The Cancer Investigator*

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Dr. Creech, Members of the American Association for Cancer Research, distinguished guests, ladies and gentlemen. Experimental cancer research as we engage in it today began in earnest some 60 years ago around the turn of the century. Before that time, cancer had become recognized as a disease which originated in different organs and tissues of the body and spread by metastasis to other sites. For the most part illnesses due to cancer pursued a relentless course and the patients became cachectic and died. An association between certain types of cancer and occupation began to be understood so that before the end of the last century, arsenical, paraffin, dye, coal tar, shale oil, and chimney sweeps' cancers were all recognized. In 1842 and 1844 Rigoni Stern of Verona used the statistical method to show the mortality from and the age distribution of mammary and uterine cancers in Italian women. After a beginning had been made to correlate the gross and microscopic features of cancer, surgeons began to take biopsies, but then as now not all biopsies revealed correct information. In 1888 the great Virchow could not diagnose cancer in a laryngeal biopsy from the Crown Prince of Germany, who was already a sick man when he succeeded his father to the throne to become Frederick III. He reigned only 100 days before he died of laryngeal cancer. Virchow learned more from the autopsy than he did from the biopsy. The surgeons designed operations for the wide excision of cancer tissue which saved some lives, including those of notable people like President Cleveland, whose entire left upper jaw was resected for sarcoma in 1893. And in this last decade of the last century both x-rays and radium were discovered. Great as the acquisition of this knowledge was, it was tempered by certain failures. All attempts to isolate causative microbial agents from cancer tissue failed. Attempts to confirm in animals the observations that cancer is caused by environmental carcinogens likewise failed. About the only information gained from tumor transplantation studies was a vague notion that transplanted tumors grew best in kindred animals. Virchow, after all the years of study that he had devoted to the problems of cancer, finally concluded: "I do not think that a living human being can be found that even under torture could actually say what tumors really are."

Our modern approach to the investigation of cancer as a biologic enigma, the appreciation that cancer in animals is essentially similar to cancer in man and the use of laboratory animals and the scientific method to learn more about cancer can be said to be 20th century enterprises. All kinds of persons and things are associated with these efforts in experimental cancer research: philanthropists, fund raisers, volunteer agencies, uplifters, the Congress, money, universities, colleges, deans, professors, college presidents, private, public, and governmental institutions, hospitals, committees, study groups, councils, boards, administrators, directors, advisors, buildings, animal colonies, animal farms, apparatus, drug companies, manufacturers, and many more. But the one, single, most important, absolutely indispensable, essential element in this milieu is the cancer investigator. Without him, there is no effort. Remove him and all the other persons and things associated with cancer research add up to nothing more than a big fat zero. The cancer investigator is, therefore, a most important fellow; important enough to be examined from all angles in a strong light. What makes him tick? What sort of person is he? What are his likes and dislikes? How free or hampered is he? How much education does he have, need, or want and what kind? How best does he work?

Definition of research.—Research has been defined as a form of inquiry; a frame of mind; a questioning spirit; doing something that one is not told to do; the pursuit of a fact that is coy and elusive; that which adds to the sum of knowledge and provides an understanding and an insight into interrelationships; the development of conclusions from observations; an attempt to control one's surroundings by entering into them to understand them from within. A brilliant idea for an experiment is one that works out successfully; a silly idea...
Characteristics of the investigator.—Motivation, imagination, inspiration, mysticism, contemplation, logic, curiosity, and enthusiasm are among the traits, qualities, properties, attributes, capacities, or methods possessed or used by investigators to accomplish their research. Discoveries, creations, and inventions are almost never the result of a systematic classification and analysis of multiple observations, and the finding of a common denominator, the so-called Baconian method. Instead, they usually evolve from a chance fact, a habit, a custom, a belief, a tradition, or sudden insight into the relationship of observations apparently insignificant in themselves. Sometimes the supposed facts leading to a hypothesis are later shown to be wrong. Every speculation was once a guess, a hunch, a dream, a fancy, that the practical mind would dispose of at once. Imagination often flies in the face of logic, and soaring independently a discovery is made. All the work in library and laboratory never created a brilliant hypothesis. The hypothesis is the winged thought of the imaginative mind. The imaginative mind has little in common with the logical, practical mind. Logic may clear up doubts and prove truths if it is not carried too far beyond the facts, but it never makes discoveries. Logic has much the same relation to speculations in research as it does to theorems in geometry. It ceases them, for the time being at any rate. D. H. Lawrence said: "Every real discovery made,. . . was. . . made by divination. . . . The soul stirs, and makes an act of pure attention, and this is a discovery. . . ." "Prayer or thought, or studying the stars, or watching the flight of birds, or studying the entrails of the sacrifice, it is all the same process, ultimately: of divination." The investigator may be an atheist like Metchnikoff or he may, like Pasteur, worship the Infinite, but in either case when he does research he is a mystic. Where and when to find what we seek through research requires careful thought and planning, and these depend upon leisure and freedom from harassment and anxiety. Cannon says that any hint of censure or punishment or urgency to bring forth results are surely harmful. The research worker may have to develop a stock answer to an insulting inquiry from his administrator who discovers him day after day, week after week, loafing around his laboratory and peering out of the window for inspiration for his next move.

Enthusiasm is back of all research. It may hardly be discerned in a quiet, cool, careful, methodical personality like that of Madame Curie, whereas it is indelibly stamped on every one of Duran-Reynal’s efforts. Whether noticeable or concealed, enthusiasm is a powerful force behind all progress. It was back of the discovery of the genetic influence on cancer in animals by Jensen, Loeb, and Murray; the development of the inbred strains of mice by Tyzzer, Little, and Strong; the transplantability of tumors by Nowinsky, Hanau, and Morau; the demonstration of the mammary tumor milk factor by Bittner and Korteweg; and the observations of the carcinogenicity of the tumor agent from lymphomatous tissue by Ludwik Gross and Sarah Stewart. We note the presence of enthusiasm in the concepts of autonomy and dependence of tumors by Huggins, Greene, and Furth; of the progression of tumors by Foulks; and of the co-carcinogens by Shear and Berenblum. It was enthusiasm that guided the hand of Perkin when he dipped a piece of silk into the first aniline dye ever made and stained it permanently. Enthusiasm was in the laboratories of Bang and Rous when they discovered the virus etiology of leukemic and solid neoplasms of fowls. It hovered about the genius of Roentgen when for the first time he observed the evidence of the penetrating qualities of the x-rays. No greater enthusiast ever lived than our beloved late member, Sir Ernest L. Kennaway. When I visited Sir Ernest last in 1957 he was studying smoked mutton from Iceland as a possible source of carcinogens. He was as enthusiastic about his work as a young boy. He wasn’t content to tell me about the heavy penetration of the smoke into the meat. He took the piece of meat in his old palsied hands and cut into it with a knife. He insisted that I look at the cut specimen and smell it. He demonstrated; he did not narrate. In a few short months he was dead, an enthusiast to the very end.

There is no such category as an average investigator. Some day some enterprising student of psychology will document all the elements that comprise a research scientist, just as William S. Gilbert wrote the recipe for that popular mystery known to the world as a heavy dragoon. The now available information about investigators reveals them to be different from average people in certain of their ingredients, capacities, and characteristics. As compared with average people, the creative scientist interprets pictures more imaginatively, possesses greater appreciation for modern art, and weaves more intricate compositions in the comple-
tion of designs consisting originally of open-ended lines. As compared with artists, the creativity of Pasteur or of Darwin cannot be considered inferior to that of Dante or Goethe. The creative scientist like the artist finds new unity in nature. He sees likeness in things thought to be different. He is impatient with the current body of knowledge. That may account for his natural resistance to the accumulation of too much knowledge. The investigator points to the unobserved by displacement of accent and disproportion in statement. He expresses the half truth—usually the half hitherto unrecognized. Like the poet, E. E. Cummings, he sometimes gets 5 from the product of $2 \times 2$. He retains in his mature years much of the curiosity, imagination, and enthusiasm of his childhood. Psychologically and physically he may be not too robust a fellow. He has greater contact than most people with the unconscious, with fantasy, reverie and imagination. Yet he bounces back to reality often and promptly enough to convince average people that he is not completely off his rocker and need not be confined to an asylum. Like the pioneer who suffers to explore the frontier of a country, the investigator probes the frontier of knowledge and is able to tolerate great personal pain to testify correctly about his findings. Bronowski says the creative scientist is more primitive and more cultured, more destructive and more constructive, and crazier and saner than the average person.

The only criterion for an investigator is that he wants to do research. It is never possible to know how and when this desire will bring results. At an early age he may have established a reputation that from then on declines. Corti made the brilliant discovery of the organ of Corti and thereafter retired to a life of ease. For certain types of research, a man may not be prepared to complete a problem until he has experimented intensely with it and studied it from all angles for years. Darwin’s “Origin of the Species” and William Harvey’s discovery of the circulation of the blood are examples of late fruition. Today do you suppose an investigator is outside his competence in research—should not militate against an opportunity to do research. John Hunter was a ne'er-do-well in his youth, and Rousseau according to his

The talented investigator may be good or evil, may drink or abstain, may attend or absent himself from church. His dramatic taste may run to lively burlesque shows or be satisfied with nothing inferior to Sophocles’ Oedipus Rex. He may exhibit wicked qualities like those of a Borgia or a piety that aspires to that of St. Francis. Honesty is not even a necessary selective characteristic of a scientist, for no less a genius than Lord Bacon confessed to the acceptance of bribes and to corruption and died in disgrace.

I tell you a story about a more modern scientist. It was noticed around the laboratory in which this individual worked that things mysteriously disappeared. It became evident that they were being purloined. One of the victims decided to trap the suspect. He put inert ingredients into an empty bottle that had contained a hard-to-get drug and placed the bottle in a spot where the burglaries had occurred in the past. The next morning the bottle was missing. Some weeks later the suspect innocently asked the surprised victim: “What’s been your recent experience with such-and-such a hard-to-get drug?” “It’s been good,” replied the victim. “Funny,” said the suspect, “a batch I used recently was totally inactive, and so I wrote a complaint to the company.” How do you like that for crust? And yet the scientific findings of this thief were dead accurate. Did you ever systematically explore the underside of ash trays or the towels in the linen closet of your friends’ apartments? That experience can sometimes read like the Hotel Red Book. This is the so-called honest, respectable population from which some of the creative scientists are recruited. What can you expect of such scientists but that some may steal?

Suppose this thief had discovered a cure for cancer. Would you, knowing that, withhold his therapy from your cancer patient? Why, then, turn away a good investigator because he is a thief? Do you refuse to read the poems of François Villon because he was a thief? Is the history of the Borgias any less a classic because its author, Frederick Baron Corvo, was a spoiled priest? Do you admire any less the essays of DeQuincey because he ate opium or the pictures of Modigliani because he died at 35 debauched by whisky and women? The nature of the personal behavior and morals of investigators are outside his competence in research—and should not militate against an opportunity to do research. John Hunter was a ne'er-do-well in his youth, and Rousseau according to his
own confessions was a juvenile delinquent; yet so far as I know their youthful escapades did not impair their contributions to experimental pathology and botany. If a research problem turns out well is it any better for it to have been conceived in church, under the open sky, or in a nice cool saloon? Our duty to research is to encourage discovery, not to promote everchanging, artificial, often outmoded ethics. Respectability as defined by Ambrose Bierce is “the offspring of a liaison between a bald head and a bank account,” a combination of assets rarely possessed by creative scientists. Why then press respectability so insistently? As long as his work is good, does it matter whether a creative scientist likes to gamble, frequent low dives, pay for a Reno divorce every couple years, or, like Jim Bludo, have

“One wife in Natchez-under-the-Hill, And another one here in Pike.”

Some of my friends believe that when a man is too offensively well mannered and outrageously righteous and upright his research ought to be suspect. The Popes, Cardinals, and Bishops ignored the private lives of the Renaissance painters who spread their masterpieces on the walls and ceilings of the churches. We in science could learn a lesson from those clergymen. We should not moralize unless it is about ourselves.

A contributor to the arts has never been under compulsion to lead a puritanical life. With artists, unconventionality is not only tolerated, it is apparently expected and encouraged. Mencken says somewhere that the greatest artists of the world were rarely puritans and seldom even ordinarily respectable. And yet all this originality and talent are lost to science because respectability is the first ingredient that a scientist, especially a medical scientist, is expected to possess. An original mind can write a poem or paint a picture in any kind of an environment. But if a scientist so much as tilts his halo in or out of his laboratory he is likely to find himself on the carpet in the front office early next morning. Laboratories have strict rules for conduct. The loss to scientific discovery attributable to this narrow-minded attitude is incalculable. How many young original minds do you suppose have been repelled from science and research by the unconventional life? Walter B. Cannon extolled the good life for a medical investigator. No rounds and no dissipators; he would have him a good student and well educated, and in his maturity a strict, upright fellow, devoid of any criticism, a genuine Calvinist. Is it time we tried to modernize? To further medical research should we junk the bureaucratic and moralistic influences that have dominated all aspects of medicine since the old priest-craft days of ancient Egypt? Should we design more realistic rules for the management of cancer investigators, based upon the known conduct of men and women with creative minds?

Salary.—Medical research saves lives and prevents suffering. In World War I an estimated 700,000 military men perished who might have lived had the sulfonamides been available. In future years how many lives and how much money will be saved by sulfonamides, penicillin, and the other antibiotics that are now available for all time. Those figures combined are astronomical. Let no one ever accuse an investigator of wasting research funds until those figures are exceeded. Yet I have heard administrators arguing for weeks whether to raise the stipend of a research fellow from $3600 to $4200 a year. Imagine arguing about $600 a year for a man who has the potential to do what Domagk and Fleming did?

Are the members of cancer investigators’ families second-class citizens, so that they do not deserve as much as the family of a teamster boss, a banker, or an industrialist? Do the investigators’ children, when at night they kneel beside their beds, pray that if they are reincarnated, they be born into the family of a teamster boss who legally if not honestly might support them in better style? Does the research worker give too little thought to economics? Somewhere in one of Maxwell Anderson’s plays is the story of an inventor and his family living in dire poverty. The inventor’s wife urges him to demand a raise. The inventor demurs. He tells his wife that he is so happy to have the opportunity to invent that he is ashamed even to accept his pay check. He feels like backing up to the pay window for it each payday. Once heard a scientist say that he had never worked a day in his life, it had all been play. If he were a rich man, said another, he would pay for the privilege to do research. What research people like most is their work. When it comes to their salary they are like a school of hungry fish that snap at any bait. Why does a teamster union boss make more money than a research worker? If the creative scientist himself won’t face this question, should his wife face it?

Aristophanes, through that determined character Lysistrata, has taught all women that acting in unison they possess a powerful weapon for forcing the compliance of their husbands to any scheme that they want to promote. Lysistrata, you’ll remember, designed a magnificent scheme to organize the women of Greece to force their husbands to end the war between Athens and Sparta. The expedient was simple. They were to
refuse to lie with their husbands. The Greek women were at first reluctant to adopt so cruel a plan. But their abhorrence of war steeled their hearts to the point where they all tearfully swore the oath of celibacy over a bowl of wine. The implementation of Lysistrata's plan was, you'll remember, beset with many difficulties. Not the least of these was feminine frailty. As might be expected there were attempted defections and desertions. Lysistrata was kept busy trying to hold the women loyal to their oath. She became disillusioned and anxious. But at last, just at the moment the plan appeared to be lost, it succeeded. The turning point that climaxed the success of the scheme is the scene between Myrrhine and her distraught husband, Cinesias, one of the most uproariously funny scenes ever enacted on the stage. Aristophanes' play leaves no doubt about the effectiveness of the weapon which women possess to gain their ends. Adopting such a plan, the scientists' wives, acting in unison, could force their husbands' compliance to improve their economic situation in life. Collectively, men cannot long withstand such brutality.

Scouting research talent.—All sorts of methods have been proposed to scout research talent for projects and disciplines of science and medicine. In pathology I am a little more familiar with this endeavor than in other fields. Numerous hunting grounds have been suggested, as for example, among interns, residents, and fellows; students in medical school and college; members of student scientific societies of high schools, colleges, universities, and medical schools. High grades, a studious and serious attitude, and a good character are weighty considerations. If, in the past, recruitment had been confined to only these sources and these types, some of the finest research talent in the world would have been missed. John Hunter, who could never absorb any teaching in school, would have been missed. Leeuwenhoek, who was a janitor and ran a clothing goods store, would have been missed; and likewise Faraday, who was apprenticed to a bookbinder.

The other day a friend who like myself has grown serious, respectable, gray and baldheaded, outlined his plan for the selection of students with research talent for their introduction to research by the expedients of student fellowships or grant support to work during summer vacations. I inquired about his criteria. He said he would select those solid, mature, serious, earnest students who had made a creditable showing in their academic studies. I asked him to turn back the pages of his memory to his student days, now more than 30 years ago, to recall if he could how many of his classmates with all the characteristics he mentioned ended up in research. His answer after careful thought was, as I suspected, "None." Then I asked him to recall his early acquaintances who are now prominent in research, and enumerate the criteria by which they as students might have been selected for research. What was their scholastic standing? Where could they be found when class was in session? What were their extracurricular pastimes? How serious or frivolous were they? It was no surprise to me to hear him say that many of those now active in research whom he knew 30 odd years ago cut classes, frequented speak-easies and low dives, drank bathtub gin, read Mencken and Joyce instead of their textbooks, and had only mediocre or low grades; several flunked courses, one almost flunked out of school, and the lot of them were at that time anything but promising research timber according to his present criteria. They would have shunned a summer assignment in the professor's laboratory as an apple-polishing job only for bootlickers. Well, said my friend, I am grown too old and too respectable to hang around those emporia all hours of the night to recruit research talent, so I give up. I told him not to jump to conclusions so hastily because perhaps nowadays the student may be a different breed of fellow. But my friend was discouraged.

Genius in scientific research does not differ from genius in any other field. Think for a moment where genius in literature and painting could be detected. Eugene O'Neill and Joseph Conrad both had been common sailors. Conrad is said to have been a smuggler at one point in his career, and O'Neill's recurring bouts of alcoholism are a matter of record. To have sought the most talented French painters in the latter half of the 19th Century, you would not have mingled with the academicians in Paris but with the Impressionists in the village of Barbizon Forest. There the Impressionists, the coming painters of their day, struggled against the academic routine for the liberty of art. They were unappreciated, poor, and neglected. Yet today their paintings hang in our most distinguished and respected art galleries. Make no mistake these are the kind of bold, unconventional, original-minded fellows needed in medical research. They may be extravagant, coarse, unconventional and Bohemian, and are not necessarily found in an academic atmosphere. It has been said that the universality that characterized the great artists of the Renaissance gives the impression that, had their destiny turned them from painting, they would have been supermen in any circumstances.

Education and research.—Being curious is a
prime requirement for research, yet our present educational practice discourages curiosity. The how-why-and-when student is a great nuisance to the teacher. Most educational systems squelch all attempts at self learning. Independent thinking is penalized. It is easier to give the students a reading assignment instead of problems to be solved. The rote learning can be turned back at examination time in the form of rapid check tests. Most of the top U.S.A. scientists that constituted a group studied by Anne Roe somehow or other had found a teacher along the way who had induced them or at least permitted them to find out things for themselves. After that happened those men learned to rely upon themselves. Bad teaching then was only an irritation. The college, according to Da Costa, may teach a man how to work with the instruments of the laboratory and how to accumulate facts and many other unnecessary things, but it doesn't teach him to observe, to speculate, and to reason. It can't teach him how to make discoveries, because it can't create in him the faculty of imagination. It may teach him the design of experiments but to teach a student the mechanics of research with the expectation that he will become an investigator is just as fallacious as to teach a student the mechanism of verse with the idea that he will turn into a poet. To hope to test a man by examinations is folly, said Da Costa. Examinations do not measure the whole student. They are not tests of the man, they test his memory for facts. They tell us nothing of his judgment, tact, energy, enthusiasm, idealism, reason, observation, temperament, disposition, honesty, loyalty, courage, truthfulness, or intelligence. Memory for facts means little; the other things mean nearly all. Charles Nicolle went so far as to say that the inventive genius is not able to store knowledge and that inventiveness may be killed by bad teaching, fixed ideas, and erudition. Certainly, well developed habits of observation are more important to the investigator than large accumulations of academic learning. The powers of observation can be developed by the cultivation of the habit of observation. A man may pick a racehorse by small details another man would miss. The savage hunter whose life depends upon the game he kills has highly developed powers of observation for the forest life around him. In our modern schools the faculty of observation becomes atrophied.

Research should never be confused with technology. People trained for technology require education and sometimes a lot of it. But technology is not research. The researcher is motivated toward original achievements and not toward repetitive procedures and not toward scholarship. Many of those who made original contributions to creation, discovery, and invention frequently were not encumbered with any great amount of formal education, and some lacked it entirely. In technology precisely the opposite obtains. The technologist like David Harum's horse needs to be educated: "Every hoss c'n do a thing better 'n 'spryer if he's been broke to it as a colt." But mark you the word "broke." That is what formal education does. It breaks the spirit of horses and men. While by education a man can be broke to technology, a potential investigator can be broken for all time. For a technologist this is fine, for he keeps happy while he keeps doing technical things as he is directed over and over again. Ehrlich saw the dangers inherent in education and avoided them as much as possible. Einstein failed his entrance examination for the Polytechnic Institution. Metchnikoff bolted his classes for months on end at the University of Kharkoff, but he crammed for examinations and with his prodigious memory passed them successfully with learning that was as quickly forgotten as it was quickly absorbed. Linnaeus, because he did so poorly in school, came near to being a shoe-maker instead of a great discoverer. The book-binder's apprentice, Faraday, the great English chemist and physicist, was largely self-educated. After important contributions to chemistry in his early life, Faraday turned to electricity and magnetism in later life and left his mark of originality on all of these fields. Darwin's rebellion against the medical and theological educational standards of his day is another example of how to go to school and still survive and perform as a creative scientist. "It never struck me how illogical it was to say that I believed in what I could not understand and what is, in fact, unintelligible," said Darwin.

You may say that these examples are all from olden time and that nowadays there are no self-taught scientists. But what about Mr. Nicholas Cristofilos whose theory on a man-made radiation curtain was tested by Project Argus! Mr. Cristofilos was born in 1917. At 21 years of age he graduated in electrical and mechanical engineering from the National Technical University of Athens. He went to work on the installation and maintenance of elevators and the repair of motor trucks. In his spare time he read in science, largely from volumes on nuclear physics. He taught himself so well that by age 33 (in 1950) he propounded an idea for the construction of a new type atom smasher that resulted in a major contribution to high energy physics, the so-called "strong-focusing" principle used in most large atomic accelerators today. Mr. Cristofilos' current work is directed at the con-
struction of a machine for the control of the hydro-
gen bomb reaction. His suggestion that electrons
released by outer space atomic blast within the
earth's magnetic field would be trapped in that
magnetic field appears to be borne out by the Ar-
gus tests. Who now wants to deny that self-educa-
tion outside of a university is valuable preparation
for research?

If the pedants had their way no one could earn
an honest living in cancer research until he had
spent long years in the study of the pathology,
diagnosis, and treatment of human cancer—and,
of course, that is all rot. Roentgen discovered an
effective therapy for cancer without ever having
seen, let alone examined, a cancer patient in his
life. Pasteur, who never witnessed a surgical oper-
ation, laid the groundwork for Lister's aseptic and
antiseptic surgery which, together with x-ray and
radius, are the principal therapeutic approaches
in cancer today. Make no mistake, university edu-
cation can be overdone. The highly educated may
not produce much, if any, research. Gross and
Hudson, in their recent paper from Cambridge,
England, cast doubt on the use of the degree class
alone as a criterion for the selection of research
students. Moreover, great discoveries have been
made even by savages, people completely un-
spoiled by a university education. These savages
never saw a schoolmarm or the inside of a school-
room. Yet their discoveries are the kind of dis-
coveries that many university-educated cancer
investigators are striving for today. I mention
three: quinine for malaria, cocaine for local anes-
thesia, and curare as an antispasmodic. Who knows
how long these discoveries would have been de-
layed if those who were to make them had been
subjected to the stultifying effects of a modern
university education. Harry Greene always likens
research to a dog chasing a rabbit. Certainly the
dog chases the rabbit more by instinct than by
training. A six-month-old beagle pup taken into
the woods will chase rabbits without training or edu-
cation. He'll do what a whole kennel full of Peki-
nese dogs can't do. No amount of education about
the scent of a rabbit will divert the Pekinese dog
from the scent of the milady's expensive perfumes.

Let us look at pathology. If, nowadays, a man
wants to work in experimental pathology he has to
have a high school education, a college education,
a medical school education, an internship, and
3 or 4 years of service work in the laboratory. By
then he is so old, and his head so stuffed with learn-
ing, and he has such fixed ideas about disease that
his research potential is much reduced over what
it would probably be if he were younger and less
educated. A resident who finished his training in
Pathologic Anatomy and Clinical Pathology in
1958 talked to me about age and responsibility.
His education had been interrupted by World
War II. Now well into his 30's he told me that all
through medical school, all through his internship,
all through his period of training in pathology he
had been denied responsibility. Contrast this with
his responsibilities when he was in the Army. At
age 22 he was a Captain of a tank company at-
tached to one of the fast-moving armies that swept
across Europe and crushed the Nazis. He and men
of his age and stamp made crucial decisions that
won battles that accounted for the huge American
military successes. Imagine leaving that position
of command and responsibility for the position of
an obsequious, subservient, servile medical stu-
dent, intern, and resident in pathology. He was
sareely allowed to form his own opinion about a
reaction in a test tube full of urine and reagent,
without first checking with his chief. This retards
research. This is a defect in our education and
training today. Our young people are kept in
swaddling clothes. Let the young grope with re-
search and learn from their mistakes.

One of the best gross pathologists I ever knew
in my entire lifetime was the late George Taggert,
a former diener in charge of the morgue at the
Philadelphia General Hospital. An uneducated
Irish immigrant from Liverpool, he became by
virtue of his long exposure to autopsy pathology
one of the most skilled diagnosticians in gross
pathology in the Philadelphia of my day. He had
some fantastic theories about disease too! Time
and time again a histologic technician with no edu-
cation beyond high school has brought me a tray
of the morning's surgical slides with these re-
marks: "This lesion is tuberculosis, . . ." "That
lesion is a squamous-cell carcinoma," or "the can-
cer in Mrs. so-and-so is a very unusual type that
resembles the cancer biopsy seen 6 months ago."
Often enough that was about as far as the diag-
nosis in that case could be carried. One of our
leading ophthalmic pathologists in this country
today never attended medical school and didn't
even graduate from college. The examples show
that pathology, like many disciplines, is fairly
simple. It requires a little time and some experi-
ence to get used to the work, but it doesn't re-
quire any great type of mind or any great amount
of university education. I suspect that statement
is true of other disciplines of medicine. I hear a lot
of talk about Ph.D.'s trained in pathology and
pathologists educated and trained as Ph.D.'s,
but it is more important to afford young high
school and grade school students, young people
with curiosity, imagination, enthusiasm, and
promise, an opportunity to work in research pathology to see what they would produce. As the situation is today, the barrier of education, state boards, and specialty boards excludes these young people from pathology at a time in life when they possess to a high degree the intrepidity to challenge outmoded concepts.

Many examples of discoveries might be cited that have been made by investigators while they were young and unspoiled by too much of the prevalent education. At age 18, William Henry Perkin discovered the first aniline dye. He made this discovery not in a university laboratory or in a great research institute, but at his home in a small laboratory fitted up so he could work evenings, Sundays, and vacations. In the 1850's the currently educated English school boy of Perkin's age had made 10,000 or more Latin verses, a greater number than is contained in the Aeneid. That school boy's mind was occupied not with imagination, invention, and reason, but with conjugations, inflections, and word derivations. He knew all the intrigues of the heathen gods by heart: with whom Pan slept; with whom Jupiter slept; whom Apollo ravished, etc. Not so young Perkin. He had begun experiments in chemistry when he was 12. He enrolled first in a school in which he attended lectures in chemistry that were given during the dinner hour and later at the Royal College of Chemistry. The useless learning of his day did not interfere with Perkin's pure act of genius when he dipped a piece of silk into the colored solution that he had stumbled onto in his unsuccessful attempt to synthesize quinine and stained the cloth permanently. Morris Leifkind has observed that there was not, at that time, a school in England or in the world that could have taught Perkin that genius.

Cardinal Newman has speculated about universities that have no professors and no examinations and no rigid disciplines of study but serve as meeting places for young students to gather for 3 or 4 years and to talk among themselves. Students who discuss things widely among themselves are, according to Cardinal Newman, "likely to have more thought, more mind, more philosophy, more true enlargement, than those earnest but ill-used persons, who are forced to load their minds with a score of subjects against an examination, who have too much on their hands to indulge themselves in thinking or investigation, who devour premise and conclusion together with indiscriminate greediness, who hold whole sciences on faith, and commit demonstrations to memory, and who too often, as might be expected, when their period of education is passed throw up all they have learned in disgust, having gained nothing really by their anxious labors, except perhaps the habit of application."

Our children enter the present school system with the avid curiosity that children have naturally. The first thing that happens is that curiosity is knocked out of them. They are ridiculed or silenced when they ask questions. They learn painfully only one of four or five logical ways to spell a word. They are taught that the multiplication tables are immutable. They are forced to believe the worst sort of fables taught in the courses of reading, history, and political science. They study about biology instead of biology per se. When a new system of education is substituted for the discredited present system, as surely will happen some day, no one should be imprisoned in a classroom until he is 14 years of age or older, and the college and university curriculum should be similarly downgraded quantitatively. In one year a 14-year-old child could be taught all the essentials that he needed to know and indeed all that would be useful to him from the present curriculum contained in the first 8 grades of grammar school and the two or three years of kindergarten. Do parents send their children to kindergarten and to grade school to get an education or to get rid of them; to get them out of the house so the mother can entertain her bridge club, attend the Women's Society, collect for the Red Cross, or organize a Society for the Increase of Alimony? It should be a capital crime to force American children to memorize the speeches of Washington and Franklin D. Roosevelt; or the Russian children those of Lenin or Trotsky. Think of the schoolmarms this system would liberate to do more useful work than to show children how to cut out paper dolls or to teach about science instead of science itself. The children up to the age of 14 years would have a chance to satisfy some of their curiosity about nature as did Rabelais' Gargantua in the 15th century, John Hunter in the 18th century, and Giraudoux's charming 20th-century children. They could interest and amuse themselves out of doors, sit and laze in the sun, and watch the goings on around them. Robert Louis Stevenson said that books are a mighty bloodless substitute for life. If a child reads very hard he will have little time for thoughts. The idler gains knowledge of life-at-large, the art of living and wisdom. In inclement weather the boys could frequent the pool rooms and learn something about spheres, the transmission of energy, a straight and a curved line, reverse English, angles, and other geometrical figures transcribed by a clean, white, easily visible ivory ball on a soft green cushion under adequate illu-
mination in pleasant surroundings. The girls could
spend these rainy days at the great art and science,
appreciated only by the female—scheming how to
bring themselves to the attention of the boys.

Scientist-administrator relationship or how to do
research and survive and perform.—Strains and fric-
tions in the relations between scientists and ad-
ministrators constitute one of the chaotic prob-
lems in research today. At the core of this relation-
ship are two different prevalent attitudes; the ad-
ministrator works for the love of his salary, and the
investigator for the love of science. The scientists
seem to have little familiarity with the activities
and decisions of administrative officers and regard
many of them as generally indifferent or outright
incompetent for research management. The ad-
ministrative officers have become the policy-
makers and have achieved the power to act almost
completely unchecked. They derive their authority
from the practical control they have over budget,
personnel, space, supplies, travel, and all other al-
locations. They are criticized for their failure to
coop erate effectively in the furtherance of re-
search needs. They act, not as servants to the
research people which they should be, but instead
they treat the scientists as employees. Having as-
sumed the airs of employers, they give the impres-
sion of ownership and, depending upon their mood,
adopt a condescending or an aloof attitude toward
the investigators.

The administrators have multiplied like flies in
recent years and are now incongruously out of pro-
tportion to the number of research scientists whom
they should be serving. There are now more com-
batants than warriors. Their responsibility and
loyalty have shifted from the scientists to other
administrators above them and on their own foot-
ing, and all band together to become policy-mak-
ers. They administer for administration's sake.
The rules they make are often more appropriate
for office workers than for creative scientists. The
matters that concern the investigator are taken
care of by the administrator on the rationale that
this relieves the investigator of unnecessary work.
The investigator is thus divorced from matters
that concern him. On the average the intelligence
of the administrator is considerably below that of
the scientist. Against stupidity even the Gods are
said to fight in vain. I have asked investigators
for their remedies for this unfortunate relation-
ship. Many of their remedies are much too drastic
to repeat here. Many others, though effective and
highly desirable, appear to me to be somewhat
illegal—"boiling in oil," "off with their heads,"
"limit their tenure to 6 months," "their annual
salary to $2,000," "pay them with continental or
confederate money."

Among the variety of types of administrators
are the gossip, the egotist, the unscrupulous, the
inefficient, the busybody, and the henpecked
types. The gossip stirs trouble in his organization
that keeps the staff in constant turmoil. The ad-
ministrator who is influenced by his home life
comes to his office at nine in the morning after
the loss of a dreadful battle to his wife at break-
fast. His sole idea is to win over all other oppo-
nents. How many good ideas for experiments do
you suppose he squelches that day? Such an ad-
ministrator, like all henpecked husbands, could
be allowed to reign, but he should not be allowed
to rule. I wonder what such an administrator
would say if one of his new employees paraphrased
Diogenes' remark to his new owner when he was
sold into slavery on the Island of Crete. There his
new owner, filled with the spirit of placement-man-
agement for his slaves, asked Diogenes what kind
of work he was trained to do. Diogenes replied
that he was trained to govern and that as a slave
he was looking for an owner who needed a master.
The world depends upon the lone investigator for
research accomplishments. A scientist is too
precious a commodity to be battered around by
and made subservient to an incompetent. The sci-
entist should have complete freedom to develop
his research problems. Real breaks in the frontiers
of knowledge cannot be forced but come about
from the efforts of an unguided research worker.
There is no place here for the devastating effects
of the whims and moods of an administrator which
may simply reflect a bad morning with his wife.

Then there is the untrustworthy administrator.
Walter B. Cannon had so little confidence in his
administrative superiors (and remember these
were at Harvard) that after a conference with
them he wrote his understanding and impressions
of what had been said and agreed upon at the con-
ference. He immediately sent this document to
the officer concerned, with the request that that
officer read it carefully and return it promptly
with his concurrence or with modifications. This
avoided later unfortunate consequences based
upon what Cannon generously granted to be faulty
memories of administrative superiors.

Still another type of administrator is a great
egotist who often decorates his inner sanctum with
pictures and objects calculated to impress the
visitor with the high regard with which he is held
by his fellow man. There the meek and lowly scien-
tist stands or sits surrounded by reminders that
the man to whom he is talking, his administrator,
has achieved great distinction in life. This setting is calculated to overwhelm the visitor as were the pictures in the room of the surgeon visited by Dickens' Uncommercial Traveller. The Uncommercial Traveller, you'll remember, found that room: "bestrewn with testimonials to Joe. Portraits of Mr. Specks, bust of Mr. Specks, silver cup from grateful patient to Mr. Specks, presentation sermon from local clergyman, dedication poem from local poet, dinner card from local nobleman . . . ."

Then there is the type of administrator who exemplifies precision and efficiency to the highest degree. No papers accumulate on this man's desk. He is always punctual. His organization follows an up-to-date pattern. Not more than five department heads report to him. It takes a few seconds or a minute or two at most for him to make a decision. No investigator who seeks approval for a project or for additional funds has long to wait for an answer. Of course, the answer is usually "No." This type of administrator has never gone to jail for overspending his budget. He usually turns back surplus funds at the end of the year, for which he receives the approbation of his superiors. He occupies much of his time and that of the investigators writing monthly, semi-annual, and annual reports, specifications for apparatus, confidential reports on fellow scientists, review of scientific papers, justifications for research programs, reasons for firing and hiring employees, job descriptions, press releases, a new 5-year plan for research, and a dozen other tasks that distract from research. Could it be this type of administrator that Admiral Rickover assessed as follows: "Super-efficient administrators are the curse of the country. Their main function seems to be to harass brain workers with trivia and to waste as much time as possible." Those of you who have suffered and persevered in your work under administrators of this type will understand what I mean when I say: He runs a well-oiled machine, and the scientists all hate him.

The administrator who was once a scientist himself is a different kettle of fish. In spite of his best intentions his heart is mostly in the laboratory. He is disturbed and irritated by the duties of his office. He becomes defensive and takes refuge in opposition to most requests. Those who forsake research for administration differ, according to Anne Roe, in some personality factors from those who remain in research. She eliminated these as variables from her study of outstanding U.S.A. scientists. She suspected that this shift from research to administration may be explained by a rapid decline in some special abilities. The rate of decline in special abilities in those who remain in research may be less rapid, she thinks, because they may have greater abilities to begin with. The appointment of a scientist as the administrative head of a research organization is no guarantee that he will readily approve plans for new research or that he will accept new discoveries made by his staff no matter how worthwhile or worthy they may be. The views a scientist takes toward the plans or accomplishments of fellow scientists are often less than rational. He carries these same prejudices with him when he becomes an administrator. Ian Stevenson has collected an impressive array of examples of hostility that scientists have exhibited toward new ideas advanced by others. Bacon couldn't believe that the earth goes around the sun and Galileo couldn't accept Kepler's ellipses. Virchow received the two great scientific movements of the 1870's and 1880's, bacteriology and Darwinism, with scepticism. A scientist-administrator, just like a scientist, can have a half-closed mind. In a scientist this is a calculated risk. It affects his own work. But it can be devastating in an administrator who is in a position to cast gloom on all the ideas that originate within his organization. Scientists with their unenviable record of opposition to new ideas are, when appointed research administrators, in a powerful position to bring to bear upon the staff "the withering effect of incredulity on budding ideas."

Overhearing a conversation between two of my friends, one of them fiercely criticized his superior for some dreadful mistake. The other advocated mercy and tolerance. He compared this leader to some of the generals in the war between the states who had been recruited from the ranks of the politicians. General Grant was aware of the deficiencies of these politician-generals in his command, and when one of them made a mistake he defended him in these words: "Don't be too hard on the poor fellow, remember he started life as a brigadier general." In science, as in war, there is the type of leader who is appointed from the ranks of the politician, medical and scientist politicians in this case. This type of administrator feels that the right to his position resides in his power to maintain it and to promote his own interests. He has no qualifications for the job. He plays ball with his administrative superiors and with his administrative colleagues, but at the same time does everything to entrench his own position at the expense of the scientists. His tactics are reminiscent of those described for a quartermaster assigned to a new post in the Army. The first thing that quartermaster
did in his new assignment was to make himself comfortable. He then made his commanding officer comfortable. After that he proceeded to make himself much more comfortable than his commanding officer. No thought for the troops and in case of the administrator no thought for the scientists and their helpers. The system developed by such an administrator may fasten itself onto a scientific group as the Old Man of the Sea fastened himself onto the neck of Sinbad the Sailor. This results in the acquisition of supreme power by selected individuals. An administrator in such an organization asked a secretary for the annual report of her division. She replied that the report would be forthcoming when her boss, the scientist, had time to finish it. “Where is the boss?” demanded the administrator. “In the library,” meekly replied the secretary. “That’s the trouble with the scientists, they spend too much time in the library,” opined the administrator. He is the kind of administrator who has also been heard to say that “it would be fine to work for research if it wasn’t for the scientists.” Administrators like this one are as full of intrigues as Alcibiades. The investigator whose eagerness for discovery leads him deeper and deeper into the elucidation of hidden meanings has not the time, inclination, or the reserve strength to defend himself against the onslaughts of the administrator and his clique. The lesson we learn from the lives of scientists, men like Rutherford and his collaborators who developed a picture of the atom, is one of dignity, self-sacrifice, devotion to science, and regard for the bonds of professional conduct and duty. They are careless of wealth and fame. How expect men like them to descend into the arena to fight against skilled unscrupulous adversaries whose ethics would do credit to a 16th century Florentine duke and his court? No wonder Henry Adams terminated his career in literature, in and out of government and in and out of teaching and research in a university (Harvard again) with the statement that he had become a conservative Christian anarchist.

Some institutions give the impression that the investigator has immense freedom to follow his own ideas. Those institutions have no director of research. But as you read further you find that instead of a director of research there is a committee for research. There is, in other words, not just one director but a whole committee of them. Instead of one enemy to worry the wretched scientist, there is a whole committee of enemies to harass him. Anything that is done by a committee is done far less satisfactorily than by an individual. Remember the father’s description of the camel’s gait to his young son. “My boy,” said the father, “the camel walks as though it had been put together by a committee.” Worth-while advances in science are seldom made without taking risks, but a committee on research tends to favor secure projects that are based upon conventional lines of work and are written up in great detail.

Originality flourishes best in an atmosphere in which the creative scientist is free to carry out his own ideas. Science has grown so fast in this country and enthusiasts have been so busy raising money to make available for research and for research buildings that too little thought has been given to the organizational pattern for servicing the scientists. A democracy might afford just such a system of management. The three branches of the government in this country maintain a delicate balance between personal liberty and the free growth of ideas in a tolerant society. A democracy in a scientific institution would have the advantages and disadvantages pointed out by Maxwell Anderson for a democracy of a society. It would be governed by amateurs, incompetent in villainy and clumsy in corruption. This would contrast with the rule of a highly efficient dictatorial administrator. Management would go at a pace so slow that the alert scientist might have a chance to defeat the system at every step of the way. Nowadays it takes a scientist a long time to learn how to beat the red-tape fellows. The operation of the various branches of this democratic government of scientists would create an atmosphere in which ideas flowed freely and work flourished. It would assist with, but not force, schemes for coordination of work. It would facilitate but not plan or direct research. The least administration is, of course, the best. Under this democratic regime an administrative official who lacked sympathy with the efforts of the research people or who failed to create an atmosphere conducive to research or who was uninterested, indifferent, hypercritical, unreliable, dishonest, or stingy could be impeached. Humility may be fitting for saints but seldom for scientists, said Cajal.

No country has achieved greater organization for the production of industrial goods, buildings, and superhighways than our country. Yet, we, in the United States, have never learned to organize for the production of ideas. Industrial production and research production require fundamentally different types of organization and effort. The initiative for industrial production depends upon the push from the president and the executive organization. Research production depends upon the
push from the individual, the creative scientist. This push is strongest where management is least and can be retarded or cancelled out by an administrator of research who is too aggressive and who makes a nuisance of himself.

There are certain situations in life in which a man becomes entrapped as is a scientist in a dictatorial research organization. He has to wait to be released by help from the outside, as Prometheus, who was bound by Zeus, the administrator of the Gods, had to wait to be released by Hercules. Until help arrives he can only rage and curse and swear. He is a victim, like that motorist who, when he drove through a certain small Western town, was caught in a web of perfectly legal but completely unreasonable and downright dishonest regulations. This Western town was totally populated by a one-faith religious group. The townspeople decided to build a new church and to finance its construction from fines collected from unsuspecting motorists caught speeding on the segment of the highway that constituted the main street of the town. One busy Sunday afternoon, a recent Italian immigrant was, among other victims, hauled before the pious Justice of the Peace and duly fined for speeding. After the sentence was imposed and the fine was paid, the judge, an elder of the church, raised his hand benignly over the victim's head and pronounced this solemn benediction: “Peace unto you my good man.” The irate Italian retorted, “Peace on you, too, Judge.”

Dead wood. —An attempt to identify and weed out dead wood in a scientific research laboratory may be nearly impossible. An investigator may be so ashamed of his problem that he won't disclose the plan of it to anyone. Jenner confided his experimental plan to just one person and swore that person to secrecy. It required 20 years of work before Jenner turned out his paper on vaccination against smallpox. Imagine Jenner in a research laboratory in this country and was paid a modest salary of $15,000 a year for 30 years until he retired and went to Florida or California or Southern Texas to spend his remaining years in warmth and comfort. The total outlay for Jenner's salary would be $450,000, just a shade less than one half of the taxes collected in 1956 on the sale of pistols and revolvers. Now let us assume that in that same institution there were during all that time a thousand ineffective men who never contributed significantly to research. The money involved to maintain these drones on the same modest salary of $15,000 a year for 30 years comes to $450,000, less than the annual cost of rivers, harbors, and flood control in the United States, and much less than the cost of lives lost to smallpox. Is it worth the time, effort, money, and danger to try to distinguish between these thousand imposters and Jenner, the one genuine investigator, or is the risk of the elimination of an investigator like Jenner too great? The investigator who is secretive about his research problem would surely fare less well in the eyes of his scientific administrator than the 1000 ineffective ones, many of whom might be able to pull the wool over the eyes of the administrator who often enough is not too bright a fellow. And who knows, maybe one or more of the incompetents would finally stumble into some fine discovery. Even a blind chicken sometimes finds a kernel.

Elder statesmen. —“Elder statesman” is a laudatory term sometimes applied to a well known scientist or physician as he is entering or after he is well into his senescence. Sometimes the term is applied to medical and scientist politicians, paternalistic characters, who do not retire gracefully at the end of their career. Instead they attempt to prolong and perpetuate their influence beyond its justifiable limits and far beyond their age. The only contribution to science that some of these old fellows have made was one of doubtful value that was published when they were young and to which they keep referring all their lives. I have in mind one of this ilk who has been chairman of several national committees and advisory boards in this country. With his influence he populated those committees and boards with men whom he had trained or who were his friends and thus loyal to him. Such a committee is called a silent committee. No one argues with the old chief.
and friend. It may remain sterile for years, or stamp approval on methods 40 years behind the time, and thus retard progress. Ian Stevenson says committees and boards are likely to support timid projects which are calculated to succeed but not to advance science. They tend to back good risks rather than to support wild ideas. Fortunately for science the opinions of these elder statesmen do not always prevail, for if they did science and research would be at a standstill or on the downgrade.

We need always to bear in mind how completely wrong advice from elder statesmen can be. I cite an example of this which in one way or another touches every person here in this room this evening. I take my example from the testimony given at the Joint Hearings on the bills before Congress on July 8, 1937, for the enactment of the “National Cancer Institute Act.” Dr. Parran had just finished his testimony that outlined plans for the creation of the National Cancer Institute and treatment center: to aid scientific groups to enable them to do cancer research; to support cancer education; for the dissemination of information on cancer, and for the promotion of cancer prevention, cancer control, and cancer therapy. Dr. Parran produced a document of great historical importance for science, medicine, and research. His plan has operated successfully for the past 22 years. It has since served as a pattern for Federal support for research in several fields other than cancer. But let me get on with my story. The Congress on July 8, 1937, was interested in the views of non-governmental cancer experts about the cancer legislation under consideration and had invited several to testify or submit written opinions. Dr. C. C. Little and several others made splendid statements and testified favorably for the legislation. Dr. Little then went on to establish the position of Dr. James Ewing in the cancer field of 1937, preparatory to the introduction of a letter from Dr. Ewing to Senator Copeland, who acted as Chairman for the Hearings.

"Dr. Little: Dr. Ewing is the head of the Memorial Hospital in New York. That hospital is one of the great cancer institutions of the world. Dr. Ewing himself is a pathologist, a recognized authority the world over, and is a man who has gone far beyond that to give his whole life and thought outside of his narrow, specialized field to the subject of cancer as a whole. I think that the experts here today will admit, almost without a dissenting voice, that Dr. Ewing probably knows as much about cancer as any other living man, perhaps more.

"The Chairman: In connection with your remarks, I wish to present for the record a letter I have received from Dr. Ewing. It is as follows:

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Hon. Royal S. Copeland
Washington, D.C.

My dear Senator Copeland:

As I am leaving this morning, July 3, for Scotland, to return August 3, I regret that I cannot attend the Senate hearing on the cancer bill.

As I wrote to Mr. Maverick, I believe that the only good that can come out of this discussion is to cause the creation of a large central cancer institute in Washington, designed mainly for the treatment of patients, with which could be associated all the Government activities in the cancer field. I believe that the difficulties of administration of such an institute, requiring the cooperation of the Veterans Bureau, Army, and Navy, may be found difficult to overcome, but all the more desirable.

There are abundant reasons for dissuading the Federal Government from entering any further into the field of pure cancer research. It would mean merely another futile effort to discover the ultimate cause of cancer, which is an unsolvable problem. This solution will come when science is ready for it and cannot be hastened by pouring sums of money into effort.

We already have too many inexperienced cancer workers in the fundamental field and too few doctors capable of diagnosing and treating cancer. According to modern standards, the distribution of small grants to numerous inexperienced workers is a poor method of securing important results, and we already have enough grants of this sort.

Very sincerely yours,

James Ewing, M.D.

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"Dr. West: I do not think that you can purchase research ability. I think the investigator in cancer is a man who has a peculiar scientific curiosity and ingenuity that is inherent in individual men. I do believe that it is a very important part of the great problem, of the efforts to effect better control, if 'control' can be properly used in that connection, with respect to cancer, to train workers; but, as a matter of practical fact, it is my opinion that there are comparatively few men in this country who are qualified at the present time to give the proper training to workers. I am not so sure that the appropriation of large sums of money may not bring down a flood of applications for positions in research institutions, including those of the Government, from people who are not fitted and will never be fitted for the part that they would be supposed to play in investigative work.

"Senator Bone: I know in my own contemplation it has been largely a question of research work, more and perhaps the best contribution we can make is in that direction at this time."

End of the quotation from the Congressional Record.

Dr. Ewing's testimony is a shocker and so is Dr. West's. Yet Senator Bone, who was not a cancer expert and not even medically or scientifically trained, had both feet on the ground. The events of every
day that has passed since July 8, 1937, testify to the wrongfulness of the views of Dr. Ewing and Dr. West. How reconcile Dr. Ewing's enormous stock of knowledge about cancer with his injudicious opinions on the approach to the biological enigma of cancer? Could it be that Dr. Ewing had a blind spot? A blind spot or a half-closed mind in an outstanding authority has been documented by Ian Stevenson. Scientists become seduced by their own attainments. Success in one matter makes them think they are expert authorities in all. Pasteur at one time said that the scientific method could never be used to study the emotions, a statement later refuted by Pavlov. Da Costa cited the example of a young French intern named Melier who described appendicitis before a medical group in Paris and stated his belief that this disease could be diagnosed clinically and cured by operation. Dupuytren, the great surgeon of the day, rose to his feet and annihilated the views of the speaker. Melier was right and Dupuytren was wrong, but the medical profession chose to follow the authority, Dupuytren, instead of the young, original-minded, radical intern, and so countless numbers of patients died from appendicitis who might have been cured. Perhaps everyone is to blame for relying too completely on the weight of authority.

People considered prominent in medicine and science are supposed to have opinions on new ideas advanced and new work proposed or published in their fields. They are apparently embarrassed to have no opinions when asked questions about these matters, and so they are likely to manufacture a quick opinion without careful consideration. They often voice contempt without prior examination. A common and astonishing feature of the opposition is the certainty with which it is offered. This makes the elder statesman a dangerous opponent to progress in research and science. Ian Stevenson says that when human beings become scientists they continue to experience some of the less rational qualities of being human, and all their rationalism has to be balanced against their human qualities—their hopes, fears, and wishes. The young intelligent cancer investigator should be warned to take cover to protect his mental independence against the assaults of prominent elderly experts, singly or in groups.

I cannot hold in reverence old men appointed as scientific advisors or to scientific committees or boards to review the research program of a laboratory, or to grant money, or to act in any so-called fact-finding or advisory capacity. They have the once-over-lightly touch. The opinions expressed and the advice given to scientists by such groups should be carefully evaluated before it is accepted and followed. Have you any indisputable evidence that such a group ever helped investigators? Such men have often reached an age when they are depleted of ideas and distrust new ideas in others, especially wild ideas. Yet wild ideas have led to much good research. The satisfaction, support, consolation, and confidence such a group gives administrators is enormous, but all I have heard they do for the investigators is to hamper and annoy. While in the Army during the war we frequently had visits from groups of elderly experts sent out from Washington. Their visit certainly interrupted the routine of a military post and for its duration impeded the war effort. Some of my friends called these people "paratroopers" because they dropped in unexpectedly. One of my friends worked out a plan to handle these visitors. The moment the group arrived at the military post in my friend's organization he plied them with bounteous hospitality. As the day wore on they became more and more agreeable until toward nightfall they were real Tam O'Shanter's

"O'er a' the ills o' life victorious!"

At the conclusion of their inspection tour, which all too frequently didn't get far beyond the local club, the experts were conducted to the airport and poured on the plane for the return trip to Washington. This my friend always did after he himself had taken pains to write a favorable report and put it in the pocket of the chairman of the delegation. He thus made sure that the group was well cared for and that he himself was well cared for. Washington always got a favorable report about my friend's departmental activities.

An ideal research laboratory.—I could conceive of a cancer research laboratory devoid of administrators. Such a laboratory would parallel Cardinal Newman's university which he conceived to be without faculty or proctors, but where young people came together to study what they wished to study when and as they wished to study it. Translated to a research organization, groups of investigators would come together to work unimpeded by the obstacles that today strew the path of the earnest, industrious, creative investigator. This ideal research laboratory would be populated only by the scientists who would be their own boss and by the technicians and other helpers who would be bossed by the scientist. The scientists would operate under a democratic system of management. The salary of the investigator would be somewhat better than that of the president of the General Electric Company or of the Aga Khan, whichever is larger. When the investi-
gator needed apparatus he would send his techni-
cian to a pile of money kept somewhere for that
purpose to pick up the money he needed. On his
return the technician would stop in some con-
venient shop and purchase the apparatus. The
whole procedure should occupy not more than a
half hour’s time. Anyone who wanted to work on
a research problem would be allowed to join the
staff of the laboratory. There would be no educa-
tional barriers, no necessity for academic degrees
or for specialty board certification, no lengthy in-
quiry about past or present associates, habits, or
membership in organizations. If, for example, the
scientist was a burglar in his off hours outside the
laboratory, he would not be denied employment
rights as long as his ability to make discoveries was
not hampered or impeded by his nocturnal occu-
pation of burglary.

There would be no newspaper reporters, public
relations men, or information specialists who now
loom larger than the persons who are supplying
the information. This would automatically elimi-
nate self-deception and public deception and the
present volumetric increase in press releases which
are out of proportion to the scientific contributions
now produced. Up for elimination also would be
the sorts of quacks, crackpots, paranoiacs, and
hangers-on who attach themselves to new enter-
prises—formerly the early Christian groups within
the Roman Empire, now research groups of one
kind or another. When a piece of work had
reached a state of maturity and the scientist
wanted to report his findings, he would write a
manuscript in his own words learned on the sand
lot or the baseball diamond. No one would force
him to seek editorial assistance. He would turn his
manuscript over to printers to be set in type just
as written: sans grammar, sans punctuation, origi-
nal spelling, and all, untouched. It would be the
responsibility of readers to learn the modern Vul-
gate in order to understand scientific papers so
written, just as the aristocratic, erudite, scholarly
readers of Dante, Rabelais, and Erasmus had to
learn the Vulgate of their day to understand those
authors. Words with double meanings would be
eliminated from the language to avoid repetitions
of misunderstandings like that which arose be-
tween the homesick young Army recruit and his
mother. The recruit wrote home to his mother
that he missed everything at home—the security,
the kindness, the love of the family, her good
meals, his soft bed. Most of all he said he missed
the little pottie under his bed. His mother wrote
back that she wasn’t surprised for he had always
missed it at home.

In this ideal laboratory there would be no rules
of conduct, no malicious gossip, no cliques, no an-
nual reports, no budget estimates, no personnel ac-
tions, no program evaluations, no telephones, no
visiting firemen—in a word, none of the distrac-
tions that currently harass the scientist. If the
scientists wanted to get together for a convivial
evening, it would be illegal for a policeman or vice
crusader or any other snooper to be caught within
10 miles of the location of the party. If day after
day a scientist sat looking out of the window and
dreaming, a heavy fine would be imposed on any-
one who disturbed his reverie, who spied on him
thus unoccupied, or urged him to activity. A
guard would be stationed at the front door to bar
visitors of any and all types, except those who
were welcome. The acts of the investigator would
not be regulated and his thoughts would not be
limited. No research unit would be established in
a university department headed by a professor
who knew nothing about research. The economies
effected by the elimination of 75 per cent or more
of those who now draw their salaries from cancer
research funds, would provide money to increase
the salaries of cancer investigators, and joy would
reign supreme.
The Cancer Investigator

Harold L. Stewart


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