ADVANCES IN SCIENCE AND TECHNOLOGY during the past few decades have accelerated the growth of international law as a creative force in organizing and regulating cooperative projects among nations. International control over the utilization of new discoveries, however, has not been realized. Methods to accomplish this goal must be discovered within our existing legal framework or developed through other institutions. The topics discussed in this Symposium present a clear challenge for international law to acquire and maintain effective control over the potentially destructive technological revolution.

This Symposium is both descriptive and instructive. Because the range of the legal issues involved cannot be assessed accurately without knowledge of the scientific and technological progress which has generated the problems, the contributors have included in their articles pertinent descriptive material to place the legal questions in proper perspective. They have also sought to stimulate discussion by indicating possible solutions to foreseeable problems.

Oscar Schachter, whose article *Scientific Advances and International Law-Making* serves as the Preface for the Symposium, has acted as legal adviser to many United Nations Councils and international conferences. For some years he was Director of the General Legal Division of the United Nations, and is presently Director of Research for the United Nations Institute for Training and Research. Mr. Schachter concentrates on the capability of international law to deal with the emerging pressures of developing science and technology. He points out that treaty processes and declarations of international institutions enable nations to react quickly to meet new situations, and contrasts this efficiency with the slow growth of international law by custom. Mr. Schachter closes by recommending the compilation of factual data as a prerequisite to implementation of legal principles, and suggests that the task of fact-gathering can profitably be handled by international institutes emphasizing cooperative research and staffed by experts in various disciplines.

Steven Doyle, the author of *Communication Satellites: Catalysts for Changing International Law and Organization*, has been involved in attempts to discover solutions to the problems raised by communication satellites and the exploration of outer space. Mr. Doyle describes in detail the organization and structure of INTELSAT, the interim inter-
national agreement on the regulation of communication satellites. He discusses the possible effects which recent worldwide technological developments will have upon planned negotiations in 1969 for a permanent agreement on a global satellite system. He specifies the organizational problems which these negotiations must solve, and offers alternatives to present policies. In particular, Mr. Doyle directs attention to one of the most important future issues of communication satellite technology—direct broadcasting of political propaganda from satellites, and the jamming or destruction of offending satellites.

Douglas Johnston, who has published the recent book The International Law of Fisheries, was formerly Associate Professor of Law at Louisiana State University and is currently serving as Research Associate at the Harvard Law School. In his article, Law, Technology and the Sea, Professor Johnston first traces the rapid scientific and technological progress in the exploration and utilization of marine resources. He then discusses the legal developments which have occurred in the various areas of marine science and technology. Finally, he explores the implications of these developments and suggests some organizational bases for future cooperation among nations engaged in marine research.

Herman Kahn was for many years a senior physicist and defense analyst with the Rand Corporation. Since 1961 he has been Director of the Hudson Institute, a research organization. He is the author of On Thermonuclear War and Thinking About the Unthinkable, as well as many articles in scientific journals and popular magazines. Together with Carl Dibble, Research Associate at the Hudson Institute, Mr. Kahn offers in Criteria for Long-Range Nuclear Control Policies a novel and imaginative approach to the problems of nuclear proliferation and arms control. Kahn and Dibble propose a list of criteria to be considered in evaluating any proposed policy for arms control. They discuss in part the current proposal for a nonproliferation treaty and conclude that it fails to fulfill the criteria suggested for an effective long-range nuclear policy. They offer their own proposal for limiting proliferation to regional military organizations which can guarantee a credible, reliable and proportionate response to any nuclear aggression against any member of the regional pact or any nation covered by a multinational guarantee.

Howard Taubenfeld, author of Weather Modification and Control: Some International Legal Implications, is Professor of Law at Southern Methodist University. He is an authority on legal aspects of weather modification, and has written Weather Modification: Law, Controls, Operations, a 1966 Report to the Special Commission on Weather Modification of the National Science Foundation. Professor Taubenfeld discusses two specific problems which will arise from future large-scale
national weather modification and control programs—minor interference in another nation's territory, and major conflicts of interest among nations. He focuses upon the question of imposing liability for damage caused by weather programs and suggests that analogies useful for answering that question exist in related fields. Professor Taubenfeld predicts that future development of legal principles covering climate modification and control activities will follow along lines similar to the present international space agreements.

Ivan Vlasic is Associate Professor of Law at McGill University and is co-author of *The Public Order of Space*. Professor Vlasic's article, *The Space Treaty: A Preliminary Evaluation*, describes the rapid development of space law through the unanimous resolutions of the United Nations General Assembly, the American and Soviet proposals for a space treaty and the negotiation and signing of the final treaty. Professor Vlasic analyzes critically the various provisions of the new treaty and notes several important omissions which portend significant problems of interpretation as space technology progresses.

All these scholars emphasize the capacity of international law to organize cooperative programs and to harness the tremendous potential of science and technology. Due recognition of this function is especially warranted at the present time when ambitious hopes and sizeable fears accompany rapid scientific advances. In this environment international law can serve as an organizational mechanism to implement the desires of nations to cooperate. Given the uneasiness in the social and political areas of human relations, international cooperation seems more feasible in scientific and technological areas. The prohibitive cost of large-scale scientific programs necessary to ensure efficient progress in diverse fields encourages cooperative ventures and sharing of information. Moreover, cooperation in social and political spheres is greatly hampered by significant ideological and emotional discord. This friction has precluded agreement upon a substantial number of current international problems and has raised serious obstacles to social or political integration.

To be sure, some aspects of science and technology, such as nuclear weapons and fishing rights, are closely linked with social and political concerns. Yet, the divisive effects of the latter are to some extent offset by the desire to overcome the massive challenges of climate, sea and space, and to dull the ever-growing threat of nuclear weapons. These pressures force nations to cooperate, initially perhaps because of self-interest, self-preservation, a common adventurous spirit, or a mutual realization that atomistic behavior in certain fields will produce fewer results than collective action. The resulting cooperative programs foster increased contact among nations; more contact accompanied by good
faith performance of assumed obligations should hasten the emergence of a common respect and understanding which may brighten the prospects for future agreements beyond science and technology.

Establishing effective control over scientific and technological pursuits will require both a realistic appraisal of political factors and a process of give-and-take. Obtaining some measure of international control in the development of a system of communication satellites or climate modification, in the exploration of the sea, or in the limitation or abolition of nuclear weapons, requires a certain loss of sovereignty by each participating nation. But against this loss must be measured the mutual advantages to be gained from a realistic accommodation of interests. Hopefully, the articles in this Symposium will serve to increase awareness of the benefits to be obtained from the development and maintenance of an effective international law for science and technology.

Carl J. Seneker II*

* A.B. 1964, Stanford University, Stanford, California. Editor-in-Chief, California Law Review.