WARREN WEAVER, *Director, The Natural Sciences, Rockefeller Foundation*
BETHUEL M. WEBSTER, *Webster and Garside, New York*
LEWIS H. WEED, *Director of the School of Medicine, The Johns Hopkins University; Chairman, Division of Medical Sciences, National Research Council*
F. C. WHITMORE, *Past-President, American Chemical Society*
ROBERT E. WILSON, *Chairman of Board, Standard Oil Company of Indiana*

On behalf of the combined executive committees of the Union of American Biological Societies, comprising 38 national societies, and of the American Biological Society, dealing with cooperative functions of biologists; we heartily endorse the viewpoint, expressed by the Committee called by President Bowman, as supporting the Bush Report of which the principles are being incorporated in an impending bill, sponsored by Senator Magnuson.

In the formation of the National Science or Research Foundation, the three main proposals are: first, that the responsibility be in the hands of a board composed of laymen and scientists to be appointed by President Truman solely on the basis of interest in promoting scientific research and education; second, that no *ex-officio* members from other Government agencies serve as active members on the board, and third, that the board be responsible for the appointment of the chief administrative officer of the foundation.

As biologists we are also keenly interested in having realized the contemplated plans to include the biological sciences in a division of basic science separate from medical research and public welfare.

ROBERT CHAMBERS, *President, Union of American Biological Societies*
J. S. NICHOLAS, *President, American Biological Society*
NOVEMBER 24, 1945

ORGANIZATION AND SUPPORT OF SCIENCE IN THE UNITED STATES[1]

By Dr. L. C. DUNN

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THE war and the sudden need to improve means for supporting and directing war research have brought into high relief an important fact which has been dimly recognized for many years: there has been in the United States no orderly means for the continuous support of fundamental scientific research, and no policy or method for the deliberate utilization of science by our society. Science has been a hardy plant which grew where and how it could, thriving in the comfortable greenhouse of a research institute, or turning ample fertilizer into real fruit in an industrial laboratory, or in the more usual case struggling for sustenance in the thin soil of colleges and universities, occasionally enriched by temporary growth stimulants from a foundation or private donor. Except in the case of certain industrial developments and in a few government departments, the support of science in the United States has not been the result of decision but of chance, operating in a milieu which contained good scientists and a good deal of fluid wealth.

The most blunt and truthful statement we can make about the reason for the lack of continuity and of public policy regarding science is that, as Americans, we did not want either continuous support or direction or planned application of science. The detailed causes of this attitude trace in part to reasoned premises and in part to prejudice; and from these there has resulted a confusion of thought which the war has now revealed.

The contradictions come out most clearly in the views of scientists concerning the support of science after the war. Most of them hope for release from the capricious and precarious methods by which fundamental research was chiefly supported before the war, namely, by periodic begging from donors, such as foundations who chose the researches to be supported. Scientists generally hope for a more orderly and stable means of support than this, yet most of them would not turn to the Federal Government as the source of more continuous support. They profess to fear infringements on their freedom more when support comes from their government than when it comes from private sources.

There is no sense in dodging or belittling the dilemma in which this places science. On the one hand, the war agencies which have guided and financed a large segment of scientific research propose to withdraw from this function. If they do, the public investment in scientific research will drop to

[1] An address given on May 3, 1945, before the chapter of the Society of Sigma Xi of the University of Rochester. This address will form one chapter in a forthcoming book "Currents in Biochemistry" Edited by Dr. David Greene, to be published by Interscience Publishers, Inc.

a third or a quarter of its present level. At the same time, the principal sums in the hands of the great foundations are declining and science must adjust itself to diminishing support from this and other private sources, and possibly to the extinction of this sort of financial aid within another generation. There will eventually remain as sources of support chiefly industry and business, through their research laboratories and foundations, and the government, through its own scientific agencies or through new channels yet to be created.

Most scientists who do not like "domination of science by government" like "domination of science by industry" even less; and many have already objected to the influence which the foundations wield because of their control of the fluid funds with which to supplement the fixed investments of universities and research institutes in men and permanent plant. It has often seemed that this small tail of free funds has wagged the larger dog of solid investment.

Moreover, scientific research depends upon trained men and women as much as upon material facilities, and we have as yet made no provision for assuring a steady flow of young scientists into research. For advanced training we have relied upon the existing scholarships and fellowships of the universities, which are so meager that most young scientists can devote only a portion of their time to learning, the rest being needed for earning a living; and upon the advanced fellowships supplied by foundations, private philanthropy and industry. The same considerations of approaching exhaustion of private funds apply to the training of persons as to the provision of research funds.

The facts that must be faced are, then, that the present means of support of science are running out and, whether we like it or not, changes in the sources and form of support will occur; and that a chief desideratum for scientists will be to keep science under the new conditions as free as possible to develop according to its own inner needs and according to its function in society.

In the following pages I propose to discuss, first, what the function of science is that entitles it to support; second, what determines the attitudes of scientists toward forms of support; third, what general public policy toward science would represent the best interests of science and scientists; and, fourth, how this policy could be implemented in practical ways.

At the bottom of every consideration of science in its public aspects must lie the question: "What is science for?" When this question is squarely and thoughtfully faced, scientists will agree that science exists for man and not for itself alone. As a means of understanding the material world, it leads toward the improvement and control of the environment in which human society must always operate. Eventually, its results and the methods of thought which it develops accrue to the public good, not merely by increasing the physical well-being of the people through technological applications, but also by extending the domain of reason and by increasing our understanding and appreciation of nature. In discussing the material means which have to be provided for scientific research, it is often forgotten that the great and lasting changes wrought by science are in men's minds, and that, in the end, science is to be supported for the same reason that education is to be supported. The products of science are primarily increase and diffusion of knowledge and increase in the number of trained minds, and secondarily increase of technical facilities and production of goods. Like other knowledge, scientific understanding is one of the "rights" to which all citizens should have equal access. Its support, like that of education generally, is thus to be shared, as most essential activities are in our society, by the State and by "public spirit" as it acts through foundations, private citizens and industry. At the material level, science in the modern world has become a public necessity without which technical advances and social developments determined by them can not occur in an orderly way. It has become so "affected with the public interest" that its support must be a matter of public concern. The scientist has thus become in some sense and in spite of himself a public servant.

Those many scientists who are serving their country in the war as scientists are less likely now than formerly to forget their public function; but in the past a failure to recognize this led scientists as a class to have too little confidence in seeking support for scientific work. They were not sure that science was worthy of public support, because oftentimes science was not what the world needed, but only what they enjoyed doing. They did not generally think about a public policy for science because they were not clear about the public function of science. Can we really expect (they would say) the public to support this kind of work? Or as a small boy said to a scientist after a visit to his research laboratory, "Uncle, do they really pay you for doing this?"

When questions about the organization and support of science were raised, however, other reasons were generally given for either opposing the formulation of policy or avoiding the question altogether. These reasons took different forms, but in general had their roots in our tradition of individualism. Since scientists have usually been strong individualists, the traditional public objections to schemes for the support and direction of science have been strengthened and

rationalized by the scientists themselves. They said: "Organization kills initiative"; "Planning interferes with free enterprise," or "Continuously assured support removes the need for periodic justification of each research on its own merits." "Support implies direction, and he who pays the fiddler will call the tune; and only scientists can know what tunes can or should be played."

These are valid and weighty objections and they must be squarely met by any general proposal for the maintenance or direction of science. It is nevertheless true that these are not the primary or real reasons for opposing the formulation of a public policy or even specifically for opposing the support of science from public funds, since the same scientists who use them against government support approve the use of organization, planning, continuous support and central direction when these are employed, as a matter of policy, in the great industrial laboratories. In fact, many scientists point with pride to the splendid results which industrial laboratories have achieved under the very conditions which they allege would impede and stifle scientific research done at the expense of government. Moreover, public support and direction appear to have been quite acceptable in the great program of agricultural research which has been in operation since 1887 through the United States Department of Agriculture and the State Agricultural Experiment Stations. These facts are not cited to minimize the difficulties involved in planned continuous support and direction of research. They do show clearly, however, that the objections are generally not to support and direction as such but to these only when the authority which wields them is the Federal Government. As the attitude toward agricultural research shows, the objection does not apply with similar force to the State governments. Many scientists have expressed the fear that central and especially federal support of scientific research would put an end to "scientific freedom" and lead to "regimentation." In most cases, it is the threat to scientific individualism or "free enterprise in science" that is the real cause of fear. Since such changes in modern society as the decline of individualism are not due to deliberate acts of governments but result from the social and economic and technical developments of our age, they call, not for fear, but for a greater effort to understand them.

I believe that most scientists have come to realize the nature of such objections to discussing general policies for the public support of science. The central position that "pure science," especially physics, came to occupy in war research revealed facts about science in the modern world which simply could not be evaded or overlooked. Even the need of "coordination," the blackest of the beasts which threaten the research scientist, became evident as soon as the war imposed pressing requirements which an unplanned, uncoordinated science could not meet. The knowledge that our enemies had succeeded in so organizing their research and development programs that they had "got the jump" on us in numerous ways persuaded even reluctant individualists that coordination was absolutely necessary.

The war emergency also revealed the lack of balance which obtains when science is directed by chance. Many fundamental problems, upon which other inquiries depended, had not been touched and efforts had suddenly to be made to straighten the front. If this was borne in upon those scientists who participated in war research, it became even clearer to those who through lack of organization were left out. There are now many biologists who would sacrifice their cherished individualism for the sake of being identified with a great national effort. They realize that the neglect, the omission almost, of biology and biologists from the hastily improvised war agencies was bad not only for biology and for other sciences, such as the medical and agricultural sciences which depend upon biology, but for the nation. Their state of mind is not improved by the reflection that, by and large, the fault was their own.

Still other changes in the attitudes of scientists are due to the growing realization that research workers need to recognize the connection between their own special work and the general scientific structure in which it will find its place and its function. It is difficult for the research worker to envisage this larger field without inquiring too about the still wider frame of society in which science operates. Many more scientists than formerly now believe not only that this social awareness of the men who do the work of science is needed to make a social being and a citizen of the scientist, but that this is essential in the national interest. Those who so believe will want to face the questions involved in the public support of science.

By these paths we come to the problem itself: what public policy toward science would encourage the best growth of science and its use for the welfare of the people? The aims of policy must be to reconcile two basic requirements, about which there is probably general agreement.

(1) Science and scientists must be free to grow and change in ways determined in part by the discoveries of science itself. This is the way in which science has progressed in the past—and the autonomy of small groups and the feeling of freedom of the individual to follow the new idea wherever it may lead are goods which must be preserved. This freedom must be accepted and guarded as a matter of principle; and pro-

visions for freedom of publication and the prevention of arbitrary censorship must be a part of the basic policy.

(2) The forms of support and organization of science must be determined by social needs and purposes and are therefore matters of concern not only to scientists but to government and to the ultimate beneficiaries of science, that is, the people, as consumers and workers. Those who most directly need and use the results of scientific research in education, industry, agriculture, medicine, and public health have a special interest in the development of science, and means must be provided by which this influence can be exercised. The two primary conditions should therefore be: (a) a central organization by which the conduct of science is made responsive to public requirements and needs; and (b) the representative character of the directing agency or agencies, insuring democratic methods of administration.

These two requirements of autonomy, on the one hand, and subservience to social needs, on the other, have seemed antithetic to some, but I do not believe this need be the case. There is much evidence of the vitality and progressiveness of science in other countries where it is largely under public control. The extreme example of public control is in the Soviet Union, where the direction of scientific research is centralized in the Academy of Sciences, through which the support of the state flows to all of the research agencies. Other European countries occupy positions intermediate between this maximum and the minimum reached in the United States, where almost alone among modern nations science has retained a predominantly private character. Even here, the wartime activities of the Office of Scientific Research and Development and the Committee for Medical Research show that no essential incompatibility exists between research and public control; while the long peacetime history of United States Government scientific departments and especially of the Department of Agriculture illustrate the feasibility of accomplishing at once a scientific and a social purpose.

Much experience in the United States and in other countries indicates that, to obtain the maximum results from a given effort in scientific research, the interests of the research workers themselves must be consulted, but that these are not fundamentally different from those of the community around them. Scientists traditionally are primarily devoted to their work, often sacrificing other interests to it and excluding other interests which tend to interfere with it. Yet, as the war shows, they will voluntarily and gladly place this devotion and their technical ability and intelligence at the service of an objective which is clearly defined and compelling. On the other hand, directing agencies, public or private, do not grudge to the scientist a greater measure of freedom than to other workers, provided they are assured of his adherence to the principles of service and to the general purpose which they consider essential, and that this freedom actually produces the results expected from it. Freedom within a general plan is a practical ideal at which to aim, as the comparative freedom of local political units within the general frame of Federal Union of the United States shows.

Voluntary cooperation of scientists with public agencies in the planning and execution of research would seem to provide the soundest base. The greater tendency toward teamwork and pooling of ideas by groups of scientists, the distribution of responsibility and credit for scientific work among the whole staff of a laboratory, the greater diffusion among younger scientists of the sense of social responsibility and the resulting tendency for social incentives to supplement more purely personal motives—these facts all indicate that it is reasonable to expect that scientists can and will participate in formulating the plans they will execute. This leads to the kind of self-government to which democratic administration tends, and which industry has found valuable as an incentive.

A further question that policy must meet is the ultimate disposition of the new knowledge which accrues from science. In the large segment of scientific research under private control, it is generally agreed that the ownership of valuable processes arising from research is to be vested, not in the individual scientist, but in the laboratory or the industry which has financed the research. Patents therefore generally become the property of the corporation by which the scientist is employed.

The question of ownership has already arisen concerning values accruing from war research, and it must enter inevitably into all plans for the future support of science.

The clearest basis for policy in this regard is that research done for a social or public purpose must be brought as quickly as possible to serve this purpose. If it is carried out for the public and at public expense, it should belong to the public; and there is no more direct way of making it public property than by publishing it as soon as the facts are clear. Publication would preclude patenting and, with certain precautions to be discussed below, would prevent the results of public science from becoming private property. But, by the same token, the results of private science would remain private, subject to patent or other ownership rights and restrictions.

A division of this sort already exists. Most agricultural research in the United States is done at public expense and results are freely published and can

be consulted and used by anyone. The greatest change in American agriculture in the present century, the introduction of crossbred or hybrid corn, resulted chiefly from cooperative research between the United States Department of Agriculture and the State Agricultural Experiment Stations. The results were quickly utilized by private seed companies, none of which was able to obtain a patent or found a monopoly on it. Crossbred corn therefore came very quickly into general use and its benefits were soon spread over all agricultural communities.

Side by side with this development, it was possible for private individuals and corporations to produce and patent new varieties of other plants, such as roses, which could be propagated asexually. The ownership of new rose varieties is thus (in general) private; but the new method of corn breeding belongs to the public.

The question of property rights need then be faced only when new values are created by publicly supported research; and the basic policy stated above—that is, free publication of the results of public research—need not interfere with existing arrangements under which private research operates. As a matter of fact, the more fundamental the research in the sense that the more general the truth that arises from it, the less will property questions arise. It is hard to find a patentable value in the general theory of relativity, or in the periodic system of the elements, or in the theory of the gene. It is the fate and the function of such ideas to become common property, and no man-made rules should be allowed to interfere with their free circulation. It is usually only the specific applications of general ideas which become subject to property restriction; and public policy can only aim at preventing such restriction from interfering with the advance of science or with the spread of the benefits to the people.

It is time now to deal briefly and in bare outline with the last question: how can these ideas and hopes about the support of science be brought into practical operation?

It seems evident that there must be an agency having as its chief concern the preservation, advancement and diffusion of scientific knowledge. There are, in the United States, dozens of organizations having this aim in limited spheres, but that not one of them fulfilled the required functions in the national interest became evident when, in the war emergency, a wholly new and temporary agency, the Office of Scientific Research and Development, had to be created. The importance of the work assigned to this office, and the powers and facilities which accompanied the responsibility, pointed not only to the need but to the method of meeting the need for a central agency of government concerned with science.

It is probable that nothing less than the creation of a cabinet department of science under a Secretary of Science can permanently meet the need. It ought to be connected directly with the central executive body of the government, because only in such a position can it be made aware of the basic problems which face the nation, and only through the political power which attaches to cabinet rank can it gain the means and facilities with which to support the study of both immediate and long-term problems.

The structure of such a department may well be different from that of other government departments because, in addition to policy making and administrative functions, it would have to serve as a coordinating agency for many existing scientific agencies, both public and private. To name only two groups of interests, it would have to be closely connected with the universities and research institutes, and with industry, since in each of these institutions needs for new knowledge are likely first to become apparent, and from each flows scientific and technical information which can be put to use in national defense and development.

At the heart of such a department could well be a board or council of scientific research which could act at once as a granting agency, allocating funds for specific researches, and as a board of strategy, seeking out neglected areas, mobilizing disparate facts and distant persons, and shifting its forces from time to time to explore new avenues of research. If it fulfilled its best purpose, it could not be content to sit and sift, but would itself have to search and ponder in a more active way. Its basis of operation as a granting agency might well be patterned upon the Office of Scientific Research and Development in that it might receive applications for research funds from universities, research laboratories, other government agencies, or even individuals, and might enter into contracts with those it judged as offering the best prospects for needed scientific advance. Like O. S. R. D., it might find no need to become an operating agency with plants and facilities of its own, although it should have some freedom to use those methods best calculated to promote the best research.

Much would depend upon the composition of this board. It should consist of working scientists who can judge the merits of various research proposals and policies, and of representatives of those for whose benefit the research is done and who in the end pay the bills, that is, the public as represented by labor, consumers and industry, small or large. Perhaps a proportion of eight scientists and four public representatives would express both the purposes and responsibilities of the board; and some of the scientists

should be drawn from, or be primarily interested in the scientific work of, the government departments.

Since there should be no disposition on the part of such a board to displace any existing research agencies, but rather to supplement and aid them, its most important function might well turn out to be, especially in its initial operations, that of coordinating and facilitating research generally. It would undoubtedly avoid competition with industrial research, and direct its first attention to "unprofitable" fields such as exploration looking toward new natural resources, housing, public health, etc. It would probably be concerned with such public services as the provision of adequate means of publication, of bibliographic and library services, of abstracts and translations of foreign scientific literature and similar functions.

Either this board or another one in the Department of Science would of necessity concern itself with one of the basic questions in all scientific research: how to insure an adequate supply of trained scientists for research, for education, for industry and for public service. Its operation in this respect could well be patterned upon the fellowship boards of the National Research Council, which at present administers limited and temporary funds supplied from private sources.

Two main criticisms to the proposal outlined above may be anticipated. One is that research can not be free under a central direction, but will wither and die. Scientists, it is said, will not submit to regimentation, nor can new ideas, the life blood of science, be created by subsidy. The other criticism is that the needs are already met by such existing agencies as the National Academy of Sciences and the National Research Council.

The first criticism is certainly a cogent one when central control is proposed, but it applies with less force to a board which judges applications initiated by working scientists as individuals or groups, especially when many of the judges are themselves working scientists who know how delicate a plant original research is and how necessary is the atmosphere of freedom to its growth.

Much will depend upon the degree to which members of the board realize that any organization of this sort exists primarily to provide a material body for the mind of science. There are scientists and others who know this and who apply to organizations proposed for science two essential criteria: Does it provide the mind with adequate and proper facilities? Does it leave the mind free to strike out in new directions? Men who ask these questions are the ones whose sense of public duty would bring them into the service of such a board, just as it brought such men into the direction of war research.

In regard to the second criticism, it must be pointed out that in the war emergency neither the National Research Council nor the National Academy of Sciences proved to have the character needed for an agency to guide and administer the organization and support of science. Neither is an operating agency; and, as constituted at present, neither could provide the initiative and the administrative services which are required. The relative isolation in which they have functioned has removed them from that close connection with problems of public policy so essential for an agency to have which is to be responsive to public needs. They have the confidence of scientists and close connection with academic research and with the scientific societies and organizations and are thus well prepared to serve an important advisory function. The National Academy of Sciences, as a council of elder statesmen, could well be called upon to pass upon the qualifications of scientists proposed for membership in the Board of Scientific Research. The academy would be less able to maintain sufficiently close relations with consumers, with labor, and with industry, and it would be less competent to advise on questions bearing on the social relations of science in these fields.

The board might conduct its relations with the scientific societies through the National Research Council, which could then be incorporated into the Department of Science and carry out other important functions, such as maintaining a permanent roster of scientific personnel.

It is of course possible that the academy and the present National Research Council might be so changed as to assume the functions it is proposed to assign to the board. The changes would be so fundamental as to constitute conversion of these older organizations into a new department of the government; and it is probable that the traditions of both institutions would make such conversion a slow and difficult process, for, in spite of their "national" character, neither has felt itself to be a truly public agency.

In this brief sketch, it has not been possible to indicate what the relations of the new organization would be to existing scientific departments and bureaus of the government. Some, like the Bureau of Standards, would probably become a part of the new department; others, like the Department of Agriculture, are already so important as to require separate existence and budgetary independence, although certain of their research functions could well be assumed by the new department. But these and many other questions will require thorough study and discussion both by scientists and statesmen.

Finally, as scientists, we may ask what practical steps we could take to hasten the consideration of

questions about the organization and support of science. One suggestion arises directly from the fact that, as scientists, we have no over-all organization to bring our views on such questions to a focus or to represent our interest in public matters, or to permit our influence to be brought to bear upon problems which affect the scientist. Perhaps we should have a guild or a federation of scientific societies which could concern itself with such questions.

As scientists, we might also encourage and cooperate with those statesmen who have seen the need and have begun to study the problem of the public support of science. Too frequently we have remained aloof or have opposed even the public discussion of the problem. Apparently we have still to learn that there is a politics concerned with policy, and that only through such a political channel can science come to occupy its rightful and necessary place in the state.

OBITUARY

HERBERT EUGENE WALTER

PROFESSOR WALTER died at his home in Providence, Rhode Island, on October first, in the seventy-ninth year of his age. He was born on a farm in Burke, Vermont, on April 19, 1867. Living as a schoolboy in the neighboring village of Lyndon Center and marrying Alice Hall of Lyndon in 1893, he always remained a staunch Vermonter, returning there for frequent summer visits. Mrs. Walter, who is an ardent ornithologist, survives him. Over the course of many years their keen mutual interest in birds served them as a semiprofessional pastime, resulting in the collection of many records and in substantially furthering the cause of wildlife conservation.

Walter graduated from Bates College in 1892, and in 1939 he received the honorary degree of Sc.D. from his *alma mater*. A similar honor, also the Sc.D. degree, was conferred on him by Middlebury College in 1934.

His graduate work began at Brown University in 1892–93 under the tutelage of H. C. Bumpus, at that time professor of comparative anatomy. Their early association, already begun during several summers at Woods Hole, led him to Brown and proved to be the beginning of a lifelong friendship. The next year was spent in Germany, following the habit that then prevailed among young aspirants to a zoological career. He was very fortunate to proceed to Freiburg, where the quartet of Heeren Professoren at the Anatomisches Institut included the justly celebrated Weismann and Wiedersheim.

Walter was a delightful writer, and his Germanic experiences at Freiburg are interestingly set forth in a brochure entitled "One Innocent Abroad," published only very recently (1943) and circulated among a wide circle of his friends.

On his return from Europe he took a position as teacher of biology in the North Division High School in Chicago, where the writer and his boyhood friend, A. L. Melander, had the great good fortune to receive their first instruction in the mysteries of biological science at his hands. Then, as later, Walter was a marvelously fine and enthusiastic teacher whose equal I have seldom known. He took a great interest in secondary education during this period of ten years, but wanted to return east and complete the graduate study he had begun in Germany.

The two following years were spent at Harvard University, where he received the degree of Ph.D. in 1906. At this time he relinquished temporarily his primary interest in vertebrate zoology and presented a doctoral dissertation dealing with the behavior of planarians, a study sponsored by Professor G. H. Parker. W. E. Castle, another member of the Harvard biological faculty, was already at work in the newly born science of genetics and Walter's interest in this phase of biology was aroused, later to be further stimulated by association with C. B. Davenport, another pioneer geneticist.

Following the interlude at Harvard, Walter joined the faculty of Brown University, of which he remained a member for thirty-one years, first as assistant professor, then as associate professor and finally for fifteen years as professor of biology. He retired from active teaching in 1937.

Concurrently with his activities at Brown, from 1906–1927 Walter spent a considerable part of each summer at the Cold Spring Harbor Biological Laboratory, where he conducted a class in field zoology. The daily meetings of this class, in which the writer had the opportunity to take part on several occasions, were a round of continued activity on the part of all participants. There were frequent trips to selected marine, fresh-water or terrestrial habitats, where the fauna suffered an inquisition that offered an opportunity to acquaint the members of the class with a most varied list of animals, numerous plants, and furnished the cue to present many biological principles in vivid form. At the end of each session a daily report was prepared on a simple mimeograph held in readiness at the laboratory. These reports, often embellished with appropriate diagrams, Walter prepared, printed and distributed with the precision and well-ordered haste usually associated with the afternoon edition of a metropolitan daily. This class is selected as an example of the unusual facility with