because of intimidation. In fact, as the physician begins to realize how slender the facts are behind the ego and id vocabulary of psychiatry, he also begins the downgrading of this field which was inevitable.

Perhaps the fact that as a physician he knows the one-to-one ratio, the confinement upon which the physician-patient relationship depends, makes it difficult for him to understand how an educational structure could be developed around group concepts, or around any field (social or behavioral sciences) which allows a nonphysician a large role in the construction of a curriculum.

It is interesting that basic scientists (brains) can understand that the very social framework of medical education and subsequently medical care may need changing whereas the clinician (hands) finds this beyond his imagination. Some of the reasons behind the clinician's attitude have been indicated above. Perhaps it is true, to state it differently, that the clinician has come through such a long, confining, and restricting discipline that he has become a victim of it and even against his own judgment or without his own knowledge, he cannot see the issues as clearly and originally as the basic scientists, M.D. or Ph.D. The latter group can think, perhaps, of problems of world health, of Malthus, of mass destruction, and of mass well-being.

The clinician, because of the initiation rites of his club: after 10 or 15 or 20 years of thinking of sickness, not of health, and of responsibility for *a* patient, not a population, finds himself trained into a mold. This mold has been defined by the profession as the way in which it wants its physician to perform. The fact that there may be a better way to care for the health and sickness of the population is occasionally suspected by the individual physician, but only occasionally. Day after day the method keeps shaping him and unconsciously he finally *knows*, right or wrong, that this is the way a physician should be made and this is the way a physician must practice.

The "brain" half of the discussion cannot accept this argument as a reasoned one. Why can not a new school develop a new curriculum which is designed for a world which has changed? What is so changeless about the practice of medicine which would make it correct to produce doctors now, using the Flexner report as a guide book? The 40 years since its appearance have seen a change upon obsolescence upon change in practically every other form of human endeavor.

This can be deprecated by saying that these changes have been in mechanistic fields, transportation, communication, and industry, and that medicine and medical care reflect changeless qualities, as fundamental as love or hate, and therefore the qualities which make a good physician are durable and have remained so, on through Hippocrates, to Harvey, to the present.

This answer is a retreat behind phrases. The caring or concern for the sick is a continuing enlightenment of man. This does not mean that the individual who applies therapy has been unchanging. Society has continued to evolve a physician to suit its temper, time, and tolerance. The physicians of Rome read the entrails of animals, the physicians of Medieval Europe prepared decoctions of urine, pearls, and toads, the physicians of the 18th century bled and purged.

The argument of "hands or brains" can be a good one. If wise enough men are engaged in it, and if the hostile elements can finally come not to a compromise but to a level of originality and even daring, then not only a new medical school but an experiment which is long overdue will come forth from their labors. It is possible to consider the hand, the brain, the behavioral sciences, and the individual, as well as the society.

Such opportunities for originality come but infrequently and they come to a given institution but once. That moment is gone and lost if the original handful of men, who sit down to dream and define, are unable to separate their own ambitions and bias from the potential before them.

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Ozone: Protection of Plants from Injury

It is interesting that particulate agents as diverse as clay and sulfur can protect plants against damage by ozone [E. L. Jones, *Science* **140**, 1317 (21 June 1963)]. However, I must express skepticism regarding Jones's idea that the catalytic decomposition of ozone would be expected to produce enough heat to "burn" plant leaves.

The net reaction, $O_3 \rightarrow 3/2\ O_2$, is exothermic to the extent of 34.1 kcal/mole of ozone decomposed, but the ozone concentration in polluted air is only about 1 part per million; hence the heat available from this source is only about 0.034 cal/mole of atmosphere, equivalent to a temperature rise of about 0.005°C. Reaction of ozone with reducing substances at the leaf surface would yield a somewhat higher heat of reaction, but certainly not by a factor of 10. Thus the protective effect of these substances must be attributed to their ability to destroy ozone, rather than to their ability to dissipate heat.

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In a physical sense, the kinetic recombination of oxygen atoms on the leaf structure, a third body, could result in the evolution of sufficient heat to degrade specific leaf cellular structure.

A rough calculation yields a potential oxygen atom pair impact per tomato cell of at least 65 per second when the ozone concentration is 1 ppm.

The mechanism of leaf "burn" by ozone has not been established.

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Eradicating the Gypsy Moth

The successful isolation, characterization, and synthesis of gyplure, the sex attraction of the gypsy moth, which was described by Jacobson and Beroza [*Science* **140**, 1367 (28 June 1963)] represents a milestone in the 60-year-old battle against this forest pest. Synthetic gyplure is quite inexpensive, and as little as 10^{-8} mg has attracted male gypsy moths in the field. Since it became available it has replaced benzene extracts of virgin females as a lure in survey traps. There have been suggestions that it might be valuable in controlling the insects through massive trapping programs. However, very little attention has been given to the potential use of gyplure in a control program designed to frustrate mating by confusing the males during the brief flying season, when they must locate by smell the heavy-bodied and essentially flightless females. This could be accomplished by saturating the en-

vironment with gyplure. Adsorbed on a granular substance, it could be cheaply and widely distributed by high-flying airplanes. Since it is nontoxic there would be no danger of overdosage or contamination of cultivated areas. A single application might be effective for several years, as the chemical is quite stable.

Because of the toxicity of chlorinated hydrocarbon insecticides, spraying has been limited in recent years to the periphery of the gypsy moth infestation to prevent its spread to the west and south. The gyplure granules would be most effective in such areas. Indeed, the effectiveness would very likely be directly related to the ratio of "dummy females" to live ones. Insecticide spraying could then be concentrated on areas of especially heavy infestation where it would do the most good.

The broadcast application of gyplure is an approach which can't conceivably do any harm, would be much less expensive than insecticides, and might possibly afford the means of finally eradicating the gypsy moth.

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Moulton Hall

I agree with the suggestion made by Frank L. Campbell [*Science* **141**, 311 (26 July 1963)] that the headquarters building of the American Association for the Advancement of Science be named and dedicated as Moulton Hall, in honor and tribute to the late Forest Ray Moulton (1872-1952), astronomer, author, mathematician, and business administrator, whose rare combination of talents recreated the physical, financial, and administrative structure of the AAAS at the most difficult period in its 20th century history. Under his strong, informed guidance and leadership it developed into the organization of power and prestige that it is today.

Moulton almost literally "took over" the Association in the middle 1930's, when its membership was continually declining (down to 18,000 in 1935) and rebuilt it. His confidence and drive overrode the sense of futility and discouragement that cramped the mid-30's, following the so-called Great Depression, and set the Association on an upward path. He was that rare combination of scientist and administrator (with an unexpected talent for business) who set the stage for the advancement of science along its present lines of organization.

It is a little-known fact that among other accomplishments Moulton made a spectacular and financial success of the 1933 Chicago World's Fair.

I knew Moulton in the later years of his life as a co-editor of *The Autobiography of Science* and as a friend. My memory of him is that of a man of courage, integrity, wisdom, and genius and the modesty to accept these gifts simply as his contribution to the welfare of mankind through the medium of science. Like Campbell, I would find myself hard put to write a competent biography.

The AAAS would honor itself by naming its headquarters building Moulton Hall.

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Nevada Test Fallout

Commenting on my reconstruction of the Nevada test fallout that occurred on 26 April 1953 in the Albany-Troy-Schenectady area of New York, James H. Lade [*Science* **141**, 1109 (13 Sept. 1963)] states that there has been "no increase in the incidence of cancer or leukemia over the past ten years" in the tri-city area. At the risk of prolonging the argument over the fallout I would urge that Lade cite the pertinent statistics so that we may judge whether routine medical data could be expected to show up any biological effect of unusual irradiation of the infant thyroid.

It will be recalled that I urged that a special survey be made to determine if human pathology might be associated with instances of intense fallout from weapon tests. It seems that no such survey has been made in the New York area but that one is under consideration in Utah.

Since the publication of my original report [*Science* **138**, 1196 (1962)] more data on continental fallout have come to light. For example, the hearings of the Joint Committee on Atomic Energy on 20–22 August 1963 reviewed the findings of the St. Louis Committee on Nuclear Information and unearthed the Knapp Report. The latter makes it probable that areas close to the Nevada tests were subjected to fallout comparable to the 26 April 1953 contamination. It would appear that some individuals received thyroid doses in excess of 100 rad, or 1000 times the normal dose to which the thyroid is exposed in a single year. One can no longer say with easy assurance that no one in the United States has been injured by fallout, although the matter should be decided by analysis of the affected populations in Utah and elsewhere.

To an outside observer it appears that the U.S. Government has not yet found a formula for dealing candidly with the fallout issue. What is the American public to believe when President Kennedy prefaces resumption of atmospheric testing in Nevada with assurance that there will be no danger of fallout and then, with the initial test firing, milk levels in Utah rise to unprecedented levels of contamination? Then a full year passes before the AEC releases—apparently with great reluctance—a real estimate of the whole situation.

The signing of the Nuclear Test Treaty underlines the importance of looking carefully at our tests in Nevada to make sure that populations adjoining the Nevada Proving Grounds are fully protected from fallout that is not contained by underground detonation techniques.

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Mature Scientists Need Support Too

At present there are three categories of career support offered by the National Institutes of Health, two designed for younger investigators (career development awards) and one for the active senior scientist. I would like to suggest a fourth category: senior scientists who are required by institutional and statutory regulations to retire, but whose potential for continued work is by no means at an end. These scholars should be provided with sufficient funds to insure their having adequate facilities and help to produce a written legacy of scientific information and intuitive, speculative thinking derived from experience and knowledge.

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