Cancer Research

VOLUME 29 SEPTEMBER 1969 NUMBER 9

[CANCER RESEARCH 29, 1615–1641, September 1969]

The American Cancer Society and Cancer Research Origins and Organization: 1913-1943

Victor A. Triolo† and Michael B. Shimkin*

Fels Research Institute and Department of Behavioral Science, Temple University, School of Medicine, Philadelphia, Pennsylvania 19140

FOREWORD

A full history of the American Cancer Society has never been published. As a consequence little is known of the extensive support rendered by the Society to the promotion of applied and fundamental cancer research. More recent activities of the A.C.S. in the area of research are familiar to experienced administrators and established scientists who act in advisory or other capacities in connection with the Society's extramural programs. Other details are part of the forgotten record, obscured by the passage of over 50 years since the foundation of the Society as the American Society for the Control of Cancer.

It is advisable, therefore, that the earlier episodes of the Society's prescribed mission—to serve as an agency for professional and lay education on cancer—be examined so that fresh perspectives may accrue for the history of public health in the United States. This article, a first report, will consider the development of the national voluntary cancer movement from its inception to the period of transition; specifically, the era that encloses the activities of the American Society for the Control of Cancer. Another report will project the history of the Society to 1963; this will encompass the first 20 years of the American Cancer Society and is intended for a later issue of CANCER RESEARCH. The scope of the present review is limited to a discussion of those developments that have a direct bearing on the growth of cancer research as reflected in peripheral sources, such as the Society's publications and transactions (for example, *Campaign Notes* and *Bulletins*; see section on bibliographic sources and footnotes). Unfortunately, the evidence of archival sources and primary documentation, such as the *Minutes of Executive Council Meetings*, are not available at the present time.

It is intended that this paper will provide information on the influences exerted upon cancer research by the American voluntary health movement devoted to the control of neoplastic diseases.

INTRODUCTION

Epic advances in health science research, especially in recent years, have given rise to an alerted and responsive reaction within the American scene. A public attuned to the efforts of modern medical science readily supports these efforts through periodic appeals instituted by the national voluntary health organizations and other agencies dedicated to social service. The results of campaigns now largely concluded require little discussion. Scourges that once weighed heavily in the national mortality statistics, such as tuberculosis and poliomyelitis, no longer measurably influence the status of contemporary health. There are ample indications that the current campaigns against cancer, heart disease, and stroke will eventually bring similar results.

Although the national voluntary health organizations have different missions directed at specific targets, they resemble each other in their patterns of operations (Chart 1). First, the voluntary health organizations form integral units within community health service programs to expedite communications between the laity and the professional sectors. This work largely concerns the dissemination of information and the establishment of educational liaisons. Secondly, the voluntary health organizations provide sources of financial support for the scientific fronts. Needed assistance derived from local and national appeals in this way is made available for clinical, laboratory, and field studies. Health science advancements ultimately return to the social milieu in the form of regional programs of diagnosis, prevention, treatment, and rehabilitation, assisted through the advisory adjuncts of the voluntary health organization. Viewed in this perspective the voluntary health organization catalyzes the interaction of services and resources between the scientific and lay communities. The coordination of voluntary efforts to secure a healthful and disease-free environ-

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† USPHS Career Development Awardee (3KO3CA17850) from the National Cancer Institute.

*Present address: Department of Community Medicine, University of California at San Diego, La Jolla, California.

Received February 7, 1969; accepted April 30, 1969.

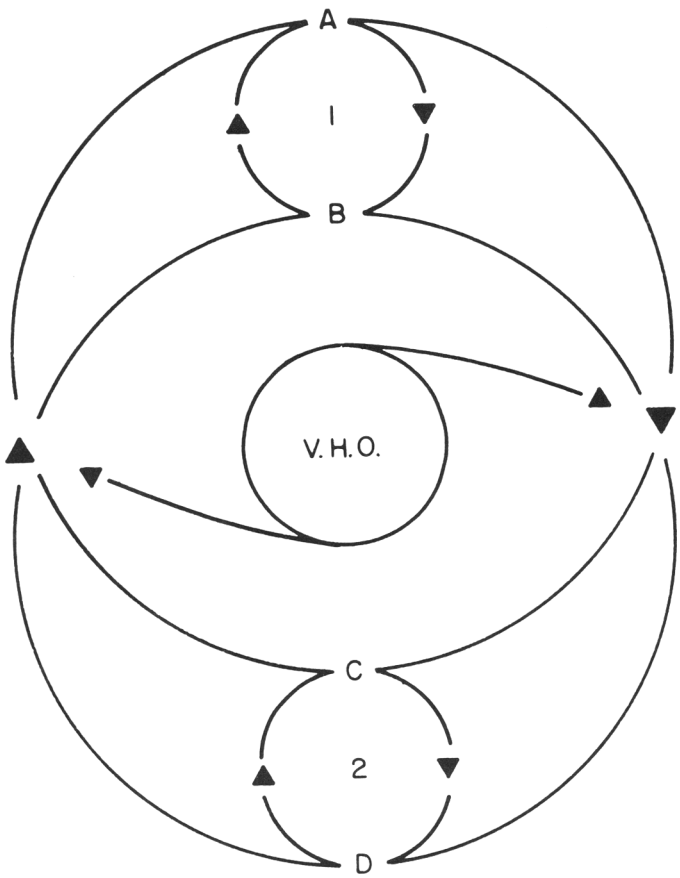

Chart 1. *A*, the laity. *B*, medical and paramedical professions, e.g., physicians, dentists, nurses, etc. *C*, public health services, preventive diagnostic, and therapeutic facilities. *D*, basic research and ancillary programs. V. H. O., voluntary health organization. The cycles, *1* and *2*, suggest the proximate relationships between the laity and community medical functions and between the public health and basic research organizations respectively.

ment within the United States is less than a century old: it dates from the establishment of the National Tuberculosis Association in 1904 (66).

The American Cancer Society (A.C.S.) is committed to the proposition that the ultimate causes and treatments of neoplastic diseases will proceed from scientific investigations. Very recent A.C.S. contributions to research-related areas are cited in available publications (54, 55). The attitudes of the A.C.S., or rather its forerunner, the American Society for the Control of Cancer (A.S.C.C.), toward more remote trends in cancer research are not recorded. Conversely, the discrete mission of the A.S.C.C. as a voluntary organ of cancer education has been reviewed in several articles (13, 58), which describe the evolution of programs concerned with the dissemination of educational propaganda. This report underscores the character of scientific interests within the A.S.C.C. and projects a basis for the institution of research support by the modern A.C.S.

Origins of the A.C.S.

Plans for a society, "to disseminate knowledge concerning the symptoms, treatment and prevention of cancer, to investigate conditions under which cancer is found, and to compile statistics in regard thereto,"[1] were formulated by a committee of physicians and laymen (Table 1), in New York City, on May 22, 1913. The society, designated the American Society for the Control of Cancer, grew in response to contemporary demands for specialized tasks requiring a dual focus of professional and nonprofessional viewpoints. An organization was envisioned specifically to render a variety of clinical details on cancer into a language of useful phrases for public education. At this time it had become obvious to medical specialists, especially to gynecologists, that there was no appreciable understanding among the laity of cancer and its treatment. The popular view of cancer was belabored by a variety of misconceptions that invariably gave rise to unreasoned fear.

There is evidence that the cancer research of this period lacked the necessary human orientation to generate much public or private concern. Only minimal endowments for these studies were available before 1900 although several hospital departments had already inaugurated programs of cancer investigation. When, in 1897, a small laboratory was designed for this purpose at the University of Buffalo, to be supported at New York State expense, Governor Frank S. Black vetoed the appropriation of $10,000 in unequivocal terms: "I cannot approve of a proposed policy which requires the state to engage in the investigation of the causes of various diseases with which the human family is afflicted. I think that the interest of the people themselves and the skill, intelligence and enterprise of physicians may be depended upon to make such investigations."[2] Nevertheless, the Buffalo cancer laboratory received state backing the following year, and a dividend on this investment was soon realized in the form of studies[3] which suggested the value of a regional epidemiologic survey as a statistical modality in cancer research.

Table 1

Name	Speciality[a]
Dr. James Ewing	Pathology; oncology
Dr. Howard C. Taylor	Gynecology
Dr. Thomas C. Cullen	Abdominal surgery; gynecology
Dr. William E. Studdiford	Obstetrics; gynecology
Dr. Frank F. Simpson	Gynecology
Dr. Joseph C. Bloodgood	Surgery; surgical pathology
Dr. George E. Brewer	Surgery; anatomy
Dr. Charles L. Gibson	Surgery
Dr. Clement Cleveland	Surgery; obstetrics
Dr. Sigmund Pollitzer	Medicine; physiology; dermatology
Mr. John F. Parsons	
Mr. George C. Clark	
Mr. James Speyer	
Mr. V. Everit Macy	
Mr. Thomas M. Debevoise	

Charter members of the American Society for the Control of Cancer.
[a] American Medical Directory, 4th edition, 1914.

It should be noted that this approach was gaining recognition elsewhere, especially at the Imperial Cancer Research Fund, whose scopes were aligned in a preliminary (1902) *Scheme for Enquiring into the Nature, Cause, Prevention and Treatment of Cancer*[4] (64). This plan, drafted by the first director of the Fund, E. R. Bashford, outlined an open-ended policy combining the methods of statistical, comparative, and experimental research to adduce the broadest interpretative basis for the problem. Subsequent reports of the Fund included significant results on the frequency and distribution of cancer in various animal species; these conclusions provided guidelines for experimental technics of tumor transplantation introduced during this era.[5]

Cancer statistics were given high priority in the early proceedings of the American Association for Cancer Research (A.A.C.R.), founded in 1907 (73). Through a memorandum issued in 1909 to the National Board of Health, the Executive Committee of the A.A.C.R. noted alarming trends in the cancer statistics of several European States and urged that similar evidences from American demographic records be explicitly published. To insure the reliability of these data the A.A.C.R. installed a "Committee on Statistics and Public Education" in 1912.

The necessity for compiling reliable cancer statistics was also urged in other quarters. On May 7, 1913, Dr. Frederick Hoffman, statistician for the Prudential Life Insurance Company of America, in a paper read before the American Gynecological Society (A.G.S.), warned of the increasing death rate from cancer (33). This phenomenon could not be entirely attributed to improved medical diagnoses and more accurate procedures of death certification that had been lately instituted. An actual increase in the incidence of cancer mortality appeared to stem from unknown causes. Dr. Hoffman summarized his recommendations in a ten-point plan as follows: (*a*) a Society be established for the study and prevention of cancer; (*b*) investigations be undertaken to determine the geographic distribution of cancer throughout the Western Hemisphere; (*c*) hospital records showing cancer experience data be thoroughly reassessed; (*d*) improvements be made on official cancer mortality returns; (*e*) local incidences of cancer be precisely specified through a reapportionment of vital statistics and data analyses distributed through governmental agencies; (*f*) incidences of occupational hazards with respect to cancer be exactly determined; (*g*) nutritional influences on the induction of cancer be analyzed; (*h*) provisions for the National Board of Health to alert the public on cancer in a manner befitting its character as a national health menace; (*i*) arrangements by the Departments of Agriculture and Soils to launch intensive investigations on the occurrence of cancer in domestic animals; and (*j*) specific citations of the danger signals of cancer and the necessity for early treatment.

The A.G.S. possessed the requisite machinery for implementing a number of these recommendations; as early as 1912 a committee of the Society had been empowered to conduct a campaign of cancer education among women. A.G.S. members involved in this program, under the leadership of Dr. Clement Cleveland, espoused the Hoffman proposals as a personal challenge to inaugurate a new Society for the purposes of cancer education. Precedents for this plan appear in the United States as early as 1905, when Dr. Lewis S. McMurty, president of the American Medical Association (and vice president of the A.S.C.C. from 1913 to 1922) appointed a committee of the association to assess the actual extent of cancer mortality. An additional step was taken, in 1912, by the Clinical Congress of Surgeons of North America, which empowered Dr. Thomas Cullen, as chairman of its Cancer Campaign Committee, to formulate a policy of popular education on the subject.

The American Cancer Control Society, launched on January 1, 1914,[6–8] constituted a rather novel element in the international community, where other anticancer activities were taking root. The cause in Britain was championed by the English surgeon Charles Plumley Childe, who, in 1906, unsuccessfully attempted to implant a national cancer control society (15, 17). A League against Cancer in France was delayed until March 1918. Switzerland, Belgium, and Denmark are true pioneers in this work, having put organizations for cancer education into the field between 1908 and 1913. Local committees also were created at this time in the states of Prussia, Saxony, Baden, Hesse, Oldenburg, Thuringia, and Bavaria.

PERIOD OF ORGANIZATION, 1913–1943

Early Activities in Statistics and Epidemiology

The question of cancer statistics was assumed among the first responsibilities by an A.S.C.C. committee under Dr. Frederick Hoffman. The *Statistical Advisory Committee* promptly undertook preliminary cancer surveys based upon the actuarial experiences of a few leading insurance companies. However, it soon became apparent that successful completion of this work would require the resources of the federal government. Accordingly, on February 14, 1914, the A.S.C.C. prepared the following resolution:

> *Resolved*, that the Executive Committee of the American Society for the Control of Cancer respectfully suggests to the Director of the United States Census that the Division of Vital Statistics be instructed to publish hereafter, in the annual volume on mortality statistics, a more detailed statement of the deaths from cancer, and other malignant tumors, as reported for the Registration Area of the United States, and in accordance with the details as given in the second revision of the Manual of the International List of Causes of Death, pages 63–66 inclusive (40, p. 791).

In response to this proposal, the Director of the U. S. Census Bureau, on October 17, 1914, authorized the preparation of a monograph report on the national incidences of cancer mortality for the year 1914. The design of this project was assigned to an advisory council composed of representatives of the Caroline Brewer Croft Cancer Commission (Harvard University), the George Crocker Cancer Research Fund (Columbia University), the Bernard Free Skin and Cancer Hospital (St. Louis, Missouri), the New York State Institute for the Study of Malignant Diseases (Buffalo, New York), the Prudential and Metropolitan Life Insurance Companies, the A.A.C.R. and the A.S.C.C. The Council ultimately decided to pattern the work on the *International List of Causes of Death*, specifically on the List's tumor protocols. The data were to be arranged under

29 titles, indicative of gross tumor position, and subdivided into two categories: cases in which tumor diagnoses were "reasonably certain" and cases of doubtful authenticity. This information, pursuant to ascertainment and evaluation of comparable data from questionaires circulated among 35,000 physicians and from abstracts of Census Bureau accounts, was to be further subdivided into sex, age, race, marital status, and other vital tables.

Shortly before the publication of this monumental enterprise, the first *United States Cancer Census*, in 1916 (48), an equally comprehensive study of international cancer mortality statistics, was issued by Dr. Hoffman in 1915 (34). On the basis of this assessment, it was possible to conclude that, "the actual frequency of malignant disease throughout the world has been ascertained to be much more than has generally been assumed . . . and that cancer remains one of the few diseases actually and persistently on the increase in practically all of the countries and large cities for which trustworthy data are available (34, p. vii)." Henceforth this message was resounded vigorously in the educational campaigns of the A.S.C.C. Various encouraging signs began to appear as early as 1917, at which time Dr. Hoffman reported[9] that areas in which the programs of the Society were firmly rooted were beginning to show appreciable decreases in cancer deaths.

Although the 1916 Census Bureau report cited comparative statistics for rural as opposed to urban environments, and included other geographical contrasts of cancer mortality, it gave no account of unusual environmental circumstances such as occupation. This omission elicited considerable concern among various research specialists and public health officials, who, by 1915, were convinced that hazards of occupational and industrial situations were proven factors in the causation of cancer. This field had remained unspaded according to one noted authority, Dr. Francis Carter Wood, an A.S.C.C. board executor and Crocker Research Fund Director: "It is well known that the workers in brass foundries are liable to cancer of the upper extremities, chimney sweeps and briquette workers to cancer of the scrotum, those employed in the manufacture of certain synthetic coal and tar products to cancer of the bladder, and X-ray operators to cancer and leukemia; but there are many occupations as to which no information of this sort is available . . . (77, p. 120)." The necessity to enlarge this area of knowledge was felt not only by those concerned with a pending problem of enforceable safeguards, but also by those interested in its medico-legal implications (such as the establishment of rates for industrial insurance and workmen's compensation).

A sizeable portion of the Hoffman monograph was devoted to the epidemiology of cancer. The treatise included appendices on the cancer mortality figures reported from selected industries and employments as listed in the decennial reports of the Registrar General of England and Wales, the industrial mortality tables of the Prudential Insurance Company, and the 1910 Hungarian cancer census. Moreover, the question was treated separately in a special bulletin of the A.S.C.C., *Cancer as a Social Problem*, issued in 1914.[10] In addition to a review of contemporary sociologic issues relating to cancer, the bulletin framed an appeal to the Director of the U. S. Bureau of Mines to institute investigations on the "apparent relation" of gas works, pitch industries, and manufactories of fuel briquettes to employment disabilities involving ulceration of the skin and epithelioma.

In 1922 Dr. Joseph W. Schereschewsky, associated with the Division of Scientific Research of the U. S. Public Health Service, received authorization to inaugurate an *Office of Cancer Investigations* under the auspices of the Public Health Service. This date marks the commencement of unbroken federal cooperation in cancer research (3). Part of Dr. Schereschewsky's assignment involved a detailed analysis of the statistical and epidemiologic evidences of cancer, a mission successfully completed in 1925 with the issuance of the now classic *Public Health Bulletin No 155* (62). Dr. Schereschewsky's data showed an appreciable annual increase in deaths from cancer, over a 20-year period, within a large part of the registration area of the United States. This report gave circumspect support to Hoffman's studies and provided incontrovertible evidence of the fatal progress of cancer in the United States.

After 1925 the Public Health Service assumed the primary responsibility for periodic announcements of trends in cancer mortality, such as the Gover reports of 1939-41 (22–25), thus satisfying one of the fundamental policy aims of the A.S.C.C. Although recommendations of vigilance on the question of statistics continued to be stressed in A.S.C.C. directives, the role of the Society in the late 1920's and early 1930's shifted toward the more basic aspects of cancer control. A review of its formative period suggests that the A.S.C.C. pump-priming activities on behalf of statistical and epidemiological investigations deserve notice as outstanding contributions to the American public health movement.

Currents in Research on Therapy

Radiation Therapy. Prior to 1900 surgical intervention provided the only reliable treatment for the relatively few cases in which less-advanced cancers were discovered. Patients with advanced cancers were offered little hope except for the misleading pretentions of omnipresent quacks and charlatans. A more promising prospectus for reliable cancer therapy appeared at the turn of the century in the form of radiation procedures, following the discovery of X-rays by Roentgen (1895) and the isolation of radium by the Curies (1898). As early as 1902, while the powerful force of ionizing radiation was being harnessed to the service of medicine, its previously unsuspected capacity to induce cancer gradually became recognized (65). Clinical research inadvertently had taken possession of an incisive yet treacherous weapon.

By 1910 the exploration of radium and X-ray effects on cancer was well advanced at several European clinical centers. A Parisian Institute, the Laboratoire Biologique du Radium, and the Czerny-Krankenhaus für Strahlenbehandlung of Heidelburg, (4) both founded in 1906, stood at the forefront of radiologic research. An American counterpart, the *Department of Cancer Surgery and Radiation*, came into existence in 1912 at the General Memorial Hospital for Cancer (New York City). This facility spearheaded the method of radiation treatment for cancer on the North American continent, a result largely made possible through the efforts of Memorial director Dr. James Ewing, the noted clinical oncologist and A.S.C.C.

founding father.[11] Supervision of the program fell to Dr. Henry H. Janeway, a well-known exponent of the "radioactive" technic.

Dr. Janeway published the findings of initial clinical trials in 1914, simultaneously as a J.A.M.A. report (37) and as an A.S.C.C. bulletin, *Results of Radium in Cancer*.[12] Preliminary evidence suggested that radium treatment should not supersede surgery in any form of operable cancer. A possible exception existed in the case of localized, surface lesions. Moreover, analyses of data gathered at European clinics indicated a positive response in selective cases of inoperable cancer, circumstances in which radium had been employed in well-regulated doses targeted at accessible tissues. The exact potential of radioactive emanations from radium and other newly uncovered sources (mesothorium and thorium X) as an adjuvant to, rather than a replacement for, surgery lay in future research.

The Janeway recommendations were cited by cancer control authorities as part of a campaign to offset grossly exaggerated claims for radium therapy blatantly advertised by the news media. In 1914, A.S.C.C. Executive Secretary Curtis Lakeman warned of "radium fakes" and derogated the misguided counsels of "honest and educated enthusiasts, who have been led to premature confidence in the curative effects of radium by the excitement of witnessing the temporary relief of symptoms and decrease of tangible tumors which it undoubtedly produces even in advanced cases."[13] Nevertheless, the Society advocated expedient measures to conserve the limited stockpile of radium for legitimate cancer treatment and research. An A.S.C.C. Executive Committee resolution of April 1920 urged that $250,000 of New York State funds be applied to the purchase of radium, in the face of spiraling prices forced by commercial speculation, for the purposes of radiologic investigations at the State Institute for the Study of Malignant Diseases. As had occurred with serums, vaccines, and other biologic medicinals, the unpredictable market in radium threatened serious shortages for experimental uses.[14]

During this embryonic stage of experience with radiotherapy, the Society felt that all policy matters and public statements dealing with technologic development should reflect no more than a "deep, conservative interest," pending a more definitive outcome with its clinical applications.[15] A significant step in this direction was taken in February 1922, at which time the American College of Surgeons assigned a task force to evaluate the case records of 22 U. S. and Canadian hospitals, over a 5-year period (1914 to 1919) for results on radium and X-ray treatment of cancer of the cervix. This committee issued a preliminary report in 1924 through its spokesman, Dr. Robert M. Greenough, director of the Caroline Brewer Croft Cancer Commission and a member of the A.S.C.C. Executive Committee (26). As a curative measure radium was generally found to be somewhat less effective than surgery. In cases of early-favorable and border-line malignancies, the choice of either method remained open. Both radiotherapy and hysterectomy fell short of expectations in advanced situations. Radium, with or without X-ray or palliative operation, was a most useful agency in the destruction of local disease. Radium treatment offered the greatest promise where alleviation through operative management gave the least expectation for success. It also appeared to increase the possibility of prolonging life in recurrent cases of cancer after hysterectomy.

This comprehensive study prompted a more favorable consensus regarding the radiation treatment in A.S.C.C. commentaries on the contemporary status of cancer therapy.[16] Nevertheless, this favorable turn for radiation therapy did not hasten its complete acceptance by all clinicians, many of whom were separated into opposing surgical and radiologic camps. Large numbers of surgeons, especially among the older contingents, were slow to accept an innovation of unproven worth in the cure of cancer. According to Dr. George Soper, managing director of the A.S.C.C., a convocation of English specialists in 1926 attested to a poor record of radium experiences in England. The aura of disillusionment was captured in a comment by Dr. Victor Bonney, surgeon at the Middlesex Hospital, "I am sorry to be such a pessimist on methods of treatment for whose success all of us so longed and hoped. But it is no use blinding ourselves to the hard fact that as methods of cure they are disappointments, and even as means of palliation they leave much to be desired. The time for rejoicing is not yet."[17]

Discoveries of biologic injury through severe exposures to irradiation prompted a realignment of perspectives on radiotherapy after 1925. A multitude of disorders—jaw necrosis (14, 35), aplastic anemia (44, 56), and osteogenic sarcoma (43, 45)—elicited in occupations involving frequent contacts with radium and other radioactive sources, pinpointed gross inadequacies in the control of physical agents as therapeutic tools. The A.S.C.C. acted vigorously to allay public fears of radium poisoning and to renew confidence in its remedial applications.[18] The scientific advisors of the Society urged equally forceful measures to dispel the obscurities surrounding the biologic action of X-rays and radium.[19] A progressive campaign of research in this area appeared improbable without a formidable expenditure of clinical and experimental talent harnessed to a common cause.

Several issues of the A.S.C.C. *Campaign Notes* for 1928 and 1929 applauded a photographic technic, developed by Dr. Ronald G. Canti at the Strangeways Laboratory (Cambridge, England), illustrating the microscopic behavior of normal and neoplastic cells. Radium emanations produced immobilization and mitotic arrest in cell suspensions of fowl embryo periosteum (fibroblast) and Jensen rat sarcoma. "It would appear," Canti concluded, "that the hypothesis of the selective action [of irradiation] on the cells of a malignant tumor, has been again substantiated by this method of direct observation."[20] In 1930 Dr. Ludvig Hektoen plotted three satellite issues in the orbit of the "selective action" concept as follows: How does radiation work? Why are not the cells of all cancers susceptible to radiation? Can insusceptible cancer cells be rendered radiosensitive (30)?[21]

World-wide inquiries into the first of these three crucial problems centered within such laboratories as the Institute for Cancer Research (Columbia University), at which there was established, by 1930, an intensive program of radiobiology, including "the study of the lethal dose of radium for animal cancer cells as compared to normal cells, both on inoculated tumors and on healthy cells growing in culture, as well as the

effect of Roentgen rays."[22] The numerous contributions of the Columbia group laid important groundwork on the knowledge of the biophysical action of ionizing radiations, especially lethal dose and wave length relationships, of which the Drosophilia egg experiments of Packard are classic examples (52).

Other contemporary trends in cancer research marked equally significant advances on the questions of tumor tissue sensitivity and resistance to penetrating radiations. In 1933 the A.S.C.C. commissioned an extensive survey of this topic, prepared as the first of its clinical monograph series[23] and published simultaneously in the *Archives of Surgery* (69) by Dr. Fred Stewart of the New York Memorial Hospital. This report cited the impact of scientific advancements upon the evolution of attitudes in radiology over a 25-year span: "if current ideas of radiosensitivity were derived wholly from observations made in the days when the low voltage X-rays represented the entire therapeutic armamentarium, then sensitive tumors would be rare and the field of radiology limited."[24]

The Stewart Report affirmed that the criteria of radiosensitivity and radioresistance implied no absolute significance in clinical decisions regarding the behavior of a given tumor type. However, the following conclusions were generally applicable: (*a*) certain tumors, such as melanomas and neurogenic types, appeared to possess inherent properties of radioresistance; (*b*) the capacity for radiosensitivity was enhanced in tumor cells demonstrating highly undifferentiated (embryonal) and anaplastic characteristics; (*c*) radiosensitivity depended upon such variables as the nature of the tumor bed, desmoplastic reaction, metastatic involvement, and age and physical vigor of the patient. Myoma uteri and carcinoma of the breast, ovary, and thyroid gave particularly unusual responses to radiation, a result suggesting the activation of "unknown physiologic mechanisms." Radiation effects evidently evoked an interplay of metabolic reactions between tumor and host tissues, the precise sequences of which were as yet obscure.

The composite view of the cancer radiotherapist that came into vogue by 1932 presented a mosaic of basic and applied specialities tempered by the arduous exercise of practical performance. Only an integrated perspective would suffice in any attempt at the method. In the opinion of the Memorial Hospital radiologist, Dr. Ralph Herendeen, "the success or failure of deep Roentgen-ray therapy in each case should be ascribed not so much to the specific action of the rays as to the judgement exercised by the radiologist in selection of the dose and the method of administering it. It is obvious that this judgement results from the knowledge possessed concerning the disease in each patient and the effect of certain doses on such processes, which is obtained largely by experience. . .(32)."[25]

By 1930 clinical attitudes began to encompass a well-structured philosophy of teamwork with respect to the management of cancer. This development succeeded therapeutic innovations exacting a number of specific skills. For example, the expression of tumor vulnerability implied in the principle of radiosensitivity presupposed the applications of separate verdicts; those of the pathologist, the internist, and the radiologist, among others (21).[26] An evaluation of radiotherapy cited in 1932 by Dr. Stanford Cade, of the British Empire Cancer Campaign, gave a firm testimonial to the indisputable value of this technic, "as used by experts in institutions where teamwork is understood and practiced, X-rays and radium have today no rivals in the treatment of malignant disease (11)."[27] The sound footing given to radiation therapy, and particularly within the contexts of team effort, is an achievement of unparalleled significance in the prewar progress of clinical oncology.[28]

Chemical Therapy. The practices of the healing arts from the earliest times have advanced untold prescriptions for the treatment of neoplastic disorders by esoteric means, usually through applications of ointments, pastes, poultices, and plasters. The cancer quack has arisen in every society to advertise his "infallible" nostrum, whether a compound of animal, vegetable, or mineral matter. Before the era of legal prohibitions against fraudulent and injurious patent medicines, and at a time when the uses of surgical antisepsis and anesthesia were still in their infancy, the traffic in alleged cancer cures constituted an unconscionable abuse of the public trust.

The alarming extent of this fraudulent trade in patent medicines was cited by the American Medical Association (A.M.A.) through an exposé, issued in 1914, of 8 "cancer cures" distributors proscribed by the U. S. Post Office.[29] Two categories of commonly advertised quack preparations were in evidence:

> "First, those that consist of mildly tonic drugs to be taken internally in conjunction with weak antiseptic washes to be applied externally; and, second, those in which a "paste" or "poultice" containing some strong caustic, is applied to the ulcerating surface. The "cures" belonging to the first class are absolutely worthless, and, while not in themselves dangerous, are vicious in that the patient is likely to rely on a valueless remedy until the cancer has reached a point where no treatment will avail. The caustic pastes, on the other hand, are sometimes used by reputable physicians in carefully selected cases of superficial (skin) cancer. Even in such cases and under the daily personal supervision of the physician the escharotic (caustic) treatment is uncertain and unreliable."[30]

By 1921 the A.S.C.C. formally endorsed the A.M.A. inquiry by enjoining the use of internal medicines, ointments, pastes, and superficial cauteries for the treatment of cancer.[31] A substantial statement on proprietary cures was entered in the *Campaign Notes* for 1924, in which the Society denounced newer cancer frauds such as alleged "immunizing" horse serum extracts. The precaution against the employment of caustics for superficial cancers was reiterated in view of their uncertain effects and potentially damaging sequelae.[32] At the same time the A.S.C.C. offered its support to the continuing A.M.A. investigations on proprietary cures. (By 1938, 40 such operatives under Federal indictment for unlawful flight to avoid prosecution were exposed with A.M.A. assistance.[33])

Charlatans engaged in these vicious practices, although led by a sanguine disregard of scientific principles, often boast of new findings on cancer. These claims obscure open and earnest explorations of chemical deterrents to neoplastic diseases. Such were the circumstances surrounding the controversial lead treatment of cancer reported by Dr. William Blair Bell and his surgical associates at the University of Liverpool in 1925 and 1926 (6, 9).[34] The Blair Bell method rested upon two relatively secure ideas: first, that cancer reproduced atavistic changes such that neoplastic tissues, reverted to ancestral cho-

rionic (undifferentiated) epithelium, failed to elicit the type or degree of repressive mechanisms underlying somatic cell regulation; secondly, that placental and neonatal tissues were particularly susceptible to the damaging effects of lead. These conclusions gave substance to the argument that the specific character of cancer growth was as sensitive as embryonic tissues to the action of lead and its complexes. The course of the experimental and clinical demonstrations of this principle by the Liverpool group discloses a significant chapter on the evolution of modern cancer chemotherapy. By 1928, the explicit theme of the investigations on the curative effect of lead was phased by Blair Bell: "Failing to discover the biological—that is, natural biochemical—regulators of differentiation, we must seek some chemical substance that will arrest growth as such and endeavor to discover one that has also an inhibitory action on the essential functions of the cancer cell, or a selective affinity for some part of its chemical constitution, and some influence on its physiochemical state (7, 8)."

Although the lead technic failed to achieve these expectations, it received a deliberate hearing under the vigorous scrutiny of expert witnesses. A 1926 report to the A.S.C.C. listed Francis Carter Wood's impressions of the lead treatment ascertained through a personal visit to the Liverpool laboratories.[35] Wood found that intravenous injections of colloidal lead or newly devised lead preparations (e.g., lead selenide) produced some improvement in advanced cancer patients. Toxic reactions were often pronounced, and the dose administrations required narrow determination. Administrations of other metals appeared to be ineffective. He applauded the merits of this contribution, but he was unable to endorse its claims as a legitimate competitor of surgery and radiotherapy.

A comprehensive review of the lead question was carried in the *Campaign Notes* for 1929.[36] The cumulative results of 5 years work permitted no more than an attitude of reserve toward lead therapy, and its use was recommended only to those widely experienced in treating cancer and possessing a full knowledge of the potentialities of radiation therapy. In this respect, the experimental findings of Wood (78) and Mottram (49), and the clinical studies of Ullmann (74), Soiland (68), and Knox (38), indicated that a course of therapy combining lead and X-radiation, originally suggested by Blair Bell, was more effective than the separate application of either agent. A collateral relationship between lead sensitivity and radiosensitivity also found support in these studies.

An A.S.C.C. commentary of 1930 noted the emphasis of various European studies upon trypan blue and isamine blue in a "quest for a vital dye to serve as a chemotherapeutic agent."[37] Newly reported irregularities of cancer cell respiration also prompted investigations of metabolic inhibitors, specifically, the incorporation of an oxygen-deficient atmosphere to suppress aerobic glycolysis, pursued by the Warburg group at Berlin. A resumé of research on metallotherapy and biochemical routes to the treatment of cancer (29),[38] reported to the A.S.C.C. in 1932 (11),[27] tendered a catalog of negative experiences—with the exception of certain favorable indications for lead selenide applications. Adrenalin, pituitrin, theelin (estrogen), and parathyroid extract were found to be ineffective against cancer, despite various claims for their cancerocidal effects. A dilemma in these arguments apparently proceeded from a confusion of hormonal effects in normal and diseased states, an objection denominated in the closing statement of the review, "No doubt some have growth restraining properties, but it is unfortunate that 'growth' and 'tumor' formation' should be considered synonymous (11, p. 751)."

Cancer cell conversion and its reversal through chemical suppression became a primary focus of research for U. S. Public Health Service scientists (e.g., calcium inhibition of tumor growth rates by M. J. Shear in 1933).[39] These studies suggested the need for more intrinsic analyses of chemical alterations upon tumor induction; they were first outlined in A.S.C.C. prints by the U. S. Public Health Service spokesman Carl Voegtlin (75)[40] and the Lankenau Hospital (Philadelphia) cancer investigator Stanley Reimann[41] as promising features of contemporary research bordering upon cancer control.

Classic experiments reported in 1932 by Antoine Lacassagne (39) aroused new controversy regarding the role of hormones in tumorigenesis. Lacassagne demonstrated the production of mammary tumors in male mice through the administration of repeated doses of estrogenic hormones, a result that directly confirmed earlier studies such as the pioneer ovariectomy experiments of Leo Loeb in 1919 (42). These and other findings implicated hormones with recently opened topics of experimental carcinogenesis, specifically, the discovery of chemically pure carcinogenic hydrocarbons. Although the full implications of this issue—the question of "endogenous carcinogenesis"—cannot be discussed here, several repercussions were felt in the A.S.C.C.

Additional evidences of the tumor-promoting effect of hormones, notably reports by Cramer and Horning (19), Collip (46), and Zondek (79) on the experimental production of pituitary tumors following prolonged administrations of estrogens, produced fresh considerations of their therapeutic value. The A.S.C.C. *Bulletin* of April 1936 recapitulated the conclusion of Cramer and Horning: "The discovery that the sphere of action of oestrin preparation extends beyond the generative organs and embraces the whole endocrine apparatus is likely to enhance greatly their therapeutic importance (18, p. 249)."[42] This view was subsequently reaffirmed by A.S.C.C. observers[43] through reference to a *Lancet* editorial (April 1936) (50),[43] in which the studies on estrogen carcinogenesis were credited as an advance toward the solution of tumor causation and a firm contribution to an understanding of the therapeutic possibilities and limitations of estrogen activity.

A significant acknowledgment of hormone research appeared in special features of the A.S.C.C., "Signposts Pointing Toward the Control of Cancer,"[44] originated in 1940. In 1941 Society vice-president-elect Frank Adair cited the relation of sex hormones to cancer of the breast and uterus as one of the newest and most important problems in cancer control. "The very existence of this question," according to Adair, "is a tribute to the great progress made in chemical and biological cancer research in recent years."[45] In confirmation of this appraisal, the Huggins group, at Chicago, the same year produced an observation (36), now regarded as a milestone of modern chemotherapy (70), on the therapeutic effects of castration in patients with advanced cancer. Regression of prostatic carcinoma following administration of the synthetic estrogen, diethylstilbestrol, was simulataneously reported by

these workers.

The advent of chemotherapy, the newest clinical front against cancer, properly falls within the 1940 period; the various attempts at chemical therapy of the preceding two decades served as prologue to this advance. However, confidence in this approach became increasingly evident in the labors of experimental pharmacology and biochemistry after 1930. With the exception of the Blair Bell episode, the main efforts lay within the nonclinical sphere although the value of exceptional contributions for the relief of human cancer was recognized, if not in actuality then as a potential outcome of laboratory projects. Early enthusiasm for the possibilities of hormone therapy is a case in point although its progress, in common with the evolution of radiation therapy, was ostensibly contradicted by the supervention of carcinogenic effects. The proposition that cancer therapy through physical or chemical agents and the phenomenon of carcinogenesis presented the obverse and reverse respectively of the same coin emerged as the central paradox of cancer research in the 1930's.

This dilemma created a research reemphasis to explore the elemental events in tumor growth and to reissue improved concepts of etiology. Such efforts brought increasing numbers of workers into basic research, a development of consequence for A.S.C.C. policy adjustments after 1940.

Towards the Support of Fundamental Research

Initial Attitudes. The first objectives of the A.S.C.C., incorporated into the plan of 1913, specifically precluded a research campaign. A disinclination toward research was generally felt among members of the governing council, who, for the most part, felt unequal to the task.[46] This attitude was reflected in an early number of the *Campaign Notes*, by way of comment on the armamentarium necessary to a medical confrontation with cancer: "The practicing physician does not need to be conversant with all the details of cancer research, constructive and interesting as these are. He does need to recognize the importance of early diagnosis and adequate treatment if the death rate from cancer is to be reduced."[47] However, the Society remained attuned to the latest laboratory developments and significant trends were occasionally reported by its scientific contingent. Thus, in 1918, Dr. J. Collins Warren, chairman of the Harvard University Cancer Commission and an A.S.C.C. director, announced[48] the abandonment by Cancer Commission investigators of research on the parasite (microbic origin) issue (71) and the commencement of fundamental studies on the applications of radium and light rays to living matter.

In 1923 the value of animal experimentation received A.S.C.C. review in an editorial by William H. Woglom (Institute for Cancer Research, Columbia University) stressing the need for laboratory projects to settle problems inherent in X-ray and radium therapy.[49] The same year the Society praised the criticism of Dr. Charles P. Childe, president of the British Medical Association, leveled against both medical men and laymen for the neglect of cancer investigation,

> "In an age which has yielded the secrets of so many diseases it's a point of honour with the medical profession not to rest content till this pressing problem has been solved. With the public it is not only an obligation but, from the point of view of their own interest and safety, a vital necessity to furnish the financial means of solution and to see that research is not crippled or stinted by any niggardly parsimony (16, p. 137)."[50]

This appeal struck a respondent chord within the newly created British Empire Cancer Campaign (1923), which pledged itself to raise a fund of one million pounds for cancer research.[51]

A Society notice of 1924,[52] emphasizing the "outlawry" of cancer, pinpointed its source in the well-springs of life, an interpretation which diminished hope of understanding the disease until the processes regulating the "orderly government of cells" were known. Nevertheless, A.S.C.C. Managing Director George Soper, in an address on the Possibility of Applying the Facts and Opinions Resulting from Experiments to the Practical Work of Cancer Control,[53] delivered to the American College of Surgeons, decried hasty acceptance of unconfirmed investigations on the presumption that existing knowledge offered greater prospects for the diagnosis and treatment of cancer than any discovery likely to be made in the foreseeable future.

This prophecy nearly collapsed in July, 1925, with news releases that the cause of cancer had been established by two scientists, William E. Gye and J. E. Bernard, of the British Medical Research Council. The *Lancet* papers (5, 28) issued by Gye and Bernard confirmed and expanded studies, begun in 1909 by Peyton Rous (Rockefeller Institute), on the transmissible agent of fowl sarcoma (60, 61). The British workers demonstrated the presence of viral infectivity, in conjunction with a chemical activator, through biochemical and ultramicroscopic analyses of the avian neoplasm described by Rous. Filtrate experiments in which the "chemical activator" was allegedly isolated, failed to establish similar properties in mouse-to-mouse and rat-to-rat transfers; e.g., only unfiltered cultures were effective in transmission experiments involving spindle-celled sarcomas of mouse strain 37/S. Attempts at transfers among dissimilar species, for example, Jensen rat sarcoma and human adenocarcinoma filtrate inoculations into mice, to assess the infective stimulus of the so-called "Rous accessory factor," also yielded specious results. However, several conclusions were admissible as preliminary hypotheses: (*a*) that a viral etiology in cancer was entirely consistent with experimental findings; (*b*) that an adjuvant was necessary for viral activation *in vitro*; and (*c*) that viral propagation occurred within the internal boundaries of the cell (28, p. 117).

These reports provoked considerable discussion among cancer control experts. The A.S.C.C. pronounced them a "subject of first-class scientific and practical importance."[54] Their appearance created a sensational impact on public opinion across two continents. The pioneer studies of Rous were again brought into prominence. A.S.C.C. representatives estimated, "the general assumption of the scientific world has been. . .that someone would be able to capture the organism, especially since the methods of culture have been greatly improved of late, largely through the efforts of Dr. Hideyo Noguchi, of the Rockefeller, and American Bacteriologists."[55] The conclusion ensued that irrefutable confirmation of Gye's observations in every instance of cancer would constitute a triumph for the relatively new field of cancer prevention and inspire a reassessment of

cancer epidemiology throughout the domain of public health.

The enthusiasm for research, especially through the notoriety attached to the investigations of Gye and Blair Bell, aroused a wave of concern among the professional advisors of the A.S.C.C. Toward the end of 1925, Society director Joseph Colt Bloodgood, the Johns Hopkins surgeon, called for an authoritative consensus on the recorded experiences of clinical and experimental oncology.[56] This argument was reinforced by the Soper Reports of 1925[57], in which the A.S.C.C. was apprised of the rapidly advancing developments within European institutions devoted to cancer research and control. The occasion for a convocation of international cancer experts now appeared auspicious, arrangements for which were announced by the Society in November 1925.[58] This, the first Cancer Congress since 1913, was assembled at Lake Mohonk, New York, September 20 to 24, 1926.

The Mohonk Conference. Plans for the International Cancer Symposium at Lake Mohonk originated in 1924, at which time a convention of American cancer specialists was arranged under Society auspices in New York City. Ensuing discussions reinforced existing opinions concerning the faultiness of communications on cancer trends, especially among workers separated by national boundaries. At this juncture militants of the cancer control movement in the U. S., Soper, Bloodgood, Wood, and Ewing, among others, submitted a roster of international authorities (Table 2) to discuss progress in oncology during the first quarter of the twentieth century.[59]

The scope of the Symposium (12) extended to the intellectual limits of the cancer problem: namely, prevention and cure; prevalence of the disease; the value of radium, X-rays, and surgery as therapeutic measures; histologic and serologic methods of diagnosis; and the administration of cancer detection programs. Twenty-seven papers were presented at the executive sessions, among which 15 dealt with the general topic of organized campaigns against cancer, 8 with research, and 4 with treatment.

The tone of the Symposium was set by Sir John Bland-Sutton in an introductory address, The Value of Co-ordinated Efforts Among Surgeons, Pathologists and Others in the Control of Cancer (12, pp. 17–21), which underscored the philosophy indispensible to the prosecution of modern oncology. An updated approach to the study of cancer required a phalanx of

Table 2

Name	Speciality	Location
Prof. Raffaele Bastinanelli	Surgery	University of Rome, Italy
Prof. Leon Berard	Surgery	University of Lyons, France
Dr. Robert Bierich	Experimental oncology	University of Hamburg, Germany
Sir John Bland-Sutton, Bt.	Surgery	President, Royal College of Surgeons, England
Prof. Ferdinand Blumenthal	Internal medicine	Director, Cancer Institute at Berlin, Germany
Prof. H. T. Deelman	Pathology	Director, Institute of Pathology and Pathologic Anatomy, University of Groningen, Holland
Prof. William De Vries	Pathologic anatomy	President, Netherlands Cancer Institute, University of Amsterdam, Holland
Prof. Charles DuBois	Dermatology	Director, Dermatological Clinic University of Geneva, Switzerland
Prof. Johannes Fibiger[a]	Pathologic anatomy	Rector, University of Copenhagen and Faculty of Medicine at Copenhagen, Denmark
Mr. W. Sampson Handley	Surgery	Middlesex Hospital, London, England
Prof. Henri Hartmann	Surgery	University of Paris, France
Dr. Archibald Leitch	Experimental oncology	Director, Cancer Hospital Research Institute, London, England
Prof. J. Maisin	Pathology	Director, Cancer Institute of the University of Louvain, Belgium
Prof. T. Marie	Medicine	Medical College of the University of Toulouse, France
Dr. James A. Murray	Experimental oncology	Director, Imperial Cancer Research Fund, London, England
Dr. Claude Regaud	Radiophysiology	Director, Pasteur Laboratory of the Radium Institute, Paris, France
Dr. Albert Reverdin	Medicine	General Secretary, Anti-Cancer Center of Geneva, Switzerland
Prof. Gustave Roussy	Medicine	Director, Institute for Research and Treatment of Cancer at Villejuif, Paris, France

Foreign participants and correspondents at the International Cancer Symposium, Lake Mohonk, N. Y., September 20–24, 1926. From *Cancer Control:* Report of an International Symposium Held Under the Auspices of the American Society for the Control of Cancer, p. vii, Surgical Publishing Co.: Chicago, Ill., 1927.

[a]Recipient of Nobel Prize (1926) for cancer research.

disciplines—biology, bacteriology, biochemistry, and physics—to ensure enlightenment and guidance in the pursuit of its clinical management. A firm adherence to this objective dictated the alliance of clinical observation and research such that the hospital and laboratory would exist as a unit dedicated to a single purpose. Adherence to a common cause also required new ties of coordination among cancer research societies at the national and international levels. Lastly,

> "The independent worker must not be forgotten. Many have felt the lack of a laboratory in their early days. In the pathologic laboratory at the Middlesex Hospital, rooms are set apart and facilities given to anyone who can show good cause for his ideas and methods. He is then allowed to work on his own lines. The cause or causes of cancer may be discovered by an independent quester unfettered by routine and prompted by originality. He should be adequately rewarded and allowed to pursue his quest unhampered by domestic needs (12, p. 21)."

This theme was taken up by Professor T. Marie in a paper, The Need of Special Institutions for Investigation and Treatment of Cancer as Compared with Other Methods of Dealing with Cancer Patients (12, pp. 47–55). With a view toward French experiences, Professor Marie cited a number of precedents illustrating the effectiveness of liaisons among administration, investigation, treatment, and public education, incorporated into special institutions for anticancer activities. Affirmations of equally positive results from coordinative efforts within institutionalized contexts were projected by Belgian (Professor J. Maisin, Louvain) and German (Professor Ferdinand Blumenthal, Berlin) participants.

An alignment of essential perspectives in experimental oncology was given in a presentation, How We Should Regard the New Theories of the Origin of Cancer (12, pp. 185–194), by Professor Gustav Roussey. The first quarter of the twentieth century had been especially fruitful in theoretical innovations on the etiology of cancer, a consequence of new insights into cellular life made possible by the progress of biochemistry, physical chemistry, and cytobiology. Several theories were entirely new; others were resurrected hypotheses or of more ancient vintage. In general, the hypothetic endowment of oncology was discernible as two schools of thought: first, that which attributed the origins of cancer to intrinsic causes of cellular evolution; secondly, that which referred the basis of the neoplastic process to an exogenous, living, specific agent.[60]

The infection theory, assisted by Rous and the work of Smith on crown-gall formation in 1916 (67), enjoyed a particular longevity. Adherents of this philosophy had occasionally argued, but without appreciable success, for a visible, pathogenic cancer agent. A greater measure of conviction came from recent pronouncements on an "ultra virus" with cytotropic properties. The virus alone, purified of all accessory substances, appeared incapable of tumor induction without the coactivation of a species-specific chemical agency.

Advocates of the "cellular theories" promoted their arguments through the modern applications of tissue culture and biochemistry. One school denied the intrinsic relevance of a cytotropic virus; emphasis, rather, was laid upon senescent tumor cells from which liberated substances—the "trephones" of Carrel—triggered multiplication of adjacent cells. The alleged prerequisite for indefinitely propagable virus was a matter of indifference to these cellular processes since exogenous chemicals were known to be equally effective in tumor production, as in the case of chicken sarcomas. Conversely, three factors were critical; (*a*) strength of the chemical stimulator; (*b*) cells in a given condition of vitality; and (*c*) susceptibility of the organism.

The biochemistry wing of the cellular theorists viewed the cancer process as a category of disordered metabolism, a situation reproducing losses of normal synchronization between respiration and glycolysis [the Warburg Postulate (46, 76)]. Evidence of a shift toward aerobic glycolysis in cancer suggested a special metabolic adaptation of malignant tissue,[61] thus exposing an organic (respiratory) defect of etiologic significance.

All of these theories, in the summation of Roussey, lacked ineluctable demonstrations of root causes. Although the balance of scientific opinion tilted toward the idea of an intrinsic disturbance of cell function, the *primum movens* in cancer remained unknown:

> "Cancer. . .appears to result from the combined action of known and unknown causes, which produce in the cell disturbances of growth or of function resulting in a quasi-definitive fertility. This fertility, which is transmitted to daughter cells, constitutes the essential characteristic of cancer cells; it is found in no other morbid process. It matters little whether the occasional or determining agent disappears, be it chemical, physical, or living; the new characteristics of the cancer cell will continue to follow the established rhythm (12, p. 192)."

Cancer Institutes. The Cancer Institute approximates the Baconian ideal—a facility harboring a variety of labors directed toward a single scientific end. A blueprint for the modern cancer institute only appears as late as 1902 in the *Draft Scheme* proposed by E. F. Bashford for the Imperial Cancer Research Fund (72).[4] The development of a comparable program in the United States awaited the opportunities for a proliferation of service (cancer detection, prevention, treatment, and investigation) slowly annexed to large eastern institutions, such as the New York Memorial Hospital, before the first World War. This plan gradually spread to other areas of the U. S. through local interests in cancer control. Thus, in 1924, a $250,000 endowment for a cancer institute at Minneapolis was provided by Mrs. George C. Christian, a patron of the A.S.C.C. Campaign Committee in the Northwest under the chairmanship of the University of Minnesota surgeon, Dr. Arthur C. Strachauer.[62] The institute, opened in 1925 as a unit adjoining the University of Minnesota Hospital, established a pattern of treatment, education, and research[63] that in more recent years has been adopted at other American centers of higher learning (Wisconsin, Missouri, Nebraska, Texas, and Florida). As in the case of Minnesota, these university-related institutes are outgrowths of progressive traditions in cancer control, rooted in the various states by vigorous and farsighted A.S.C.C. Campaign Committee chairmen: e.g., Wisconsin, Dr. William D. Stovall; Missouri, Dr. Ellis Fischel.

Experimental research was not originally envisioned among the multiple objectives of the cancer institute, greater impor-

tance having been first attached to clinical aspects, especially to the examinations of X-ray, radium, and drug effects. The numerous obstacles to cancer research, especially those phases of investigation only distantly related to the human problem, were written into the A.S.C.C. record for 1925 by Francis Carter Wood:

> "Cancer research is the most fatiguing sort of work because it does not offer the brilliant results which can be obtained with a minimum of labor and a maximum of reputation in other scientific fields. Only those enter it whose whole-hearted interest lies in the solution of this problem. Those working in the field are poorly paid; their laboratories are all insufficiently endowed; the work is slow and expensive and too often produces no new facts to pay for months or years of hard work.[54]

The delegates to the International Cancer Symposium of 1926 were given an illuminating discussion of The Practical Value of Researches into the Causes of Cancer (12, pp. 208–216) by Britain's Dr. Archibald Leitch, who focused the human problem in the seemingly remote arena of experimental activities. The cancer-producing responses examined in laboratory animals and comparable carcinogenic effects detected in human subjects afforded an indispensable yardstick for analogy.[64] In each case, tumor production followed a slow course, suggesting a lengthy period of initiation. Cancer erupted as a terminal reaction, following a lengthy procession of preparatory events. Although carcinogenic agents acted in small quantities, their damaging effects were shown in relatively few individuals repeatedly exposed or given repeated applications of these agents. Moreover, experimentation failed to reveal any general or inherent susceptibility to carcinogenic influences. The diversification of studies on cancer causation under experimental conditions thus eminently subserved a practical purpose, according to Leitch: "When we know the causes of cancers we can do a great deal to prevent their occurrence, and that, I take it, is the ultimate aim of every experimenter (12, p. 215)."

The Mohonk Conference gave a resourceful airing to all phases of contemporary cancer research, fundamental and applied. The value of such investigations could no longer be questioned. Moreover, a core of research activities was essential to the furtherance of the cancer control movement and these investigations were within the province of collective responsibility.[65] As noted in an A.S.C.C. postscript to these proceedings,[66] the international consensus rested upon the conviction that progress in cancer education and the advancement of cancer research must follow interdependent lines [see *Resolutions* 11, sect. 15 (12, p. 329)].

Within a year of the International Symposium the A.S.C.C. impaneled a committee consisting of James Ewing, Robert B. Greenough, and John C. A. Gerster, to examine the status of medical service available to cancer patients in the United States. A two-year study produced findings that the future development of cancer service resources depended upon three essential requirements: concentration, organization, and specialization. These recommendations presumed revisions in the organization of service, such that the establishment of strategically located and highly endowed cancer institutes would provide the basis for subsequent planning:

> "These institutes should, as a rule, be under university affiliation. Complete university control has proved undesirable in some instances (12, p. 167)."

The Ewing report cited the necessity for close ties of collaboration between the cancer institute and the agencies of cancer control within its geographic territory; moreover, each institute would form an integral part of coordinated activities within a national network of institutes and cancer hospitals. The work of coordination was recommended to joint A.S.C.C. and A.A.C.R. auspices.

A proposal of October 1929 approved by the American College of Surgeons authorized its Committee on the Treatment of Malignant Diseases to give substantive support to the A.S.C.C. cancer service review. This move was consistent with a College of Surgeons project to design and coordinate high surgical standards in American cancer clinics. The College, committed to this program since 1921, empowered its standing committee on malignant diseases not only to undertake a full survey on cancer service, but, unlike the Ewing Commission, to implement these findings with respect to the rehabilitation of cancer service on a nationwide basis (27, 41, 53).[67]

An interim report on the disposition of resources at cancer institutes, research laboratories, hospitals, and clinics within general hospitals was released by this committee of 14 surgeons under the chairmanship of Dr. Greenough in 1930 (51)[68]. The Greenough report reaffirmed the ultimate value of experimentation for the advancement of cancer control; however, as long periods of testing were usually required to assess the clinical potentials of an experimental result, the cancer laboratory afforded only an indirect route toward improved treatment. Cancer institutes, "equipped with hospitals and laboratories especially organized and conducted for carrying on research in relation to the nature of cancer and its diagnosis and treatment, as well as for the clinical diagnosis and treatment of actual cancer cases (51, p. 570)," held the greatest promise for assuring immediate progress. In common with the large endowments necessary for the maintenance of cancer laboratories, cancer institutes were limited through their dependence upon sizeable appropriations as were possible only from state or federal sources.

A further view on the question of cancer institutes was added by Ewing in a 1930 address to the Clinical Congress of the American College of Surgeons (20)[69]. Ewing suggested that the future of the cancer control movement lay in the direction of greater and greater specialization. Special institutions were indispensable for enlisting the diversified talent necessary to the burgeoning cancer field. The vital functions of these centers encompassed the well-known trilogy of responsibilities—service, education, and research—each divisible into as many specialities as present and future developments required:

> "This, then, is something of the idea of the cancer institute. I believe there should be 5 or 6 of these . . . of the ten million dollar standard. They should be located in Boston; in New York; in Baltimore; possibly in Washington—if we might hope for such a thing—under the Government; in New Orleans; in San Francisco; and in Chicago (20, p. 524)."

Similar appeals for the formation of cancer institutes continued to be heard through the early 1930's, despite the deterrent to their imminent realization created by the national eco-

nomic crisis.[70] Caught in the grip of a severe depression, the internal organization of cancer research came under sharpened criticism. In 1933 the A.S.C.C. debated the feasibility of an industrial plan for cancer, in which the philosophy of corporate enterprise would be applied to the problem.[71] The A.S.C.C. dismissed this plan on the grounds that cancer research would be stifled in any attempt to regiment its separate disciplines under a monolithic administration. The study of cancer appeared to be best served by the free play of personal expression and innovation. However, the greater degree of freedom required by scientific investigations occasioned an undesirable tendency toward isolation among researchers. This tendency prompted the dissolution of "technical correctness" in their mutual communications.

Therefore, regarding the future course of cancer research, there existed a greater necessity for organization imposed from within than organization superimposed from without. Private and governmental patronage would be rendered to full advantage were it to catalyze the opportunities for discussion among research workers and unbiased benefactors (here the relevant work of the Chemical Foundation is cited[72]):

> "Whimsical support of cancer research and self-centered execution of that type of experimentation have abounded in the past. They still exist. The best chance of eliminating them is the education of actual or would be donors and by the liberalization of investigators. Such a result may be impossible. Without efforts at exchange of ideas it certainly will be. With such efforts continued and expanded a changed attitude may be produced. Granted that it can be, a very great service to humanity will have been rendered by those responsible for the new order."[73]

The A.S.C.C. and the N.C.I. In 1925 Managing Director Soper apprised the A.S.C.C. directors of the firm resolve among European authorities to create adequate endowments for cancer research.[74] This commitment was especially evident in the British Isles where three forces were in motion to insure a high production of clinical and laboratory investigations. These were the Imperial Cancer Research Fund (I.C.R.F.), the British Medical Research Council (M.R.C.), and the British Empire Cancer Campaign (E.C.C.). The I.C.R.F., senior of the 3 organizations, maintained a well-equipped laboratory (London) and an experimental station (Hampstead) under an endowment of 143,000 pounds. Its official representatives, the Royal Societies of Physicians and Surgeons, provided liaisons with the U. K. government.

As an arm of the Privy Council, the M.R.C. established during the first world war, was an official department of the British government. The resources of the M.R.C. in the amount of 140,000 pounds provided by the Parliament were expended on a great variety of research problems within its own laboratories (for example, at Mill Hill, *cf.* Gey and Bernard), or through grants made available to universities, hospitals, and other institutions.

Conversely, the E.C.C. had as its single aim the sponsorship of scientific investigations and methods of cancer prevention. This agency raised and disbursed funds—26,500 pounds in 1924 and 1925—to worthy applicants. Applicants for research grants were required to pass extensive review, first through a screening by the E.C.C. Preliminary Inquiry Committee composed of 5 scientists and laymen. Acceptable candidates then passed through the more critical apparatus of the Scientific Advisory Council, consisting of 10 experts assigned by the *Royal Society*, the M.R.C., and the E.C.C. A favorable report was referred to the E.C.C. Executive Committee, composed of 20 members, which determined the extent of financial support for the project in question. This elaborate process invoked at its various stages the services of 50 scientists of outstanding merit in the disciplines bordering upon cancer research.

Nothing of a comparable order, with respect to the I.C.R.F., M.R.C., or E.C.C., existed in the United States at this time. An Office of Cancer Investigations, opened within the U. S. Public Health Service in 1922, was permitted only the most conservative powers to explore the problem. The major reserve for cancer studies was vested in a few private or state-affiliated institutes and laboratories. From the point of view of this narrow domestic scene, Francis Carter Wood, in 1927, estimated an annual worldwide expenditure of barely $400,000 for the conduct of cancer education and research.[75]

It is obvious that legislators, captains of industry, and other managers of high finance were readily disposed to lavish rich rewards for a quick solution to the cancer question. Ample evidence of this appears in two incidents of 1926–1927; namely, the announcements of the Saunders Prize[76] and the Neely Bill[77] (U. S. Senate), which proffered awards of $100,000 and five million dollars respectively for a discovery of the cure of cancer. The naivèté of these proposals shortly removed them from the realm of serious consideration. Early in 1928 the Saunders offer was withdrawn following an A.S.C.C. admonition that, "had the experience gained in other competitive efforts of this kind been published, the futility of this method . . . would have been apparent."[78] The Neely Bill was simultaneously shelved, in response to unfavorable publicity which convinced the West Virginia Senator that closer adherence to scientific counsels formed a more judicious basis for cancer control legislation (31, p. 147).[79]

Renewed arguments before the A.S.C.C. by Francis Carter Wood, in 1928, again described the insufficient allocation of funds and personnel for cancer research. This situation prompted an action jointly undertaken by the Society and the A.A.C.R. to prepare "a plain and authoritative statement on the subject . . . and the need of devoting much larger sums of money to this work (73, pp. 144–145)."[80] Two committees were assembled to draft the appropriate measure: the A.A.C.R. appointed Drs. Aldred Scott Warthin (U. of Michigan), Elexious T. Bell (U. of Minnesota), and Otto V. Huffman (New York); the A.S.C.C. appointed Drs. Robert B. Greenough, Francis Carter Wood, and James Ewing. As events moved toward the *Crash of '29*, the expectations of a suitable endowment for cancer research were short-lived.

A significant move toward greater participation by the federal government in the area of cancer research was made at the opening of the 1930's, the period in which a National Health Institute (N.H.I.) was established as part of a reorganized Public Health Service. The N.H.I. was authorized to create fellowships and to allocate donations for special research including cancer (63).[81] Two Public Health Service scientists, Drs. Harold W. Chalkeley and Carl Voegtlin, were assigned to the N.H.I., where, by 1931, studies on the division processes

of cancer cells were in progress.

The philosophy underlying a policy of municipal and state assistance in cancer control gained appreciable momentum in the years immediately preceding the National Cancer Institute Act of 1937. Its proponents—Drs. Burton J. Lee, George T. Pack, and Thomas Parran, among others—advanced the idea that effective action against cancer constituted both a practical and moral obligation on the part of public administrators. This sphere of social responsibility was examined by several local A.S.C.C. committee chairmen in presentations before the Society Directors on March 7, 1936. Cancer, so argued Dr. George C. Wilkins,[82] now occupied the upper hierarchy of diseases affecting the long-range outlook of the American public health movement. Government had the specific mandate of its constituents to carry forward all necessary legislation, including vigorous fiscal measures, to bolster existing avenues of cancer work.

> "When the people of a state, through its legislative representatives, have been convinced of the need for such legislation, certain definite advantages appear at once. In the first place, cancer control has thereby been definitely accepted as part of the State's activities, and, unless proved an inadvisable or unsatisfactory expenditure, will continue to be accepted as a permanent part of the State program. In the second place, the significance of the movement as well as the weight of authority is greater if such activity is an integral part of a State program than when it is under private auspices."[83]

Acting upon its prior recommendation for greater solidarity within the scientific community dedicated to cancer control, the A.S.C.C., in March 1937, instituted a Council to act as a clearing house for information on various aspects of the subject and to initiate a drive toward the integration and coordination of different activities.[84] The A.S.C.C. Cancer Council,[85] pursuing the objectives lately adopted by the Chemical Foundation and the International Cancer Research Foundation, also was empowered to offer interpretations of trends within the various departments of oncology. This concept prescribed a special context for the role of public opinion:

> ". . . The vast increase in the public interest in cancer will be well-served by an unprejudiced national body representative of the major groups in cancer. It should be possible to prevent abuse of public confidence by a sane evaluation of current and future developments in the various phases of the cancer problem. Unwise or premature publicity may be forestalled or its harmful effects minimized. Claims of successful treatments or cures may receive prompt and authentic criticism."[86]

In July 1937 the Society was alerted[87] to the imminent passage of legislation on a national cancer program. The enactment of the National Cancer Institute (N.C.I.) Act was carried before a flood of Congressional support. Three pieces of legislation, introduced between April and June 1937, constitute the foundations of this law. Identical proposals were submitted (April 2) by Senator Homer T. Bone and Congressman Maurey Maverick of Texas on April 29; the following June 24 Congressman John F. Hunter of Ohio introduced a Joint House Resolution which contained nearly the same provisions as the Maverick Bill. The collective proposed legislation was ultimately referred to a joint committee hearing, comprised as a cancer subcommittee of 5 senators and 6 representatives (chaired by Senator Royal S. Copeland, of New York), at which, on July 8, a revised bill was drafted. This bill, adopted by both the Senate and the House, received the Presidential signature on August 5, 1937 (31, pp. 148–149).

The A.S.C.C. applauded the Federal cancer program, conceived in depth and breadth, and especially the "revolutionary" provisions for assistance to private research laboratories and investigators, devised with a view toward eliminating unnecessary duplication and wasted effort. Moreover, the appropriation of appreciable resources to the cancer field would give a crucial trial to the research coordination ideas:

> "An interesting test will be provided to determine whether the attitude of those who object to coordination or those who favor it is more nearly correct. Those cancer research institutions whose heads are opposed to cooperation will of course decline or will fail to apply for government aid. On the other hand, those who believe in cooperation will be given a chance to put their theories to a very practical and important test under auspices which should insure impersonal and fair treatment to all participants."[88]

Financial awards for cancer research under the N.C.I. enactment were subject to the approval of a National Advisory Cancer Council and to the recommendations of the U. S. Public Health Service Surgeon General as well as the Secretary of the Treasury. The federally conducted programs of clinical and laboratory investigations were assigned to the supervision of Carl Voegtlin, Chief of the N.C.I. from 1938 to 1943. Cognizant of the broad perspectives embodied in the Act, the A.S.C.C. moved to arrange liaisons between its Cancer Council and the National Advisory Cancer Council in a cooperative juncture that marks a unique alliance between the government and the voluntary health movement of the United States.[89]

Prewar and Wartime Trends

At the time of its 25th anniversary, in 1938, the A.S.C.C. had advanced beyond its original New York City boundaries to encompass a national scope, largely through the enlistment of 100,000 female activists (Women's Field Army) to the anticancer campaigns of thirty-eight states.[90] The national program was made prominent by a progressive, centralized leadership developed at the end of the 1920's through a reorganization of the Society's governing board and the appointment of Dr. Clarence C. Little, educator, public health exponent, and research worker, as second managing director (Addendum B). A mark of congressional recognition for A.S.C.C. efforts was bestowed, on March 28, 1938, through the passage of *Public Resolution No. 82*, authorizing U. S. President Roosevelt to issue annually a proclamation setting apart the month of April each year as *Cancer Control Month.*[91]

During 1938 the Society witnessed the unlimbering of the Federal cancer machinery in the form of extramural research project support. By July the Advisory Cancer Council considered 77 applications, of which 16 were approved at a cost of $125,000 (approximately 30% of the total N.C.I. budget for 1938–1939).[92] As a result of this initial experience the A.S.C.C. noted[93] the important tendency to centralize finan-

cial resources available for cancer research, rather than to spread them over a large number of grants-in-aid. The greater part of federally appropriated funds for cancer research (nearly 70% of the total N.C.I. budget) had been allocated, in 1938–1939, to intramural programs or to closely related projects. Nevertheless, this sizable investment, in the Society's view, did not override the necessity for privately endowed research in the purely scientific phases of cancer, a need estimated in amounts of approximately $100,000 annually, for an indefinite period and without restriction, expended as subsidies to eight or ten existing laboratories:

"The main thing is for the general public to realize that cancer research is still handicapped in many places—not through lack of organization—but through the absence of adequate financial support."[94]

This pointed dissatisfaction with the inadequacy of financial assistance for cancer research reflected equally upon defects within the existing framework of scientific support. Private agencies had largely committed their resources to project research in the form of grants-in-aid. The first National Advisory Cancer Council, unequipped with guidelines on similar experiences within government agencies, closely examined the pros and cons of the grants-in-aid system. Opposition was voiced at the first council meeting (November 9, 1937) in a critical adjoinder to these discussions by Ewing: "I believe the whole policy of grants-in-aid is unsound. I wish to report after personally conversing with four or five of the best known men in charge of cancer research institutions in the world that they regard it as the greatest handicap to their organization's development (31, p. 153)." At the next meeting of the Council, on November 27, 1937, Ewing issued a Critique of the System of Grants-in-Aid of Scientific Research (Addendum C), which exists as a significant precedent for more recent trends in the financial support of cancer research.

The commencement of World War II, in September 1939, implanted new fears in the minds of American cancer control authorities concerning the future prospects of their efforts in a country unsettled by an unfolding global conflict. To allay these fears Dr. Little warned against interruption of continuing commitments to the cancer campaign: "It is probable that many worthy appeals will be made in the name of the victims of the war abroad. Americans will of course respond, but the first duty remains the continuance and expansion of worthy movements for the protection of the health and well-being of our own citizens."[95] This plea, and other messages of reassurance against "European disaster, native economic unrest, and the jitters which always accompany the progress of a presidential election year"[96] assisted an even flow of activities beyond 1940 and throughout the period of the U. S. war effort.

By 1940 the A.S.C.C. had established a solid collaboration with the National Association of Science Writers (N.A.S.W.), which proved a powerful ally in producing an articulate synthesis of newsworthy propaganda. The high-caliber talent enlisted to the cancer coverage front, including Howard Blakeslee (Associated Press), William Lawrence and Waldemar Kaempffert (New York Times), Gobind Lal (New York American and Hearst syndicate), John O'Neill (New York Herald Tribune), and Jane Stafford (Science Service), acted as effective intermediates between the spheres of scientific and public relations. Moreover, the science writers contrived to give added projection to their assignments, the products of which served to enliven public interest in the progress of cancer research.

A combined meeting of N.A.S.W. and A.S.C.C. representatives, held in March 1941, examined the correlations between industrial research and cancer research, a subject that inspired A.S.C.C. publicists (e.g., Clifton R. Read) to undertake explorations of the industrial establishment in pure and applied science. An interim report, Industrial Research vs. Cancer Research,[97] issued the same year, disclosed vast differences between annual expenditures for industrial investigations and the amounts expended each year for cancer research (for 1938, $150,000,000 to $200,000,000, in the case of the former, against $700,000 to $800,000, in the case of the latter). It would appear that the tremendous output of industrial research could be partly diverted to cancer research were the managers of industry to consider the strategic value of consumer longevity:

"It would be an interesting development if large industries could become interested in the problem of *increasing* the life expectancy of man in order to thereby prolong man's *purchasing power.* This would also result in the preservation of valuable knowledge and skill among both executive and industrial workers by reducing the cancer death rate in this important group."[98]

This novel proposal, advanced by the Society's newly appointed medical director, Dr. Samuel Binkley, referred, in principle, to a dynamic concentration of efforts in the area of cancer research. The plan seeded a new idea in the soil of cancer control, such that the complex organization of industrial teamwork would be harnessed to the organization of medical resources:

"Industrial corporations could help by providing substantial grants-in-aid for cancer research in allied fields in which they are interested. For example, the chemical industry has facilities at its disposal which could provide consultation services and collaboration in the preparation of complex chemical compounds. Of course, a certain degree of consultation and cooperation exists today, but the real possibilities for correlating the activities of industrial research with medical research are untouched."[99]

The war intensified the campaign against cancer. New slogans, *defense mobilization* and *home front preparedness*, were absorbed into the spirit of the movement. A new emphasis upon national defense aroused a significant popular reaction over the health crisis occasioned by the national emergency. In 1917 a similar alarm had been sounded regarding the dangers of epidemic diseases, among which the control of influenza presented the greatest difficulties. In 1941 the war draft raised the question of nutritional deficiency as a suspect circumstance in medical disqualifications for military service. The first line of American defense, cancer experts argued, depended upon a sound knowledge of nutrition, and this knowledge also formed a logical foundation in the practices of cancer control.[100]

Despite the absence of apparent changes in program objectives, the 1941–1943 period introduced an era of reappraisal within the A.S.C.C. On the one hand, there arose the necessity to redesign features of the educational policies to operate ef-

fectively within the framework of a wartime economy.[101] These measures promoted the idea of an alliance of voluntary health agencies, linking the anticancer movement to the pioneer National Tuberculosis Association and the newer heart and circulatory disease association.[102] On the other hand, the war fostered a philosophy of progress in all matters relating to the Commonwealth. Cancer research was viewed by its proponents as a cause no less worthy of assistance than the massive confrontation on political and military grounds with alien ideologies, a situation in which large expenditures of manpower and matériel were readily disposed in defense of great moral issues. Cancer, an equally formidable deterrent to the national security, therefore, required measures as vigorous as those applied to the theaters of war:

"All over the country the most active men in cancer research are alive and alert to the opportunities which lie before them. What they need is an aroused interest of men and women. . . who will support them in their active combat on the battlefront in the same way that every American. . . is today supporting and is prepared toward National Defense. These are times when life moves rapidly and challenges qualities in all of us which have been dormant since the days when our pioneer ancestors faced and overcame similar opposition in their environment. It seems certain that modern Americans will prove worthy of their heritage and in spite of their many duties and obligations will assume the additional task which the challenge of cancer research presents."[103]

The Society's *Bulletin* for 1943 featured greatly extended coverage of perspectives in cancer research, composed by Society President Hermann C. Pitts,[104] Managing Director Little,[105] Board Directors J. Shelton Horsley[106] and Cornelius P. Rhoads,[107] and other officers of the A.S.C.C. These articles suggested a more extensive preoccupation with cancer research than was envisioned by the educational policy makers of 1913. By 1940 the education of the laity had outstripped the expectations of the Society's founders. This result proceeded from the successes achieved in the local cancer committee organization drives and the enlistment of a Woman's Field Army. The Society no longer felt the pressure of severe financial limitations, a condition eased in the previous decade through the munificence of the Lasker family[108] and other influential patrons.

A statement of the Society's acute concern over the sporadic progress of cancer research was issued by Managing Director Little in a paper read before the American Public Health Association in October 1943.[109] Little described the uneven rhythm of social responses to the recurrent threat of various diseases. The "aroused" attitude of the public toward the conquest of poliomyelitis stood in direct contrast to civic inaction regarding a solution to the cancer problem. In 1942 cancer claimed nearly 160,000 victims in the United States; the recorded number of deaths from poliomyelitis amounted to about 1 percent of the cancer mortality total. Within the preceding twelve months more than 5 million dollars had been collected by the National Foundation (founded in 1938) for the investigation and observation of poliomyelitis; only $350,000 had been raised over the same period for the different phases of cancer control, and of this amount less than 5 percent found its way into research.[110]

Little argued that the cancer movement had reached an impasse. The promise of substantial gains on this public health issue was not diminished by the state of war: rather, it faced likely deterrents imposed by a changing economic order which promoted uncertainties in the research support outlook, especially the prospect of large endowments from private sources.[111] The organization of cancer research had undergone further weakening under the explosive impact of new ideas. The solitary investigator each year experienced a growing detachment from more remote networks of activities. Unless effective leadership was promptly introduced, the process of disintegration could not be reversed.

"The National Advisory Cancer Council with added personnel as members of subcommittees might prove to be the suitable leader. The American Association for Cancer Research might also provide directive or advisory leadership. Whether that leadership comes from existing bodies or from others still to be created it should be developed as soon as possible. One thing is certain and that is that valuable time and opportunities are being lost. Not only is there little evidence of organized efforts to train new leaders in cancer research but the opportunity to apply the leadership already available is limited and restricted by lack of public support."[112]

In 1913 the Hoffman proposals raised constructive guidelines for a campaign to rescue the nation from the ignorance and fear of cancer. The Little plan, framed thirty years later, laid the blueprint for an aggressive stroke at the core of the cancer problem.

CONCLUSIONS

It is a historic paradox that the origins of the American cancer control movement should be attached to the enterprising ideals of Charles Plumley Childe, whose missionary zeal to propagate the cause of lay education was virtually unheeded in his native land.[113] In a 1925 reissue of his classic work of 1907, "The Control of a Scourge (15)," Childe remarked that the prevailing "medieval" ignorance of cancer, as late as 1907, created such a dread of even the mention of the word, that a book, "the object of which was to educate the public to some extent in the disease cancer, should have to hide its intention under the absurd title "The Control of a Scourge," invented by the publishers (17, p. 151)." Nevertheless, Childe was able to affirm that his message had taken root in the American Society for the Control of Cancer.

The 30 years that mark the ascent of the American cancer control movement also delimit a series of epochal events, or crises, in the public health aspects of cancer. The period 1913–1923 encloses the era of crisis in *cancer statistics and epidemiology*; the period 1923–1933, the era of crisis in *cancer therapy*; the period 1933–1943, the era of crisis in *fundamental research* on cancer. Each category suggests problems that transcend arbitrary boundaries of time; however, they comprise issues of systematic relevance to the promotion of cancer education during the second, third, and fourth decades of this century.

Several milestones in statistics and related studies achieved within the first years of the Society's existence have been

indicated in the opening paragraphs. These developments overlie intensive assessments of cancer mortality data in the United States, implanted in such pioneer endeavors as Frederick Hoffman's Cancer Mortality in American Cities (1913–1917), the San Francisco Cancer Survey (1923–1934), and the Cancer Survey of Nebraska issued by A.S.C.C. field representative Frank L. Rector in 1934. Among other effects these statistical works were effective guideposts of regional requirements in cancer control (59).

The 1920's may be considered a period of disarray in cancer therapy, characterized by the uneven organization of cancer service and restricted acceptance of radiology as a therapeutic countermeasure to neoplastic diseases. Although policies structuring uniform practices for cancer clinics were gradually introduced—a testimonial to the indefatigable efforts of the American College of Surgeons—the problem awaited a final outcome after 1930, at which time the concept of a total facility for the management of cancer had fully matured. The institute plan, subtending coordinated activities under the collective idea of "teamwork," dissolved vestiges of the former competitive inhibition between the surgical and radiologic points of view.

By 1933 the area of radiotherapy had ascended through research and development to a primary division of clinical oncology. This event signaled the adoption of a new tool, the relative responses of tumor tissues to penetrating radiations (*radiosensitivity* vs *radioresistance*). A sophisticated technology also was being made available. In 1931 the 900,000-volt continuous emission X-ray unit displaced the 600,000-volt unit in major cancer centers, a boon made possible by General Electric Research Laboratories.[99] At the same time radium imports from new sources of pitchblende uncovered in Canada offset further depletions of the 250-gm U. S. stock-pile. Improvements in applicators, in dosimetry, and in adjuvant technics further increased the reliability of radiotherapeutics. Moreover, by 1938, radiation therapy received exceptional opportunities from experimental physics, especially from the cyclotron research centers at Berkeley and Chicago.[89]

The closing years of the Hoover Administration attached an inspired congressional following to the support of several national health causes, primarily the influenza, poliomyelitis, and cancer questions.[79] Two pieces of legislation introduced in 1929 greatly extended the powers of government in the domain of medicine; these are the Ransdell Bill, calling for the establishment of a National Institute of Health, and the Jones Bill, proposing the expansion of the Public Health Service. The momentum gained in social legislation against cancer has been discussed in connection with the precedents favoring the National Cancer Institute Act of 1937.

A collateral recognition of deficiencies in cancer research is detected in the early proceedings of the American cancer control movement. This mood was strengthened by the Lake Mohonk Conference of 1926 and the 1928 Cancer Conference in London at which the A.S.C.C. had distinguished representation (57). The reorganization of 1929 carried an official proviso that the Society absorb cancer research within its primary perspectives. This development focused the context of research as a primary basis of succeeding plans for Cancer Institutes on a nationwide scale.

The period of the 1930's launched revolutionary innovations in fundamental cancer research. Every area of carcinogenesis was represented by major discoveries. Tumor biology, profiting from the homozygous strains of mice and the well-established experimental tumor lines, had advanced to a point of unprecedented precision. Moreover, between 1936 and 1937, there were distinct signs of a transition in the field of cancer genetics. A dramatic moment occurred at the 1936 meetings of the American Association for the Advancement of Science, whose Section of Medical Sciences was given over to a Symposium on Cancer (1). Dr. Maude Slye at the session of December 29, 1936, abandoned her view of the preceding quarter century that the hereditary basis of cancer lay exclusively in a single Mendelian factor. This signaled a unique occasion, "At which all the workers in genetics could agree that complex and involved processes"[114] were the crux of hereditary tendencies to form cancer. A suggestion given at the same session of such "complex and involved factors" was raised by C. C. Little (1, p. 157); some "influence" transmitted from a female mouse to her female descendents ostensibly constituted an intrinsic influence in the determination of mammary cancer within select species.

An equally revealing insight into the changing tenor of contemporary research was disclosed at a Symposium on Cancer held, on September 7–9, 1936,[115] at the University of Wisconsin. In a paper, The Relation of Malignant Viruses to Malignant Neoplasms (2, pp. 135–141), Dr. James B. Murphy summarized the numerous evidences of viral activation in cancer. The existence of virus, or viruses, each with specific profiles of behavior in several strains of fowl sarcoma, was no longer open to question, nor were the genuine characters of the tumors they elicited. The true nature of these agents studied under a variety of conditions (and more effectively through the recent development of immunochemistry) had thus far eluded detection. Nevertheless, suitable hypotheses explaining viral action in the formal genesis of tumors were not lacking, were one to consider related research problems:

> "But we know that there are many inanimate substances which give the impression or actually are capable of self-perpetuation. One striking example is the factor which gives specificity to the pneumococcus. This substance may be extracted from, say, Type I pneumoccus, and if brought into contact with the nonspecific strain of the organism will cause this nonencapsulated, nonvirulent organism to assume all the characters of the type specific I, including its virulence. In the new form the germ will produce more of the factor capable of transforming the nonspecific into the type-specific varieties and pass this property on to its descendants. This substance is filterable and capable of self-perpetuation (2, p. 140)."

Other experimental deductions at the close of the 1930's raised equally fertile opportunities for cancer studies. This is evident in a singular endeavor, authorized by the N.C.I. Act of 1937 and implemented the same year by the Surgeon General, to formulate a strategy of research on the problem.

A discussion of the 1938 report of the Surgeon General's *Committee on Fundamental Cancer Research* cannot be entered here as it deals with perspectives that apply to more recent laboratory investigations. (These aspects will be considered later in connection with the A.C.S. research advisory

council of 1945–1956, the *Committee on Growth*.) It is within these scopes to suggest that this exceptional report set an agenda of research priorities requiring sizable additions of funds and skilled personnel. Existing resources were known to be unequal to the task. This dilemma posed the challenge that has since reshaped the entire climate of the American cancer control movement.

ACKNOWLEDGMENTS

The authors acknowledge with thanks the assistance given to this study by Dr. Sidney Weinhouse, Fels Research Institute; by Dr. Richard P. Mason, Senior Vice-President of Research, American Cancer Society; and the following A.C.S. representatives: Mr. Clifton R. Read, former Director of Public Information, and Dr. Sourya Henderson and her staff at the A.C.S. library. One of us (V. A. T.) wishes to express his gratitude to the U. S. Public Health Service for its generous support of these research projects.

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ADDENDUM A: BIBLIOGRAPHIC SOURCES AND FOOTNOTES

The A.S.C.C. publications are arranged under the following titles: (*a*) journals, (*b*) monographs, (*c*) periodicals, and (*d*) miscellaneous pamphlets. This is a partial compilation of the literature distributed by the Society between 1913 and 1943. It represents a cross-section of subject matter relating to the Society's work. The listed sources were consulted in the preparation of this review and provide a principal key to the footnote citations that follow.

Journals

Campaign Notes, vols. 1–12, January 1918 to December 1930; superseded by the *Bulletin,* vol. 13–26, January 1931 to December 1944; succeeded by *Cancer News,* vol. 1, 1947 to date.

Monographs

Stewart, Fred W. Radiosensitivity of Tumors. A.S.C.C. Monograph No. 1. Published by the American Medical Association: Chicago, Ill., 1930.

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2. Lakeman, Curtis E. Cancer as a Public Health Problem. June 1914.
3. Lakeman, Curtis E. Cancer as a Social Problem. December 1914.

4. Lakeman, Curtis E. The Role of the Nurse in the Campaign Against Cancer. December 1914.
5. A Summary of A.S.C.C. Methods and Results. March 1915.
6. The General Practitioners Responsibility in Early Diagnosis of Cancer. A Symposium. October 1915.
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Miscellaneous Pamphlets

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Footnotes

1. Constitution of the American Society for the Control of Cancer. Typed Draft of May 22, 1913, p. 1. Courtesy of the New York Academy of Medicine Library, New York City.
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6. Shaughnessy, Donald, F. A History of the American Cancer Society. Unpublished Doctoral Dissertation, Columbia University, New York, N. Y., 1955, pp. 1–16.
7. Objects and Methods of the American Society for the Control of Cancer, and Some Visible Effects of the Work, 1914–1924. A.S.C.C. Bulletin No. *16,* May 1925, pp. 9–10.
8. Powers, Charles A. The Work of the American Society for the Control of Cancer. A published address before the Annual Meeting of the Southern Surgical Association at Hot Springs, Virginia, December 1920, p. 1.
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11. Considine, Bob. That Many May Live. Memorial Center's 75 Year Fight Against Cancer. Publication of the Memorial Center for Cancer and Allied Diseases, New York, N. Y., 1959, p. 43.
12. Janeway, Henry, H. Radium in Cancer. A Summary of Results. A.S.C.C. Bulletin No. *1,* May 1914.
13. Lakeman, Curtis E. Cancer as a Public Health Problem. A.S.C.C. Bulletin No. *2,* June 1914, p. 8.
14. $250,000 For the Purchase of Radium. Campaign Notes, *2,* April 1920.
15. Minutes of National Council Meeting (Friday, May 6, 1921). Campaign Notes, *3,* May 1921.
16. The Relative Value of Radium and X-Ray in Treating Cancer. Campaign Notes, *7,* June 1925.
17. Soper, George A. Recent English Opinion on Cancer. A Review of a Series of Lectures Delivered under the Auspices of the Fellowship of Medicine, London, 1925. Publication of the American Society for the Control of Cancer, New York, N. Y., 1926, p. 32.
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22. The Institute of Cancer Research of Columbia University. Bulletin, *13,* June 1931, p. 5.
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28. Additional evidences in support of this argument cannot be presented here. Other comments appear elsewhere in the text. It should be noted that this development parallels the advance of experimental oncology, notably the isolation and synthesis of chemically pure carcinogens, of which more will be said in the following section.
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31. Meeting of the National Council (Friday, May 6, 1921). Campaign Notes, *3,* May 1921.
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41. Reimann, Stanley P. The Chemical Approach to Cancer. Bulletin, *21*, September 1939, pp. 7–9.
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43. Oestrin, Tumours, and the Pituitary. Bulletin, *18*, July 1936, pp. 9–10.
44. Loeb, Leo. Hormones and their Relation to Cancer in Women. A.S.C.C. National Bulletin, *22*, May 1940, p. 3.
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47. Editorial in the *California State Journal of Medicine* on A.S.C.C. Activities. A.S.C.C. Campaign Notes, *1*, March 1918.
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49. Woglom, William H. The Prevention and Cure of Cancer. Campaign Notes, *5*, May 1923.
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51. The British Imperial Cancer Campaign Committee. Campaign Notes, *6*, March 1924.
52. The Government of Cells. Campaign Notes, *6*, April 1924.
53. A Notable Symposium on Cancer. Campaign Notes, *6*, November 1924.
54. The Bernard and Gye Discoveries. Campaign Notes, *7*, July 1925.
55. The Bernard and Gye Discoveries. Campaign Notes, *7*, July 1925. This statement and similar contemporary evaluations point to continuous undercurrents of activity in cancer virus research throughout the 1920's. Rous and his associates sustained viral investigations and forced acceptance of the fowl sarcoma as a genuine neoplasm, a development of relevance to the problem of tumor induction in humans (Bryan, *10*, p. 364). The availability of new technics of tissue culture is a significant factor in the establishment of the viral hypothesis. It is not so obvious, according to one school of contemporary thought, that the topic of viruses largely lapsed as a credible issue in cancer research in the interval between the discoveries of Rous and Shope although evidences for this argument cannot be pursued further.
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58. The Society to Hold an International Meeting of Cancer Experts. Campaign Notes, *7*, November 1925.
59. Minutes of the A.S.C.C. Executive Committee, vol. *3*, pp. 127–128. Cited by Shaughnessy, pp. 81–83.
60. Roussey made this appraisal in 1926, before the isolation of chemically pure carcinogenic hydrocarbons by Kennaway and his coworkers but after the reconfirmation of viral activity in cancer by Gye and Bernard. However, Roussey did not dismiss the role of chemical agents in neoplasia as discussed in the text.
61. The implications of this concept for cancer therapy are cited in the preceding section.
62. Cancer Clinics. Campaign Notes, *6*, March 1924.
63. The New Cancer Institute and Hospital at the University of Minnesota. Campaign Notes, *7*, January 1925.
64. These conclusions must be regarded within the contexts of research in the 1926 era; therefore, they are of a limited scope.
65. The Symposium to be Held by the American Society for the Control of Cancer, September 20th–24th, 1926. Campaign Notes, *8*, May 1926.
66. Statement of Facts and Opinions Agreed to by the International Meeting on Cancer Held at Lake Monhonk, N. Y., U. S. A., September 20–24, 1926. Campaign Notes, *8*, October 1926.
67. Crowell, Bowman C. Twenty-Five Years of Work on the Cancer Problem by the American College of Surgeons. Bulletin, *20*, June 1938, pp. 1–4.
68. Organization of Service for the Diagnosis and Treatment of Cancer. Bulletin, *12*, November 1930, pp. 1–4. Members of the Committee who were also members of the A.S.C.C. Executive Committee, together with Dr. Greenough, included: Drs. Bowman C. Crowell, Chicago; Burton J. Lee, New York; Henry K. Pancoast, Philadelphia; and Francis C. Wood, New York.
69. Ewing, James. Cancer Institutes. Bulletin, *13*, March 1931, pp. 1, 2, and 8.
70. The Relation of the Present Economic Situation to the Support of Educational, Charitable and Scientific Institutions. An Editorial. Bulletin, *17*, September 1935, pp. 9–10.
71. The Organization of Cancer Research. An Editorial. Bulletin, *15*, August 1933, pp. 9–10.
72. The Chemical Foundation, a holding company for industrial patents, acted as a cancer philanthropy, especially in the 1930's. For many years this corporation was a sponsor of the *American Journal of Cancer* (see Triolo and Riegel, *73*, pp. 146–148), and it provided the means for scientific and lay contacts on the subject of cancer.
73. The Organization of Cancer Research. Bulletin, *15*, August, 1933, p. 10.
74. Soper, George. Cancer Research in England. Campaign Notes, *7*, November 1925.
75. Policies for Public Health Agencies in Combatting Cancer. Campaign Notes, *9*, November 1927.
76. $100,000 Offered for Conquest of Cancer. Campaign Notes, *8*, December 1926.
77. $5,000,000 for a Cure for Cancer. Campaign Notes, *9*, February 1927.
78. The Saunders Award. Campaign Notes, *10*, January 1928.
79. In May 1929, Senator Neely introduced legislation making $50,000 available to the Federal Department of Health and the National Academy of Science for the purposes of fact-finding, the results of which were to aid the Congress in making provisions for the support of cancer control. This measure was assisted by A.S.C.C. appeals that Federal agencies assume a responsibility for education and other areas of the cancer campaign. Bill before Senate. Campaign Notes, *11*, May 1929, pp. 2–3.
80. The Cost of Cancer Research. Campaign Notes, *10*, May 1928.
81. The United States Public Health Service. Bulletin, *12*, June 1930, p. 8.
82. Wilkins, George C. State Cancer Control. Bulletin, *18*, May 1936, pp. 1–3.
83. Wilkins, George C. State Cancer Control. Bulletin, *18*, May 1936, p. 1.
84. The Cancer Council. Bulletin, *19*, March 1937, pp. 8–9.
85. This Council enlisted seven representatives from the American College of Surgeons (Frank E. Adair, Robert B. Greenough); the American Roentgen Ray Society (Karl Kornblum); the A.A.C.R. (James B. Murphy, Clarence C. Little); and the A.S.C.C. (James Ewing, Burton T. Simpson).
86. The Cancer Council. Bulletin, *19*, March 1937, p. 9.
87. The Proposed National Cancer Center. An Editorial. Bulletin *19*, July 1937, pp. 6–7.
88. The Proposed National Cancer Center. An Editorial. Bulletin *19*,

July 1937, p. 7.

89. The first National Advisory Cancer Council (N.A.C.C.) and the American Cancer Control Council (A.C.C.C. (See Footnote 85)), instituted in 1937, show interesting similarities. Each Council included seven appointees; in the case of the N.A.C.C. the following: Francis C. Wood, Clarence C. Little, James Ewing, Ludvig Hektoen, Thomas Parran, Arthur H. Compton, and James B. Conant. Among the latter, Wood, Little, Ewing, Parran, and Hektoen were A.S.C.C. Directors; Little and Ewing held simultaneous appointments on both councils. The areas of cancer research, treatment, and education were represented on each council, as follows: Experimental Cancer Research (N.A.C.C., Wood, Little; A.C.C.C., Murphy, Little), Clinical Cancer Research and Therapy (N.A.C.C., Ewing, Hektoen; A.C.C.C., Adair, Greenough, Ewing, Simpson, Kornblum), Cancer Education and Public Health (N.A.C.C., Little, Parran; A.S.C.C., Little). Conant and Compton occupied intermediate though indirect positions. Both were noted educators and spokesmen of the American intellectual community; Conant as President of Harvard University, Compton as Professor of Physics at the University of Chicago. Moreover, Conant, an organic chemist, and Compton, a nuclear physicist, represented two specialities with significant ramifications for the contemporary cancer problem, the fields of chemical carcinogenesis and radiation therapy.
90. The Cancer Front - 1937. Executive Committee Report. Bulletin, *20*, March 1938, pp. 8–9.
91. A Proclamation (Franklin D. Roosevelt). Bulletin, *21*, April 1939, p. 2.
92. Hektoen, Ludwig. The National Cancer Institute Act. Bulletin, *20*, October 1938, pp. 1–3.
93. The Organization of Cancer Research. An Editorial. Bulletin, *20*, October 1938, pp. 7–8. A similar example was cited for the $4,000,000 Jane Coffin Childs Memorial Fund for Cancer Research, established at Yale University in 1937, 90% of which had been allocated to cancer projects at or near Yale. (Funds for Cancer Research and Treatment. Bulletin, *20*, February 1938, p. 9.)
94. The Organization of Cancer Research. Bulletin, *20*, October 1938, p. 8.
95. War and 1940. National Bulletin, *22*, February 1940, pp. 8–9.
96. Little, Clarence C. Progress in Cancer Control. Bulletin, *22*, May 1940, p. 2.
97. Binkley, Samuel. Industrial Research vs. Cancer Research. Bulletin, *23* (August 1941), p. 2 .
98. Binkley, Samuel. Industrial Research vs. Cancer Research. Bulletin, *23* (August 1941), p. 2.
99. Binkley, Samuel. Industrial Research vs. Cancer Research. Bulletin, *23* (August 1941), p. 2. The absence of commercial activities in cancer research is evident at this time. Cancer workers of the early 1940's provided most of their own basic tools, such as synthetic carcinogens, for laboratory projects. However, limited industrial applications to the cancer area were found in more practical contexts; for example, the development of radiation processes for therapy at the Research Laboratories of the General Electric Company and elsewhere (Coolidge, William, D., Contributions of Physics to Cancer Therapy. Bulletin, *21*, August 1939, pp. 6–9). The emergence of industry as an arm of support in cancer research is a post-war phenomenon and reflects the peacetime demands upon the national economy for the broader maintenance of health science study programs.
100. Binkley, Samuel. Fight Cancer by Helping America Grow Strong. Bulletin, *23*, October 1941, pp. 2–3.
101. Little, Clarence, C. Cancer Control and the War. Bulletin, *24*, February 1942, pp. 3–4.
102. Carter (13, pp. 258–259) indicates that the expansive economy and flaming win-the-war spirit of 1941–1945 revivified federation among the national voluntary health organizations. This trend was given particular impetus through the amalgamation of various relief agencies within the National War Fund. Attempts to collectivize fund-raising charities date from the last quarter of the nineteenth century.
103. Little, Clarence, C. Is Cancer Research Making Progress? Bulletin, *24*, April 1942, pp. 10–11.
104. Pitts, Herman C. New Phases of Cancer Research. Bulletin, *25*, January 1943, pp. 2–5.
105. Little, Clarence C. The Scope and Trends of Cancer Research. National Bulletin, *25*, February 1943, pp. 14–16.
106. Horsley, J. Shelton. Recent Advances in the Study of Cancer. National Bulletin, *25*, April 1943, pp. 44–47.
107. Rhoads, Cornelius P. The Present Status of Cancer Research. National Bulletin, *25*, June 1943, pp. 62–63.
108. In 1922 the heirs of Harry M. Lasker presented $50,000 to the A.S.C.C. as a memorial fund. By 1924 this fund was increased to $75,000. Between April 1923 and December 1941 the Lasker bequest had produced an income of $62,665, which the Society had applied to various educational projects over this 18-year period (Little, Clarence C. What One Family Has Done for Cancer Control. National Bulletin, *24*, April 1942, pp. 3–4). Moreover, in November 1943, Mrs. Mary Lasker, on the basis of professional appeals for adequate cancer research endowments, such as that issued by Dr. Rhoads, (see Footnote 107) undertook a unique crusade to revise the Society's financial status so this area might be included within its program scopes.
109. Little, Clarence C. Cancer Research. Bulletin, *25*, October 1943, pp. 113–115.
110. Little, Clarence C. Cancer Research. Bulletin, *25*, October 1943, p. 114.
111. Little assumed that unlimited concentrations of wealth would be discouraged in the post-war atmosphere of economic redevelopment. This tendency would curtail expectations of large endowments for cancer research from the private sector. The premise, although not verified by the subsequent course of history, was sound from Little's retrospective points of view. In the 1920's cancer research was largely supported through the following bequests: the George Crocker Fund ($1,500,000; Columbia University), the Edward S. Harkness Fund ($1,000,000; Memorial Hospital), the Anna Jeanes Fund ($2,750,000, Jeanes Memorial Hospital, Fox Chase, Philadelphia; now the Jeanes Hospital and Institute for Cancer Research), The Albert Steiner Fund ($500,000, Steiner Clinic and Research Institute, Atlanta, Georgia), the Elizabeth Worcester Mills Fund ($200,000), and the Collis P. Huntington Memorial Fund ($100,000, Memorial Hospital and Huntington Research Laboratories; now the Memorial-Sloan-Kettering Cancer Center), and the Caroline B. Croft Fund ($93,000; Harvard University Cancer Commission). (Note on Some of the More Notable Gifts to Promote Cancer Research and the Practical Application of the Existing Facts and Opinions with Reference to Cancer in America. Campaign Notes, *10*, May 1928.)

    Contributions from private philanthrophy to cancer research and treatment amounted to $6,150,000 in 1937. Major bequests made available at this time include: Starling W. Childs Fund ($4,000,000, Yale University), Edith Patterson Fund ($500,000, Chicago Cancer Institute), George Walker Fund ($350,000, Finney-Howell Research Foundation, Baltimore), and the William H. Donner Fund ($200,000, University of Pennsylvania). (Funds for Cancer Research and Treatment. Bulletin, *20*, February 1938, p. 9; also, Palmer, E. Payne A Crusade Against Cancer. Bulletin, *21*, April 1939, pp. 7–9; also, An Extraordinary Year in the History of Cancer. Bulletin, *19*, December 1937, p. 10.)
112. Little, Clarence C. Cancer Research. Bulletin, *25*, October, 1943,

p. 115. At this time a Committee for Cooperation in Cancer Research, under the chairmanship of Dr. George M. Smith (Yale University), was in operation under the National Advisory Cancer Council. This committee was formed largely as a result of discussions, led by Dr. James B. Murphy (Rockefeller Institute), among the N.C.I. advisors (31, pp. 163–164). Dr. Murphy also served, together with Dr. Smith, as an A.S.C.C. board director. The constitution of the A.A.C.R., redesigned in 1940, provided for definitive liaisons of cooperation among the proliferating sectors of cancer research (73, pp. 152–158).

113. At the Mohonk Symposium of 1926, W. Sampson Handley offered the following comment regarding the continuing neglect of cancer education in England: "Our people react well to an immediate danger but not to a contingent one. The English too are never disinclined for a gamble with fate nor inclined to worry about the risks of life, regarding it as at best a dangerous business. When our Minister of Health announced in Parliament recently that 1 person in 7 of 30 years of age or over would die of cancer, I fancy most of his hearers reflected that, after all, favorable odds of 6 to 1 are good enough in this uncertain world (12, pp. 29–30)."
114. Cancer Symposium at the meeting of the American Association for the Advancement of Science at Atlantic City, December 29th, 1936 to January 1st, 1937. The Section on Medical Sciences through Dr. Vincent du Vigneaud. Bulletin, *19*, February 1937, pp. 9–10.
115. The Wisconsin Cancer Institute. Bulletin, *18*, October 1936, p. 9.

ADDENDUM B: ORGANIZATION AND OFFICERS OF THE A.S.C.C.

The 30-year history of the A.S.C.C. is highlighted in several works. Ella Hoffman Rigney's "The American Society for the Control of Cancer, 1913–1943," first published in the New York City Cancer Committee's *Quarterly Review, 9:* 43–70, October 1944, was issued in the American Cancer Society's *Bulletin, 26:* 126–141, 1944, and as a separate publication (58). Howard Canning Taylor's "Thirty Years of Cancer Control," *Quarterly Review, 8:* 39–42, October 1943, is relevant. All of these works, together with Donald F. Shaughnessy's history of the American Cancer Society,[6] are available at the Library of the American Cancer Society, 219 East 42nd Street, New York, N. Y., 10017.

From these sources a key to the organization of the A.S.C.C. has been assembled, as follows:

1913

The A.S.C.C. charter authorizes a program to educate the laity on the early signs of cancer and to encourage early diagnosis and treatment. Fifty prominent physicians and laymen are enlisted as a Committee of Trustees. An Executive Committee of 16 members is installed, together with a slate of officers, a president, 5 vice-presidents, a secretary, and a treasurer. The work of the Society is to be coordinated by an executive secretary.

1915

Mrs. Robert G. Mead is appointed Chairman of Finances, an office that inaugurates a sound financial structure for the Society's activities.

1916

Frederick Hoffman becomes Chairman of the Statistical Advisory Board, the Society's first research bureau.

1917

A 75-member National Advisory Board is established. This agency is the first step in the Society's drive toward national representation. The Society initiates the *Campaign Notes* (No. 1, January 20, 1917), published at irregular intervals during the first year.

1921

The Society appoints a field representative. Its national scope is now recognized in the proclamation of a National Cancer Week, October 30–November 5, 1921, by U. S. President Harding.

1922

On May 15, 1922, the Society is incorporated in the State of New York. A permanent field service is established on the basis of a $26,750 gift from the Commonwealth Fund. President Harding proclaims a second National Cancer Week, November 12–18, 1922.

1923

Dr. Hoffman initiates a comprehensive *San Francisco Cancer Survey* with the support of the Prudential Life Insurance Company, the Pacific Mutual Life Insurance Company, and the A.S.C.C. A third National Cancer Week is proclaimed, November 7–13, 1923.

1926

Dr. John C. A. Gerster is appointed Chairman of the New York City Cancer Committee, the first Metropolitan district organized on a self-sustaining basis. The Society embarks upon a million-dollar endowment fund campaign.

1927

The Endowment Fund goal is achieved. Mrs. Francis J. Rigney, of the New York City Cancer Committee, coins the now familiar Society slogan, *Fight Cancer with Knowledge.*

1929

A plan of reorganization, proposed after the Lake Mohonk Conference in 1927, is adopted. The plan establishes new by-laws, enlarging the Board of Directors from 5 to 30 members. Representation on this Board is distributed among the areas of surgery, pathology, radiology, public health, cancer education, and research. The National Advisory Council is abandoned. A 9-membered Executive Committee is instituted. Dr. Clarence C. Little is appointed second managing director, succeeding Dr. George A. Soper.

1930

The American College of Surgeons, in conjunction with the A.S.C.C., establishes standards of service for cancer clinics in the United States and endorses those clinics which comply with these standards.

1934

Dr. Hoffman issues the ninth and final report on the *San Francisco Cancer Survey*. This work is acclaimed as a landmark in statistical investigation.

1935

Units of the General Federation of Woman's Clubs coalesce to form the Woman's Field Army, under the auspices of the A.S.C.C. Mrs. Carl W. Illig, Jr., is named W.F.A. Commander.

1936

The Society joins with the American College of Surgeons, the American Association for Cancer Research and the National Association of Science Writers to form a Cancer Council for the purpose of reviewing contemporary problems in the cancer field. A new cancer control publication, the *Quarterly Review,* April 1936, is initiated by the New York Cancer Committee.

1937

Henry R. Luce, publisher of *Time, Fortune,* and *Life* magazines, is nominated first recipient of the Clement Cleveland Award, established by the A.S.C.C., in recognition of outstanding service to the propagation of cancer education.

1938

William L. Lawrence, on behalf of the National Association of Science Writers, accepts the Clement Cleveland Award.

1939

The Woman's Field Army receives a U. S. Public Health Service citation for distinguished contributions to the cause of cancer education in the United States. Francis Carter Wood is awarded the Clement Cleveland Medal for distinguished service to cancer research.

1940

The Clement Cleveland Award is given to Dr. James Ewing for distinguished contributions to clinical oncology.

1942

A war service program is adopted by the Woman's Field Army. The first woman recipient, Dr. Elise S. L'Esperance, receives the Clement Cleveland Award.

1943

The Society, marking its 30th year, presents the Clement Cleveland Award to Dr. Frederick L. Hoffman for distinguished services to the field of cancer statistics.

Officers of the Society, 1913–1943

The following roster (Table 3) has been compiled from various sources cited in Addendum A. Question marks indicate areas of inexact information. After 1922, the year in which the A.S.C.C. was incorporated, the office of vice-president appears to have been confined to a single incumbent. Two secretariats were instituted under the A.S.C.C. charter of 1913. Curtis E. Lakeman served as executive secretary from 1919 to 1924. Thereafter, there were no further appointments to this office although the reorganization meeting of 1929 installed Dr. Raymond V. Brockaw, the Society Field Representative, as interim executive secretary. The office of board chairman was established under the revised By-Laws of 1929.

ADDENDUM C: THE EWING CRITIQUE OF THE SYSTEM OF GRANTS-IN-AID OF SCIENTIFIC RESEARCH

This report has never been published although it forms a historic basis for more recently established guidelines on the support of cancer research, such as the adoption of institutional and research career award programs. The *Critique* is reprinted from the only copy known to the authors, an original press release of the A.S.C.C., deposited in the library of the New York Academy of Medicine. A directive to the press indicates that the document was endorsed by the A.S.C.C. Executive Committee and that it elicited a favorable response from the first National Advisory Cancer Council. A feature story on the Ewing report appeared in the *New York Times* (Sunday, January 16, 1938), under a by-line of Waldemar Kaempffert, Times science editor, as Long-Time Studies for Cancer Urged, pp. 1 and 7.

The article by Kaempffert suggests that major grant foundations at this time were planning revisions of policies on financial endowments for scientific research: "Although Dr. Ewing's criticisms are directed primarily at cancer research, they apply with equal force to research in any branch of science. With most of them philanthropies of the Rockefeller and Carnegie type are in substantial accord. Indeed, the big foundations are rapidly reaching the conclusion that money granted in small amounts to cover research costs for short terms is money usually frittered away. It is simply impossible to solve any fundamental problem in biology, physics, chemistry, or medicine in a year or two (ibid, p. 1)."

The first paragraph of the Ewing *Critique* emphasizes the successful applications of small grants-in-aid; the reference to endocrinology is amplified in the Kaempffert analysis (ibid., p. 7): "An outstanding example of what can be accomplished with a small grant is the work done in sex research under the auspices of the National Research Council. Out of this came the important discoveries of Dr. Herbert M. Evans on the effect of hormones from the anterior lobe of the pituitary gland which lies at the base of the brain and the sex hormones discovered by Drs. Doisy and Allen." The system of grants-in-aid is not controverted by the Ewing *Critique*; rather, its argument focuses a negative reaction to the exclusive partition of sizable cash reserves into uncoordinated or short-term research projects.

This question had not been resolved to the satisfaction of the first National Cancer Council, which considered suitable guidelines for part of the $400,000 appropriation made available for cancer research by the National Cancer Institute Act. At this time (January 16, 1938) four grants were approved, but not yet funded, for projects in radiation physics ($30,000 to Professor E. O. Lawrence, University of California at Berkeley), carcinogenesis ($20,550 to Professor Louis Fieser, Harvard University); hormone effects in cancer ($4,350 to Professor Edward William Wallace, University of Cincinnati); and genetics ($9,900 to Dr. C. C. Little, Roscoe B. Jackson Memorial Laboratory, Mount Desert Island, Maine). Although early Federal policies dictated a conservative deployment of resources to well-established investigators, the original National Cancer Council envisioned a course for cancer research requiring "... patience and the adoption of the long-time point of view ..." (See Bayne-Jones, S., Harrison, R. G., Little, C. C., Northrop, J., and Murphy, J. B., Fundamental Cancer Research. Public Health Reports, *53:* 2120–2130, 1938). The Ewing report addressed its recommendations to that future time when the permanent support of cancer research would be attained.

THE CRITIQUE

Note to Science Writers

(The enclosed paper—A Critique of the System of Grants-in-Aid of Scientific Research—was prepared by Dr. James Ewing of Memorial

Table 3

Term	Name	Title and affiliation
President		
1913–1919	George C. Clark	Clark, Dodge & Co., New York, N. Y.
1919–1922	Charles A. Powers	General practice, surgery, Denver, Colo.
1922–1930	Howard C. Taylor	Professor of Clinical Gynaecology, Columbia University, New York, N. Y.
1930–1932	Jonathan M. Wainwright	Chief Surgeon, Moses Taylor Hospital, Scranton, Pa.
1932–1934	George H. Bigelow	Commissioner of Public Health, State of Massachusetts, Boston, Mass.
1934–1936	Burton T. Simpson	Director, State Institute for the Study of Malignant Diseases, Buffalo, N. Y.
1936–1937	Robert B. Greenough	Professor of Surgery, Harvard University, Cambridge, Mass.
1937–1938	Frederick F. Russell	Professor of Preventive Medicine and Epidemiology, Harvard University, Cambridge, Mass.
1938–1942	John J. Morton	Professor of Surgery, University of Rochester, Rochester, N. Y.
1942–1944	Herman C. Pitts	Gynecologic surgeon, Rhode Island Hospital, Providence, R. I.
Vice-President		
1913–1922(?)	Clement Cleveland	Consulting surgeon, Memorial Hospital for Cancer, New York, N. Y.
1913–1922(?)	Lewis S. McMurty	Professor of Abdominal Surgery and Gynecology, University of Louisville, Louisville, Ky.
1913–1916(?)	Edward Martin	Clinical Professor of Surgery, Woman's Medical College of Pennsylvania and the University of Pennsylvania, Philadelphia, Pa.
1913–1922(?)	Edward Reynolds	General practice, surgery, Boston, Mass.
1913–1922	Lewellys F. Barker	Professor of Clinical Medicine, Johns Hopkins University, Baltimore, Md.
1916(?)–1922(?)	Arthur D. Bryan	General practice, surgery, Chicago, Ill.
1922(?)–1930	Francis Carter Wood	Director, Institute of Cancer Research, Columbia University, New York, N. Y.
1930–1933	George H. Bigelow	Commissioner of Public Health, State of Massachusetts, Boston, Mass.
1930–1934	James Ewing	Professor of Pathology, Cornell University Medical College, New York, N. Y.
1934–1935	Henry K. Pancoast	Professor of Roentgenology, University of Pennsylvania, Philadelphia, Pa.
1935–1937	Thomas Parran, Jr.	Surgeon General, U. S. Public Health Service (1936–1948). Commissioner of Public Health, State of New York, Albany, N. Y. (1930–1936).
1937–1938	John J. Morton	Professor of Surgery, University of Rochester, Rochester, N. Y.
1938–1941	George M. Smith	Director, Jane Coffin Childs Memorial Fund for Cancer Research, Yale University, New Haven, Conn.
1941–1942	Herman C. Pitts	Gynecological surgeon, Rhode Island Hospital, Providence, R. I.
1942–1944	Frank E. Adair	Attending surgeon and executive officer of the Medical Board, Memorial Hospital for Cancer and Allied Diseases, New York, N. Y.
Secretary		
1913–1930	Thomas M. Debevois	Attorney, New York, N. Y.
1930–1933	Burton J. Lee	Clinical Professor of Surgery, Cornell University Medical College, New York, N. Y.
1933–1934	Jonathan M. Wainwright	Chief surgeon, Moses Taylor Hospital, Scranton, Pa.
1934–1941	Frank E. Adair	Attending surgeon and executive officer of the Medical Board, Memorial Hospital for Cancer and Allied Diseases, New York, N. Y.
1942–1944	Cornelius P. Rhoads	Director, Memorial Hospital Sloan-Kettering Institute for Cancer Research, New York, N. Y.
Treasurer		
1913–1926(?)	Howard Bayne	?
1926(?)–1938	Calvert Brewer	Vice-President, United States Mortgage and Trust Co., New York, N. Y.
1938–?	James H. Ripley	?
Chairman of the Board		
1929–1932	Robert B. Greenough	Professor of Surgery, Harvard University, Cambridge, Mass.
1932–1933	James B. Murphy	Director of Cancer Research, Rockefeller Institute for Medical Research, New York, N. Y.
1933–1937	James Ewing	Professor of Pathology, Cornell University Medical College, New York, N. Y.
1937–1942	Edwin R. Wilson	Professor of Vital Statistics, Harvard University School of Public Health, Cambridge, Mass.
1942–1945	John J. Morton	Professor of Surgery, University of Rochester, Rochester, N. Y.

Officers of the Society, 1913–1943.

Hospital and submitted to the National Advisory Cancer Council. It may be used on *Sunday, January 16,* or thereafter as a basis for stories. Dr. Ewing is willing to have you use his name as author if you make it clear that his conclusions are supported by the Executive Committee of the American Society for the Control of Cancer. While the National Advisory Cancer Council has not adopted or endorsed in any formal way this memorandum, and should not be quoted, you would be safe in using some such phase as "it is understood that this statement is in harmony with present policies of the Council.")

A Critique of the System of Grants-in-Aid of Scientific Research

Any competent review of the system of grants-in-aid of scientific research must acknowledge the important service rendered by this system to American science. It has greatly broadened the basis of scientific research, added substantially to the resources available, strengthened many university departments, stimulated original inquiry by many young men and women, organized and supported systematic study of important problems, and initiated many scientific careers, some of which have been eminent. As an outstanding example, it appears that the National Research Council was responsible for placing endocrinological research in the country on a firm foundation and for initiating several lines of investigation which have proven most fruitful. The International Cancer Research Foundation has greatly stimulated and strengthened cancer research in a great many laboratories in this country and in Europe. Any proposals of changes in such a system of grants-in-aid must recognize the possible danger of disturbing an institution, which in many respects has been highly successful in accomplishing its object.

The present review of the system is the outcome of conferences held during the past summer with Dr. E. L. Kennaway of the London Cancer Hospital, Dr. W. E. Gye of the British Imperial Cancer Research Laboratory, Dr. W. J. Peacock of the Beatson Cancer Hospital of Glasgow, Dr. J. Maisin of the Cancer Institute of Louvain, Belgium, Dr. James Murphy of the Rockfeller Institute, Dr. M. G. Seelig of the Barnard Cancer Hospital of St. Louis and myself. As directors of Cancer Institutes, we feel that the system of grants-in-aid, at least in the field of cancer research, has serious defects which give rise to conditions which are onerous, discouraging, and in certain respects almost intolerable. Accordingly we reached the conclusion that a statement regarding these conditions should be prepared and presented to the proper authorities on some suitable occasion. I believe that the following statements represent the views of the men whose names have been mentioned, but they have not had opportunity of reading this report.

1. Each year directors working under grants-in-aid find it necessary to gather together the various sources of income, mainly from grants and occasional contributions, and to determine whether it will be possible to continue research in progress and to carry the personnel. This task requires time, causes constant anxiety for director and personnel, calls for debates with officials who have final charge of the finances of the institution, and constant efforts to secure new contributions to replace those which lapse. This situation necessarily develops a type of salesmanship, because the donor or the officer cannot have a real knowledge of the merits of a project, and the director is often compelled to indulge in over optimism and imagination in order to prove his point. This activity is incompatible with a scientific spirit and undignified for the scientist. Yet the better the salesmanship the larger the returns. Some years ago a laboratory man, noted for salesmanship, amassed a budget for a new scientific department of $51,000.00. The department functioned for one year and then completely collapsed and no permanent results remain from the expenditure.

2. Under the system of grants no career can be assured for any competent worker. The result is that many workers, who have pursued studies in a narrow field until they have become rather expert, find themselves without a position, and what is worse, without any training which may enable them to make a living in another field. When a director adds any competent man to his staff he must consider his responsibility for the career of the appointee, and this he cannot do under the system of grants. Yet with but a few exceptions the important contributions in the cancer field have come from men who have been in the field for a number of years.

3. Since grants-in-aid are accessible to a great number of inexperienced workers, named by heads of departments who secure the grant, the system draws into cancer research many men who have no knowledge and only a passing interest in cancer problems, and who use the grants as a stepping stone to other positions. The tendency is more marked in the cancer field than in any other branch of research, for everyone has some interest in cancer and cancer problems touch every department of science.

4. The system of grants is incompatible with any program of comprehensive investigation of any broad cancer problem which requires many years of study in several related lines. It confines the worker and the department to the elucidation of some minor point or topic which promised a solution within a brief period. Important cancer problems are not of this character. On this account the system is incompatible with the development of significant careers in the cancer field. The system demands periodical report of progress, but in the pursuit of important problems there are long periods, months or years, when there is no reportable progress. Three outstanding careers in cancer research, Rous, Warburg, and Speman would have been impossible under the system of grants. Rous brought out his sensational discovery of a filterable chicken sarcoma in 1911, and after finding the problem unsolvable at that time, abandoned cancer and did not return until recently when he brought out his important studies of the rabbit papilloma virus. Warburg made the most important contribution to the chemistry of cancer, but now it is said that he will not touch cancer for at least ten years, but will devote himself exclusively to the general subject of oxidative ferments. Imagine the annual, semiannual, or even monthly reports which Speman would have had to make during the first twenty years of his work which eventually eventuated [sic] in the doctrine of embryogenic organizers and inducers. Imagine Dr. Whitney of the General Electric Company, or Mr. Kettering of the General Motors undertaking to conduct the researchers of their organizations by funds collected after argument from a half dozen uninstructed sources. How would Dr. Weidlein like to conduct the Mellon Institute under similar conditions. Would the Steel Industries of America devote $10,000,000.00 annually to research if they had to administer the funds under the scrutiny of a series of Boards of Control. During the course of any fundamental research the main problem may reach a stalemate and progress may appear impossible at the time, but some sideline develops which leads to important results in some other field. No pursuit of profitable sidelines is possible under the grants system.

5. The system which places the support of scientific research under the control of a board of experts representing many sciences, and only distantly familiar with specific problems, must be less effective than one which places the resources in the hands of men actually engaged in the research. It also suffers from the grave danger of syndicating or bending research according to the ideas of men who cannot be as well informed as the workers themselves, but who must follow the popular trend. An example is the persistent tendency of the British National Research Council to pursue the parasitic theory of cancer and the virus theory of tumors in general as well as of multiple sclerosis, Hodgkins disease and rheumatism. This tendency is not approved by the leading British pathologists. It has been responsible for some notable fiascos in British science.

6. The record shows that while grants-in-aid have encouraged and supported ideas already formulated and investigations already in progress, they have not had the distinction of originating any project of first class importance or of being the main influence in completing any first

class contributions in cancer research. They have been excluded from this high service by the failure to establish first class careers. Contrasted with a record of valuable but small services of limited significance, is the history of results coming from some comparatively small endowments made many years ago in the field of cancer research. About 1898 Mrs. Gratwick gave a comparatively small endowment fund to found the Gratwick laboratory at Buffalo. This institution under Gaylord became one of the most powerful forces in cancer research and control, both in this country and in Europe, and it is now the leading cancer institute under government operation. About the same time Mrs. C. P. Huntington gave $100,000.00 for cancer research at the Memorial Hospital. This fund was the central influence in developing most of the early research in Cornell University Medical College in cancer and other fields, it attracted the later endowment of Dr. James Douglas, led Mr. Rockefeller to endow the project of graduate education in cancer, and now it seems likely to lend to the establishment of a broadly organized cancer institution. About 1902 Mrs. Barnard gave a modest endowment to the Barnard Cancer Hospital in St. Louis, which has struggled along during the years with an extremely creditable record. It has been a real force in its territory and in the progress of American cancer control. Mr. Crocker gave the first really large endowment, founding the Institute of Cancer Research of Columbia University, which under the direction of Dr. Wood has become one of the leading research institutes of the country and a factor of international importance. Under the fortunate conditions provided in the Rockefeller Institute, Dr. Rous, Dr. Murphy and many associates have been able to conduct systematic researches in several fundamental fields which are permanent additions to our knowledge. At Harvard University the Collis P. Huntingdon Hospital and Harvard Cancer Commission with substantial endowments have occupied a distinguished position in the more scientific branches of cancer research and have made very numerous contributions in important fields.

It thus appears that the real factors in the progress of cancer control in America have come from these endowments of substantial institutions, to which the grants-in-aid have been quite minor incidents, and the same record is duplicated in Europe. The recent very large additions to funds which it is proposed to devote in part to grants-in-aid, especially the Childs Fund at Yale and now the National Institute of Health, render directors of cancer institutions apprehensive lest this movement divert from these long established special institutions the funds which philanthropic men and women wish to assign to the most effective instruments for progress.

There will be little value in pointing out defects in one system unless better alternatives are suggested. Since grants-in-aid are of definite value some plan should be found to remedy their defects and retain the system with as little waste as possible. The following suggestions are offered for consideration.

1. Reduce the number, increase the amount, and lengthen the term of grants. Grants might well be limited to established cancer institutions, and to university officers who have a knowledge of cancer and a genuine permanent interest in its problems, and who have some permanent connection with a cancer organization. Men should not be induced to enter the field of cancer research unless they have an assured position apart from the income of the grant. Otherwise they may become a moral obligation of the system.

2. Support should be given to the definite branches of cancer research rather than to particular problems, topics or individuals. These branches include biology, physiology, chemistry, physics, pathology, radiology and surgery. *Probably the best plan for assuring sound progress in cancer research is by endowments of $100,000.00 or more to guarantee permanent careers in the different branches of cancer research in established institutions.* (ital added)

3. Plans for the comprehensive investigation of major forms of cancer or major fundamental problems could be formulated and conducted, if sufficient funds were available. Such projects would require $25,000.00 to $50,000.00 annually.

4. Fellowships in general cancer pathology with stipends of $2,500.00 to $5,000.00 are very much needed. State Health Boards should be urged to establish a system of free diagnosis of cancer for indigent cases, and to require practical examinations in cancer diagnosis of all pathologists who undertake tumor diagnosis for hospitals and the State.

5. In general the most effective method of forwarding the knowledge and control of cancer is by *substantial additions to the general endowments of cancer institutions, university departments with cancer connections, and possibly some general hospitals.* (ital added)

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