred and shattered skull remnants and pieces of bone, as well as a pointed bone artifact, were found in sediments determined, through radiocarbon dating and from other considerations, to be 11,000 to 13,000 years old. Fryxell made the discovery, Daugherty directed the excavations.

Daugherty said the discovery was announced at a news conference because it seemed "a good time to say thanks" to Magnuson for sponsoring legislation that made the discovery possible. The senator, a Democrat from Washington, sponsored a 1960 bill that directs federal agencies to cooperate with scientists to preserve archeological relics "which might otherwise be irreparably lost or destroyed . . . by the construction of a dam." The scientists also thanked officials of the National Science Foundation, the National Park Service, and the Corps of Engineers for financing or otherwise assisting the excavation project. The officials, including Leland J. Haworth, NSF director, had been invited to Magnuson's office to take bows.

The Washington State research team presented a formal report of its findings at a meeting of the Society for American Archaeology in Santa Fe, New Mexico, early this month. The team also hopes to publish a report in a scientific journal in the near future.

Announcements of scientific achievements at press conferences or in press releases has traditionally been frowned upon by the scientific community, but there are signs the tactic may be coming into vogue. Last December the first announcement of the in vitro synthesis of biologically active deoxyribonucleic acid by Arthur Kornberg of Stanford and his colleagues was made by means of press releases and a press conference (*Science*, 22 Dec. 1967). The next step may be to name scientific discoveries after public officials. Evert Clark, science writer for the New York *Times*, suggested at Senator Magnuson's press conference that the new fossil might be called "Cro-Magnuson Man."—PHILIP M. BOFFEY

McCarthy Takes Lead in Lining Up Support of Scientists

A board of 17 scientists has been formed to advise Senator Eugene J. McCarthy (D–Minnesota) on the scientific and technical aspects of public issues. The board includes five Nobel Prize winners; several scientists who have held prominent posts under the Eisenhower, Kennedy, or Johnson administrations; and three men who were active in organizing the 1964 Scientists and Engineers for the Johnson-Humphrey movement but who have since switched to McCarthy.

Announcement of the advisory board last week, coupled with the earlier organization of an active Scientists and Engineers for McCarthy citizen group, puts the Minnesota Democrat well ahead of other Democratic and Republican presidential aspirants in the race to tap the scientific community for ideas and support. On the Republican side, neither Richard Nixon nor Nelson Rockefeller has a formal scientific advisory board or a citizen group of scientists. On the Democratic side, Senator Robert F. Kennedy's strategists have decided not to activate a "scientists and engineers" group in competition with McCarthy's because such a move "would not be conducive to harmony in the scientific community" and because they hope to inherit most of McCarthy's supporters "after McCarthy withdraws from the race." The Kennedy forces say they do have groups of scientists preparing policy ideas in California, Massachusetts, and the Washington, D.C., area. Meanwhile, supporters of Vice President Hubert H. Humphrey have concluded it would be futile to organize a "scientists for Humphrey" group because McCarthy sentiment is running so strongly on the nation's campuses. "Physical scientists for Humphrey are conspicuous by their absence," comments one key Humphrey adviser.

Perhaps the most politically prominent scientist on McCarthy's advisory board is George B. Kistiakowsky, professor of chemistry at Harvard, who served as full-time science adviser to President Eisenhower for 2 years, was on the founding committee of the 1964 Scientists and Engineers for Johnson movement, and is currently vice president of the National Academy of Sciences. Two other founding members of the 1964 Johnson-Humphrey support group have also joined McCarthy's advisory board. They are Nobel laureate Owen Chamberlain, professor of physics at Berkeley; and Paul Dudley White, the prominent Boston physician who treated President Eisenhower after his heart attack.*

In a related movement, James Longcope, national coordinator of Scientists and Engineers for McCarthy, said the organization had more than 5000 members as of last week, including 12 Nobel laureates and more than 115 members of the National Academies of Science and Engineering. He said it had raised some $10,000 for McCarthy, had placed ads in leading publications, and had financed transportation for student volunteers.—P.M.B.

* The remaining members of McCarthy's advisory board include: Leon Eisenberg, professor of psychiatry at Harvard Medical School and head of psychiatry at Massachusetts General Hospital; Bernard Feld, professor of physics at M.I.T.; Frank Furstenberg, Baltimore physician; Jesse Greenstein, professor of astrophysics at Caltech; Arthur Kornberg, executive head and professor of biochemistry at Stanford and a Nobel laureate; Aihud Pevsner, professor of physics at Johns Hopkins; Nobelist Edward M. Purcell, Harvard physicist and former member of the President's Science Advisory Committee (PSAC); Bruno Rossi, professor of physics at M.I.T.; Ascher Shapiro, head of the department of mechanical engineering at M.I.T.; Maurice Visscher, head of physiology at the University of Minnesota; George Wald, professor of biology at Harvard and a Nobel laureate; James D. Watson, also a professor of biology at Harvard and a Nobel laureate; Herbert F. York, professor of physics at the University of California at San Diego, former director of defense research and engineering in the Pentagon and former member of PSAC; and Jerrold R. Zacharias, professor of physics at M.I.T. and former member of PSAC.

The government is trying to compensate for this pervasive lack of interest (and for its own past stinginess—another important factor in the lag) by allocating increasingly large sums toward industrial R & D. The effort has just begun; last year the Ministry of Commerce and Industry raised its industrial R & D grants from practically nothing to the equivalent of about $2.8 million, and there should be another sizable increase in the coming year. This support bodes well for the future of new firms, but past neglect means that Israel does not have great numbers of scientists and engineers with industrial experience.

Not surprisingly, therefore, new companies are experiencing personnel problems. They demand technical men who are also aggressive and pragmatic—who have, in short, the elusive quality of a genuine "entrepreneur." These men are in short supply, and one of the central problems for a foreign firm wanting to locate here is that of finding a capable man to run the local plant.

By far the most vexing problem, however, is marketing. Israel's physical separation from the two major markets, Europe and America, deprives new firms of constant interplay with potential customers; without these contacts, there is difficulty in finding places to unload existing products and, more important, difficulty in discovering what new demands will be.

Once science-oriented industry begins to expand, it is also likely to experience growing pains. The first signs of such pains have already appeared: there is a shortage of qualified electronics engineers, largely attributable to the industry's growth and the economy's recovery after the Six Day War. One way to fill these gaps is to lure Israelis home who have gone abroad; there are supposedly several hundred to several thousand Israeli engineers and scientists working outside the country, and the greatest incentive for them to return is said to be a challenging job. The government is also being urged to expand scientific training. Both of these approaches take time.

In the past few months, science-based industry has received an enormous amount of publicity here. It is easy to lose perspective. Will science-oriented firms solve Israel's basic economic problems tomorrow, next year, or even 5 years from now? Probably not. They represent a minute part of the gross national product (probably less than 1 percent), and even rapid expansion will keep them small in comparison with the whole. Over the next decade or so, Israel will have to rely on older products: cut diamonds (the largest export), citrus fruits (the second-largest), foodstuffs, and a growing tourist trade. But it is clear that science-based industry will play an increasingly important role in Israel's economy.

—ROBERT J. SAMUELSON