And so on with other classes of crime.

As pointed out in previous studies, when victim behavior follows a temptation-opportunity pattern, it (i) contributes to a "climate of criminal inducements," (ii) adds to the economic resources available to criminal societies, and (iii) detracts from the ability of law-enforcement agencies to suppress the growth of crime.

Conclusions

It would seem, therefore, that we can draw the following conclusions.

1) If "society should assume some responsibility for making the victim whole," it should also require victim-behavior that will diminish the number of temptation-opportunity situations for offenders. Such behavior could be encouraged through educational programs on citizen defenses against criminality, plus legislative provisions which make victim compensation contingent upon the victim's actions not being contributory to the crime. Similar standards of behavior might be studied for adaptation to casualty insurance practices. The new practices would either be adopted voluntarily or imposed through legislation.

2) The experience of insurance companies probably offers considerable material for study of the victim-compensation problem. Among other things, there is a seeming paradox: if the beneficiary of a life insurance policy causes the death of the insured the claim will not be paid, but with burglary insurance an individual can be careless or imprudent to the point of "inviting" theft and still be compensated for a loss. "Insured" thefts seem to be a law-enforcement problem of growing significance (*15*). The relationships between compensation and carelessness and between carelessness and criminal incentives need to be studied for guidance in creating a workable victim-compensation system.

3) Provisions for compensation of the citizen injured while assisting a law officer or while, on his own initiative, restraining an offender can be administered effectively only if standards of citizen behavior are carefully defined. Payment of compensation must be on such a basis as to discourage the vigilante and the busybody. A large-scale educational effort would have to be conducted, so that citizens would know their obligations and rights (*16*).

Careful criminological research is needed to help resolve these issues, and to avoid opportunism, contradictions, and serious stresses in public finance.

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NEWS AND COMMENT

Canada: Science Advisors To Propose Priorities

Ottawa. Canada, having witnessed the enormous and somewhat frantic growth of U.S. science and technology over the past 20 years, foresees an accelerated expansion of its own science and technology and hopes that, in contrast to the American experience, it will be guided by a well-thought-out scheme of national priorities. Accordingly, the Canadian government has created an advisory Science Council and Scientific Secretariat which bear some resemblance to the White House science advisory structure. There are, however, significant differences between the advisory structure in Washington and the one here.

Canadians know that their vast country is rich in natural resources, but they are becoming acutely aware that the scientists and engineers necessary for the development of those resources are at a premium. The supply of scientific and technical talent, necessarily limited in a country of only 20 million people and rarely sufficient even in more heavily populated countries, is seen as a major factor governing the growth of Canada's economy. The Canadian government will look to the Science Council for advice as to which scientific activities should be encouraged in order to get the greatest rewards, both in training more people and in producing economic benefits.

The Economic Council of Canada, established 3 years ago, has stressed the point that more industrial research and development are needed if Canadian products are to be competitive on world markets. It is apparent that Canada, lacking a large national market, must continue to be a major world trader. Specialization in fields in which Canada, by virtue of available resources and a technological lead, holds an advantage is seen as the way to success. The Economic Council and the Science Council have stated that it is their intention to work together closely in trying to focus the government's attention on the areas of greatest technological and economic opportunity.

The Science Council was created after Parliament passed authorizing legislation in May. The 29 council members were chosen by Prime Minister Lester B. Pearson largely from among scientists and engineers holding high positions in Canadian universities, industry, and government. In 1964 the Prime Minister, by executive order, established the Scientific Secretariat as part of the

government's Privy Council Office, which provides staff support for the Prime Minister and his Cabinet.

The Secretariat advises the government in its own right and serves as the Science Council's staff. The Council is chaired by O. M. Solandt, chancellor of the University of Toronto. Solandt has been a lecturer in physiology, a wartime specialist in operational research, research director for a Canadian aircraft company, and chairman of the Defense Research Board. In short, Solandt's background is similar to that of a number of U.S. scientists who, from a university base, have moved easily in and out of government and industry.

Significantly, Roger Gaudry, the Council's vice chairman, is a French Canadian. Gaudry is a distinguished academic and industrial chemist, and the first lay rector of the University of Montreal. The Council is broadly representative of all of Canada's settled regions, but no province is better represented than Quebec—the restive element in the Canadian confederation. Seven council members are from Quebec, and, of those, five are French Canadians.

The director of the Secretariat is Frank A. Forward, formerly chairman of the department of metallurgy at the University of British Columbia and one of Canada's most prominent engineers. Forward's two deputy directors —J. Rennie Whitehead, for physical sciences and engineering, and John R. Weir, for life sciences—are well known among Canadian scientists. Both have the advantage of having participated during 1961 in a detailed examination of the administration of the government's scientific program. The study was part of an overall Royal Commission review of government organization, an exhaustive analysis similar to the Hoover Commission study in the U.S.

The Royal Commission, in a 1963 report, recommended establishment of a science advisory committee and a secretariat. Prime Minister Pearson moved to carry out the recommendations after they were endorsed in their essentials by C. J. Mackenzie, former president of the National Research Council (NRC), whom Pearson had asked to advise him on the matter.

Mackenzie agreed with the Royal Commission's conclusion that NRC had not been able to discharge its statutory responsibility, assigned to it on its establishment in 1916, of serving as the government's science advisory body. Through a long evolution, NRC had itself become a major research organization with extensive laboratories and was is no position to render impartial advice.

For the most part, establishment of the new science advisory structure has been well received. The Royal Society of Canada, the Canadian Council of Professional Engineers, the Agricultural Institute of Canada, and the National Conference of Canadian Universities and Colleges, among other groups, all have commended the government's action. Some scientists, especially in government laboratories where the bulk of the government's science funds has been going, are not eager to see any rearrangement of priorities and are known to feel apprehensive. But there has been no open controversy about the Science Council and Secretariat, and, so far, all goes well.

The Council and Secretariat may be compared, respectively, to the President's Science Advisory Committee (PSAC) and to the Office of Science and Technology in the Executive Office of the President. The Council and PSAC, though their mandates are much the same, differ sharply in their composition. The seven principal science administrators of the Canadian government sit on the Council, whereas no ranking science administrator sits on PSAC, which is made up principally of university scientists. The leading U.S. science administrators sit instead on PSAC's parallel body, the Federal Council for Science and Technology. Donald F. Hornig, the President's Science Advisor and head of OST, chairs both PSAC and the Federal Council.

White House Aide Skeptical

One well-placed White House aide who looks skeptically at the composition of the Canadian Council observes that the advantage in keeping PSAC and the Federal Council as separate groups is that each has virtues which might be lost if the groups were merged. The theory is that PSAC members, having no responsibility for government operations, will offer a fresh and detached point of view. Federal Council members do have operating responsibilities and are not likely to criticize the work of their agencies. But, so it is said, they know the written and unwritten rules by which things get done and often discuss them frankly among themselves.

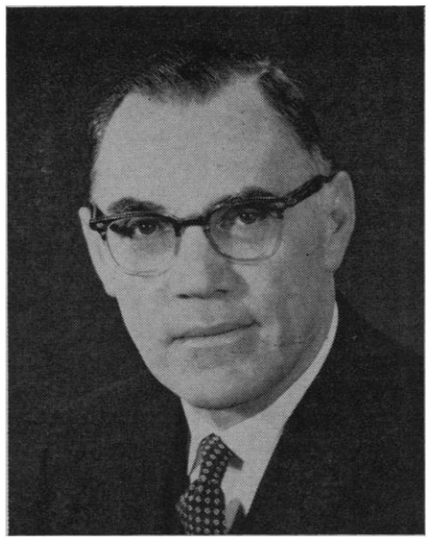
Whenever the nongovernment scientists and the science administrators are brought together, however, each group seems inhibited by the presence of the other, the White House official said. "I think the juxtaposition of separate committees is better, but maybe the Canadians' system will work," he added.

Many people knowledgeable about Canadian science believe that it would not have been wise to have excluded the government science administrators from the Science Council. The government science establishment is so large, especially by comparison with the industrial research establishment, that excluding the government administrators would have meant excluding the people who are among the best informed about Canadian science and technology.

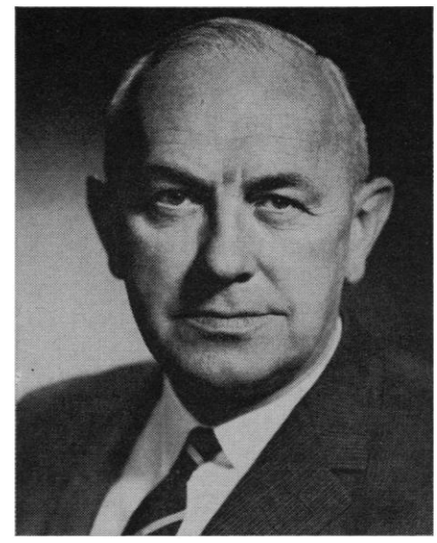
The government, through a long-established policy of making research grants and fellowships, has helped the Canadian universities build strong basic research programs. No comparable effort was made to strengthen industrial research until a few years ago, when a program of subsidies and tax incentives was initiated. The government has tended to have research done in its own laboratories, which burgeoned during World War II and the postwar years. The U.S. pattern of extensive government contracting with industry for R & D work has not developed in Canada, although Canadian firms have received some contracts in the defense field.

Much of the explanation for industry's inferior position vis-à-vis the government in matters of research lies in the peculiar nature of the Canadian economy. For a variety of reasons Canadian industry has been slow to undertake ambitious R & D programs on its own initiative, although this is no longer as true as it once was. Firms oriented to Canada's small, protected, internal market often have had neither the resources nor the incentive to do research. The branch plants and subsidiaries of American and other foreign companies, which dominate some major industries, frequently have looked to their parent companies for R & D work.

Given the weight and importance of government science in the Canadian scheme of things, the exclusion of government science administrators from the Science Council would have been viewed by some knowledgeable observers as a major strategic error. As one eminent Canadian scientist recently observed, it would hardly be politic for



O. M. Solandt



Frank A. Forward

the Council—a new entity without roots—to take up questions affecting powerful and prestigious organizations such as NRC without having an NRC official participate. But, if such officials do participate and the majority goes against them, they will be in the position of having failed to convince their professional colleagues after full discussion. Such consideration of strategy and tactics is scarcely academic. "There is going to be a struggle between the existing research enterprises and those we want to expand," a Science Council member told *Science*.

At the Council's opening session, on 5 July, Prime Minister Pearson posed a question heavy with potential conflict. He asked—though no doubt with an answer already in mind—whether Canada isn't putting too great a share of its public R & D funds into government laboratories. Government spending on scientific activities has increased from about $5 million in 1939 to an estimated $396 million in fiscal year 1965–66. Of the latter amount an estimated $294 million was spent on government-financed research and development. Of these R & D expenditures, $181.9 million was spent in the government's own establishments, $69.7 million in industry, $37.9 million in educational institutions, and $4.4 million in other establishments (such as nonprofit organizations and foreign laboratories).

The government agencies most heavily engaged in research are NRC, Atomic Energy of Canada, Limited, the armed services, the Defense Research Board, and the departments of Agriculture and Mines and Technical Surveys. Except for the armed services, each of these agencies has an official on the Science Council.

Strong sentiment exists within the Council for slowing down the growth of government R & D activities and rapidly increasing support for R & D work done by industry and universities. Some Council members observe that university research, in which graduate students participate, trains far more people than research done in government laboratories. They say, too, that inventions which result from applied research undertaken by industry are much more likely to lead to the manufacture of new products than the same inventions would if they were made by government scientists and engineers.

On the other hand, government science administrators who sit on the Council are unlikely to abandon their ambitions for their own agency programs just because ambitions may conflict with proposals to bolster university or industrial research. Competition among the rival claimants for government funds perhaps will be lessened if spending follows the ascending curve predicted. The government's spending on scientific activities has equaled less than 1 percent of Canada's gross national product; the U.S. Government's spending for such purposes ($16 billion this year) has equaled between 2 and 3 percent of the American GNP. This discrepancy has been noted and deplored by a number of influential Canadians.

Canadian government leaders have indicated that over the next 10 years total government support for science and technology will be increased several-fold. They foresee a period of rapid expansion for Canadian R & D activities, comparable, in relative terms, to what occurred in the United States during the 1950's and the early 1960's

Nevertheless, the demands on the government for R & D funds probably will be such that even a much bigger pie will look none too large to those eager for bigger slices. For example, Atomic Energy of Canada, Limited (AECL), the crown corporation which has carried on Canada's impressive effort in nuclear research and technology, has been investigating the possibility of building an intense neutron generator (ING). In Canadian terms, ING would be a very costly machine. The guesses vary, but it is clear that building and operating ING would require an investment of some tens of millions of dollars. Such an investment surely would mean that, over several years, some deserving claims for more money for new or established research projects, within or outside the government establishment, could not be satisfied.

If the Science Council follows the mandate spelled out for it by the Prime Minister, it will devote itself principally to advising the government, not on the production of new scientific knowledge, but on the application of existing knowledge to current social and economic problems. In his remarks at the Council's July session, Pearson said, "Canada is still a rapidly growing and developing country. We have many problems that we have not yet solved or even tackled, yet most of these problems could be solved within the limits of existing science and technology without any spectacular new discoveries."

Canada has the problems typical of a modern industrial state—air and water pollution, urban sprawl, and all the rest—plus the special problems of its economically weak maritime provinces and its vast northern regions. The Canadian North, especially, presents a challenge. It has oil, minerals, abundant water, hydroelectric power sites, and forests. But transport and communications are difficult, and living conditions are among the most trying to be found anywhere. "This is the last and most difficult frontier in North America," one council member said. "How do we exploit the resources of the North economically and live under the conditions there? The job to be done is almost unlimited."

A field of research likely to be given a high priority by the Council is that concerned with the processing of raw materials. More research in metal-

lurgy and in the development of wood products, for instance, may be recommended. Sweden's success in developing an advanced metallurgical industry is often cited as an example of what a small country can accomplish through specialization. Canada already has made major advances in the nuclear power field through the use of heavy-water techniques with natural uranium.

A substantial commitment to certain fields of research, such as oceanography and space studies, appears to be dictated by geography. For example, Canada is the only country in the world that has accessible ground stations in the belt of maximum activity of the aurora borealis. Late last year NCR took over the management of what was then the U.S. Air Force's rocket-launching range at Fort Churchill, Manitoba, and agreed to share the operating costs with NASA. Instruments are launched from the range into the ionosphere for studies of the ionosphere and of auroral phenomena.

A current study of Canadian activities in the space and upper-atmosphere research fields suggests the approach the Science Council and the Secretariat may be taking in assessing scientific priorities. Briefly stated, the study, initiated by the Secretariat in May, has the object of determining the significance of Canadian space research—by government, industry, and universities—to scientific knowledge, education, technological training, and the Canadian economy.

The research themes which, by reason of geography, tradition, special talents, or national policy, have particular relevance for Canada are to be delineated. The relationships between Canadian space research and the space programs of the United States and other foreign countries are to be studied. Committees will be formed, hearings held, and briefs solicited in order to obtain the views of interested organizations and individuals.

The findings will be brought before a "representative committee" of persons qualified in space science and technology before they are crystallized in a report. Finally, the report may be submitted by the Secretariat to the Science Council, for approval as it stands or in modified form. The Secretariat also has studies under way in the fields of physics, psychology, and agriculture. The Science Council, now that it is organized, will be asking the Secretariat to undertake studies in still other fields.

The Secretariat will serve as the Science Council's *moteur,* as a French-Canadian journalist put it, but it is in no sense a creature of the Council's. The Secretariat, as part of the Privy Council Office, has a confidential relation with the Prime Minister and his Cabinet, whereas the Science Council will be free openly to criticize government policies if it wishes. The Council's annual reports will be public documents and, if the reception given the first two annual reports issued by the Economic Council is any indication, they will be influential.

However, under a system of responsible parliamentary government such as Canada's, an advisory body's influence depends above all upon its ability to persuade the government in power. Legislation introduced by the government is ordinarily assured passage, whereas bills offered by individuals as private members normally get short shrift.

Thus, in Canada an advisory body cannot look to Parliament, in the way that such a group in the United States may look to Congress, to act on a recommendation which the Government has ignored. On the other hand, legislative committees in the Canadian Parliament have nothing like the independence and vigor of their counterparts in Congress. Therefore, the reports and recommendations of an effective advisory body may be relatively more important in Ottawa than they are in Washington.

The role of the Scientific Secretariat, though different from that of the Council, may be no less important. The Secretariat will always be there, available to give advice; the Science Council, for its part, may meet only a few times a year. In fact, some government science administrators have been fearful that the director of the Secretariat may become something of a czar, enjoying great influence as perhaps the last authoritative voice to speak on science proposals as they pass from the bureaucracy to the Cabinet and Parliament. At least one science administrator sitting on the Council does not want the Secretariat to play any role at all other than that of providing the Council with staff support.

Thus far, however, the Secretariat has behaved discreetly, sometimes taking care, when consulted on agency proposals by the Treasury Board (the Canadian equivalent of the U.S. Bureau of the Budget), to obtain the views of scientists from outside the government agencies on the question at hand instead of simply giving its own opinion.

Of course, in the United States the President's Science Adviser, especially when Jerome Wiesner held the position and was considered to be on intimate terms with President Kennedy, also has been regarded by some as wielding undue influence. It would appear, in fact, that the Science Adviser and OST should be able to have more direct influence than the Scientific Secretariat on the outcome of agency proposals within their respective governments. The Secretariat is consulted on important budgetary matters, but its relationship with the Treasury Board does not involve the close, day-by-day collaboration that exists between OST and the Budget Bureau. Moreover, Frank Forward, director of the Secretariat, has had occasion to see the Prime Minister personally only two or three times over the past 2 years; Donald Hornig, the President's Adviser, may see President Johnson weekly, or even more often, during periods when budget decisions are pressing.

Everyone agrees that the Secretariat cannot be effective unless its staff enjoys high prestige. The initial appointments—which included that of Elwyn O. Hughes, former science attaché at the Canadian Embassy in Washington, as the Secretariat's Executive Secretary—have been well received. The staff, which now consists of only seven professional people, eventually will grow to 24 or so. A more-or-less rapid turnover of nearly all the professional staff is considered desirable, both from the standpoint of maintaining a steady infusion of new talent and ideas and from that of allaying fears that empire builders are at work. Forward will retire next July, and his two deputies expect to move on to other jobs within a few years.

Canada's new science advisory structure is not immutable. The make-up and functions of the Secretariat and the Science Council can be altered as circumstances suggest. In fact, the Science Council act does not even require that government science administrators sit on the Council. The evolution of the advisory structure could take turns not now foreseen. What is clear is that the public dialogue about science-government relations—a dialogue which never has developed in Canada as it has in the United States—now will be stimulated by the existence of two officially sanctioned groups of highly qualified scientists and engineers.

—LUTHER J. CARTER