The George E. Brown Memorial Lecture
Fifteen Years of Progress in Cardiovascular Disease
The Role of the American Heart Association in Research

By Edgar V. Allen, M.D.

I EMBARK on this lecture with some trepidation, for, in years past, you have had the privilege of hearing scientific presentations which I doubt that I can equal. You will understand my difficulty when I mention George E. Brown Memorial lecturers of the past: Walter B. Cannon, Eliot R. Clark, Cecil K. Drinker, Henry C. Bazett, Alfred Blalock, Helen Taussig, P. McMaster, D. C. Elkin, Irvine H. Page and Walter H. Seegers. It has become established practice for the annual lecturer to be selected by the Chairman of the Section for the Study of the Peripheral Circulation, and I wish to express my appreciation to Dr. Wilkins, who has given me this opportunity to honor my late chief and associate, George Brown. He, you will recall, was instrumental in forming the Section for the Study of the Peripheral Circulation of the American Heart Association, and was its first chairman, although his death, in 1935, prevented his presiding at its first meeting.

GEORGE E. BROWN, PHYSICIAN AND MAN

George Elgie Brown was a pioneer in the clinical field of peripheral vascular diseases. When he became associated with the Mayo Foundation and the Mayo Clinic in 1921, Dr. W. J. Mayo offered him choice of several fields of internal medicine to which he could devote his major effort. Characteristically, he declined those specialties which were relatively well established and chose instead one in which there existed little knowledge and much confusion—peripheral vascular diseases. Pioneering in medicine was not new to George Brown for he had performed the first Wassermann test in the State of Montana and was the first in that region to use the roentgenoscope as a diagnostic aid.

When he went to Rochester, fresh from 10 years of practice in Miles City, Montana, Dr. Brown had wide knowledge of the entire scope of internal medicine. He continued to be active as a clinician in this broad field. It was natural for him to please people and his patients were conscious of his personal charm while he gave them the full benefit of his extensive experience.

At the same time, possessed of refreshing vigor, infectious enthusiasm, and persistent impatience with the unknown, he worked as student, investigator and teacher in the realm of peripheral vascular disease. His dissatisfaction with incomplete or uncertain knowledge raised problems for solution which constituted an inexhaustible backlog for research. In this activity, as in practice, he was always cheerful, always considerate and always stimulating. Recognizing that no one man can be master of everything, he enlisted the aid of physiologists, pathologists, surgeons and other clinicians. In his association with these others, he was persistent in his efforts to give credit to them and to assume an inconspicuous role for himself. Consequently, his bibliography and the list of important societies of which he was member and officer constitute only a partial record of his accomplishments. They are recurrently recognized, however, by the provision of this lectureship.

George Brown had an extraordinary capacity for making friends. He was respected and admired by many; those who knew him well held him in true affection. His untimely death

in November, 1935, was widely mourned; many lost a valued friend; medicine was deprived of a great physician and the clinical field of peripheral vascular disease was so placed that it never could discharge its debt to him. He achieved, in his lifetime, the pure delight of clinical research, that science of which Mark Akenside, another physician, wrote so learnedly, at the age of 23 years, some 200 years ago.

Speak ye the pure delight, whose favored steps
The lamp of science thro' the jealous maze
Of nature guides, when haply you reveal
Her secret honors.

Dr. Brown was a great believer in the aphorism that "the pot will bubble if the fire is fed." Indeed, I was tempted to use this expression as title of this lecture but I feared the wrath of indexers.

THE NATURE OF THIS PRESENTATION

In this presentation, I cannot outline the results of some fundamental research of my own, such as you have enjoyed from the lips of previous lecturers. Instead, it is my intention to review the accomplishments of the American Heart Association and the progress of research on cardiovascular diseases, in the 15 years which have elapsed since Dr. Brown died, and to indicate the problems which remain. Because of the broad scope of such a task, I could not undertake it alone and have called on a number of associates. I express my appreciation to Drs. Burchell, Visscher, Grimson, Essex, Roth, Edwards, Page, Katz and Keys as well as to many of you, and to others whose publications I have read. It is my intention to paint broadly; some details will be omitted or remain obscure; others may assume prominence in excess of their importance. Of these errors I ask your tolerance.

THE AMERICAN HEART ASSOCIATION

Fifteen years ago, the American Heart Association existed only as a body of clinicians, chiefly cardiologists; its main function was the annual scientific program. Perhaps the first significant change in this organization, implemented by the formation of the Section on Peripheral Vascular Diseases in 1935, was recognition of the fact that the American Heart Association could not fill its greatest function unless the idea was abandoned forever that clinical cardiology was the complete expression of cardiovascular diseases. It is to the credit of those who were the prime movers of the American Heart Association of 1935, and to those who have been its guiding spirits since that time, that the necessity of a wider field of endeavor was accepted; that this acceptance was indicated by an alteration in the personnel of the Board of Directors to include those whose interests were outside clinical cardiology; and that the membership was extended to include all interested in cardiovascular diseases, be they clinicians, physiologists, chemists, pharmacologists, surgeons, public health workers or anatomists. This concept of the unity of all cardiovascular problems has largely prevailed, although three organizations composed, respectively, of the vascular surgeons, of those particularly curious about coagulation of the blood and of those working on arteriosclerosis, still are officially without the fold of the American Heart Association. It is my belief that they could serve themselves better and could contribute more to American medicine were they to become parts of this inclusive organization.

As late as April, 1946, the entire staff of the American Heart Association consisted of a part-time executive secretary, an office secretary and four clerks. Currently it is composed of an executive director; a medical director; a public health director; a fund raising director; a business administrator; a director of program development; a chief statistician; an administrative assistant; seven field representatives, consultants or supervisors; a publicity manager, and a clerical staff of 41.

In 1945, the net income of the association was $39,052. There were no funds for research. For the year ending June 30, 1949, gross contributions to the association and affiliates were somewhat more than $2,500,000, of which the national organization received about $750,000. In 1948, of this sum, $250,000 was devoted to research and, in the year 1949-1950, $400,000 was allotted for this purpose. This large amount
of money available for research is cause for pride but, in my estimation, it is about 1 per cent of that which is desirable from all sources. Forty million dollars is much money but it is only one tenth that donated annually as tips for waiters and waitresses in restaurants. It represents only $5 for each person with cardiovascular disease. Perhaps we need a new slogan: "Give a tip for your heart."

Enlistment of the aid of public spirited citizens who are not physicians, and election of them to the governing bodies of the association, was a forward-looking step which was most productive. To these individuals who have served unselfishly and without profit, this organization is profoundly indebted. Without their assistance, the association would be much farther from the desired goal than it is today.

Publication of the journal, "Circulation," owned and edited by the American Heart Association, and dedicated to early printing of each accepted manuscript and to printing of articles dealing with all phases of the circulation, has been a magnificent achievement. In the short period of six months the journal has become the most eminent in its field and without a superior among current medical periodicals.

A few minutes ago, I referred to the desirability of including in the American Heart Association all organizations and individuals interested in any phase of cardiovascular disease. In the past, some benefit has accrued from special councils, such as that on rheumatic fever, and from special sections, such as the Section for the Study of the Peripheral Circulation. Inasmuch as unity of purpose exists as has been mentioned previously, it may be timely to consider abandonment of such sections and councils, except for the purpose of fund raising. Such a development must be predicated on wisdom and carried out with zeal, now and in years to come. It will require careful selection of representatives from each field of activity on various boards and committees, so that the association will express the desires of all its members.

At the risk of offending some of you, I express some concern about the retention of 75 per cent of all funds by each affiliate of the American Heart Association. In many instances such a program is maintained in wisdom but, in other instances, funds are expended in areas where facilities for their judicious use are inadequate. It is my hope that it will become customary for all affiliates to forward to the American Heart Association the largest possible amount of funds which can be designated for research; that regional research committees will be established, and that all requests for research funds will be forwarded to the association for allocation by regional research allocations committees. Those whose projects are worthy and important will not lose and those whose projects do not possess these qualities will have the satisfaction of contributing to worthy causes.

It seems clear that the future will bring changes of great importance in the problem of raising funds. The multiplication of appeals for funds and the knowledge that government support of research comes out of their taxes have hardened the hearts of many philanthropists of small and large pocketbooks. This attitude finds expression in the "Let Us Alone" weeks organized by businessmen. The public is confused by (1) multiple fund raising campaigns, (2) a trend toward a single appeal and (3) growth of government financing, all at the same time. The times and the public attitude challenge every cause which asks for money. The case for many such causes is excellent, although there is much disproportion in support obtained. For example, in 1945, funds contributed per cardiovascular death amounted to 7 cents. Contrast this with $22 per death from tuberculosis and $13,000 per death from infantile paralysis. The situation has improved since 1945, but disproportion still exists. If, by any chance, you are thinking that the large funds for poliomyelitis are necessitated by the low mortality rate and the high rate of crippling which attend this disease, I may respond that cardiovascular disease is also a great crippler, as is indicated by the estimated 9,000,000 Americans with cardiovascular diseases.

Many now believe that campaigns for funds conducted by or for individual organizations must cease and many others believe that the trend toward fund raising campaigns based on
the single appeal cannot be stayed. There is a triple danger in this trend: total contributions almost certainly will decrease; apathy may develop so that American people will lose something precious in national life, philanthropy; and the government may take over much of the function of such organizations as the American Heart Association. I speak as a citizen, without regard to party affiliation, when I express great concern over the encroachment of the federal government on a field which is, in large part, the function of individuals and philanthropic organizations. There is, of course, room for enforced philanthropy, if there can be such, and also for voluntary philanthropy, but the tendency is for the first to swallow the second. That we must not permit. Private support must balance governmental aid. Already, the opinion is abroad that the wells of private philanthropy are going dry. Yet approximately 1,000 foundations have collective assets of $2,000,000,000 and they contribute $100,000,000 annually to philanthropic causes, including research in medicine. In 1946, approximately 9,000,000 families with incomes of $2,000 to $5,000 gave away a total of about $1,200,000,000. In the past, national philanthropy each year has represented about 2.5 per cent of the gross income of those paying income taxes. The figure is about $3,000,000,000.

Certainly, it is not unreasonable to expect that a small amount of this enormous sum, perhaps $40,000,000 annually, should eventually be available for research in cardiovascular diseases. It is our job to make certain that we obtain adequate consideration of our problems by the public at large; admirable progress has been made in this direction. We, the 9,000 members of this association, have more than a professional interest in cardiovascular diseases, inasmuch as most of us will die of diseases of the heart or blood vessels. A contribution by each of us in the amount of $100 annually would provide $900,000 for research, double the amount currently available. One hundred dollars would be the cheapest life insurance premium each of us could buy. If each of us could persuade our patients to contribute an aggregate of $1,000, $9,000,000 would be available for research. It is my belief that we, the members of the association, have, perhaps, been somewhat negligent in our own personal campaigns to raise funds.

The Council for High Blood Pressure Research, a most admirable organization, has raised $217,000 in somewhat more than four years; 87 per cent of this amount was contributed by corporations in the city of Cleveland. This accomplishment indicates clearly that corporations constitute a great reservoir of funds for research.

I turn again to the possibility, indeed the probability, that our methods of raising money, currently effective, may have to be abandoned. If that be so, we of the American Heart Association must not only add strong support to encouragement of liberal philanthropy but we must insist on the truth that our problems are of such magnitude that attempts to solve them must be supported adequately. I do not necessarily imply that cardiovascular diseases can be prevented or cured with dollars, although I believe that dollars, in addition to our best resources for research, can prevent or cure most of these diseases. Some of you may disagree with that opinion but all of you will agree, I am sure, with the belief that progress requires research; research requires dollars.

Advances in Pathology

Studies in pathology have demonstrated clearly that the patient with rheumatic fever is subject to repeated episodes of rheumatic carditis which lead to the later complications of rheumatic heart disease. The cardiac lesions associated with rheumatoid arthritis have been shown to be indistinguishable from those of rheumatic fever. The probability exists then that rheumatic fever and rheumatoid arthritis are, from the standpoint of the heart, parallel conditions.

Myocarditis is now known to be associated with rickettsial diseases and with diseases caused by viruses, such as poliomyelitis, mumps, measles and influenza, if it can be assumed that all of these are virus diseases. Myocardial lesions are commonly associated with bacterial endocarditis; many of these lesions are infarcts resulting from lodgment of
emboli from involved valves. The cure of bacterial endocarditis has permitted the observation that healing may be followed by cardiac failure. Postmortem examination of the heart, roentgenologic visualization of the coronary arteries, and other studies, have demonstrated that the progressive narrowing of a coronary artery stimulates collateral circulation, the adequacy of which determines death or survival in cases of acute coronary occlusion. Myocardial hypertrophy has been shown to result from coronary arteriosclerosis in the absence of hypertension. The argument as to which is primary, hypertension or arteriolar changes, medial hypertrophy and intimal fibrosis, seems fairly well resolved for it seems clear that the arteriolar changes, if not secondary to hypertension, are at least not the cause of it.

Hemochromatosis and amyloidosis of the myocardium produce changes which cause it to fail. Heretofore, unrecognized types of congenital anomalies have been described. Malformations of the aortic arch resulting in "vascular rings" have led to surgical correction of them. More accurate study of the region of coarctation has shown that all parts of the aorta except that which connects with the ligamentum arteriosum are concerned in thickening of the media, which protrudes into the lumen of the aorta, causing it to be narrowed eccentrically. The intercostal arteries, in cases of coarctation, do not cause notching of the lower margins of the ribs but only appear to do so because this portion of the ribs is transparent to roentgen rays; the anatomic changes involve the lower portions of the main body of the ribs. Organic changes in the small pulmonary arteries, apparently resulting from increased pressure, have been demonstrated in congenital heart disease.

Medial thickening and intimal fibrosis involving the pulmonary arterioles have been demonstrated in cases of mitral stenosis. These changes may have an important influence on the results of operation for mitral stenosis, inasmuch as their presence, in significant degree, might indicate irreversibility and, by virtue of increased pressure in the pulmonary artery, fail to lessen adequately the work of the right ventricle, even if mitral stenosis were relieved.

The term "periarteritis nodosa" has been shown to be ill advised and to have no virtue except that of long usage. The correct designation should be "disseminated microarteritis." Clinical recognition of the disease has improved greatly. The condition has been shown, experimentally, to be a reaction of arteriolar hypersensitivity to a variety of drugs and is now known to be of much more common occurrence than previously it was supposed to be. Although still a rare disease, it is known to masquerade under such diverse clinical diagnoses as "essential hypertension," "disturbances of the sensorium," "chronic glomerular nephritis," "peripheral neuritis" and "clinically indeterminate lesions of the gastro-intestinal tract." The hormones, cortisone and ACTH, cause or allow "healing" of inflamed arteries although, in the process of healing, multiple infarctions may occur.

ADVANCES IN PHYSIOLOGY

The production of renal hypertension by placing of bands about a renal artery, and by prevention of parenchymal pulsation with envelopes of silk or cellophane, are more than noteworthy contributions in themselves. These investigations have touched off an enormous number of studies and have formed the basis for the observation that unilateral renal disease of man may provoke hypertension which is otherwise indistinguishable from essential hypertension and which can be cured by nephrectomy. Unfortunately, experimental hypertension is not the physiologic counterpart of essential hypertension of man. Persistent hypertension has been produced by section of nerves to the carotid sinuses and aortic arch. Continuous stimulation of splanchnic nerves or of nerves of the renal pedicle produces hypertension as long as stimulation is maintained and provides basis for a conjecture that some "essential" hypertension may be on a purely neurogenic basis. The secrets of renal function which for long have been of great interest to scientists have yielded, in substantial part, to tests for glomerular filtration in which mannitol and inulin are employed. Renal blood flow and
total tubular mass can be determined by using such substances as paraaminohippurate. The substances, renin, renin substrate, angiotonin, noradrenaline, substanied pressor principle and serotonin, wholly unknown 15 years ago, have assumed great importance in the study of maintenance of normal and high blood pressure.

Catheterization of the right side of the heart, the pulmonary vessels and the renal artery and vein, has assumed major importance in the understanding of normal and failing cardiac function and of abnormalities of anatomic structure. Even the left side of the heart has been catheterized. It has been demonstrated clearly that the edema of congestive heart failure is not solely a result of increased venous pressure, but that retention of sodium and endocrine factors are operative. On the other hand, edema of the lung seems to be a consequence of left ventricular failure.

Experimental heart failure of animals is associated with waste of energy by the heart; perhaps this is true in man. In experimental heart failure, the various preparations of digitalis increase the efficiency of utilization of energy and the output of energy in systole. This observation helps to explain the therapeutic usefulness of the drugs of the digitalis series.

Various other achievements are noteworthy. The action of the valves of the heart has been photographed and the heart sounds of the isolated heart have been recorded. An artificial extracorporeal heart has been devised. Endocardiography has permitted visualization, although considerably limited, of the interior of the normally beating heart. The vital and enormously complex process of coagulation of blood has become increasingly better understood. There is evidence that in some experimental animals, the formation of atheromatous changes depends on endogenous and exogenous cholesterol. But most exciting is the observation that atheromatous changes can be made to disappear. There appears to be a close relationship in animals among the ingestion of cholesterol, the presence in the blood of giant molecules of protein-cholesterol and the incidence of atheromatous changes.

**Advances in Conditions Commonly Considered Nonsurgical in Nature**

Unfortunately, the hard core of the problem of hypertension remains. The original hope that sympathectomy would offer a uniformly effective method of treatment of hypertension has faded as experience has accumulated. It is of some interest that a patient of Dr. Brown, in whose honor this lecture is given, was the first to undergo sympathectomy for hypertension. Dr. Adson performed the operation. Dr. Brown lived long enough after this experience to know that sympathectomy for hypertension was more commonly ineffectual than effectual for treatment of hypertension. Fifteen years later, we know little more of this subject. All means of selection have failed in greater or lesser degree and, with the best selection, not more than 20 to 35 per cent of those subjected to sympathectomy are benefited by satisfactory reduction in blood pressure. I am not convinced that very extensive operations produce better results than less extensive ones, but opinions vary about this. The results are, on occasions, excellent but no one has been able to determine before operation which patients will be greatly benefited and which patients benefited little or none. There is one exception to this statement: patients with advanced cardiorenal vascular complications of hypertension hardly ever benefit from sympathectomy. We have then, in sympathectomy, an important therapeutic method, application of which is hampered by lack of knowledge of the situation in which it can be most satisfactorily used. These observations, considered along with the knowledge that the blood pressure of some patients with essential hypertension is reduced by such diverse measures as rigid restriction of intake of sodium, use of the rice diet, psychotherapy and administration of potassium thiocyanate, seem to indicate that "essential" hypertension is not one disease but many diseases having in common nothing more than elevation of blood pressure.

In addition to sympathectomy, three other great advances in surgical treatment of hypertension have been made in the past 15 years. In the presence of unilateral atrophic pye-
lonephritis, tuberculosis, hydronephrosis or pyonephrosis, and hypertension, nephrectomy will effect a "5 year cure" of associated hypertension in a third to half of the cases, provided function of the other kidney is "normal." However, such cases represent only about one in each 300 to 500 cases of hypertension. Successful surgical treatment of coarctation has largely eliminated the problem of the hypertension that accompanies it. An extremely small percentage of patients with hypertension have coarctation. Hypertension resulting from pheochromocytoma may be paroxysmal or sustained; removal of the tumor cures the hypertension in most such cases. But again, very few patients with hypertension have pheochromocytomas and, in the past, clinical diagnosis was made in only a third of the cases. Fortunately, tests with histamine, Dibenamine, Mecholyl, tetraethylammonium chloride and benzodioxane have made the diagnosis possible with increased frequency. Many tests must be performed to find one pheochromocytoma. At the Mayo Clinic, tests for pheochromocytoma were made on 730 patients; tumors were found in 12 instances.

In the great majority of all instances of essential hypertension, the blood pressure can be returned to normal or nearly normal values. The problem is chiefly one of duration of relief, for although drugs such as tetraethylammonium chloride will cause striking and satisfactory reduction in blood pressure, the results endure for only a few minutes. I am hopeful that sometime in the currently unpredictable future, there will be found a drug which will reduce the blood pressure of patients with hypertension to a degree comparable to that which results from the use of tetraethylammonium chloride, but which will have enduring effects and be free of those which are undesirable.

Considerable experience has been accumulated relative to the use of adrenocorticotropic hormone and cortisone in the treatment of disseminated microarteritis and cranial arteritis. In the latter condition, the rate of recovery is hastened. The lesions of microarteritis apparently heal as a result of administration of the aforementioned hormones; although some patients die while under treatment, others are clinically much improved. More time and experience are needed to assay finally the usefulness of ACTH and cortisone.

Medical science has encroached but slightly on the distressing intravascular thrombosis which is such an important complication of arteriosclerosis, arteritis and phlebitis, and which may occur in the absence of inflammation of the walls of veins. Use of the anticoagulants heparin and dicumarol has saved many lives and many limbs, and has prevented or lessened much chronic venous insufficiency. Newer substances similar to heparin and dicumarol, at present under study, do not appear to have important advantages. The great deficiency in the satisfactory use of dicumarol is the need for expert knowledge, and for wholly reliable laboratories, unavailable to many physicians. Administration over long periods of time requires constant vigilance. Heparin is expensive and needs to be given parenterally. The possibility of hemorrhage is of some magnitude although lessened by experienced use. Anticoagulants are used mostly when intravascular thrombosis has occurred. Anticoagulants never can be entirely satisfactory until they can be used commonly and over long periods without danger, or until the physician can predict the occurrence of intravascular thrombosis and prevent it with anticoagulants. It is most unsatisfactory that a new therapeutic tool has been improved so very little in the years just past.

Atherosclerosis has been largely resistant to efforts to prevent or cure it. Restriction of the intake of animal fat and of cholesterol, and use of lipotrophic agents such as choline, anisotol and methionine, has done no more than provide a clue to a disease which I consider preventable and perhaps reversible. Previously I referred to work which indicates that experimental atherosclerosis is reversible. I do not look on atherosclerosis as a manifestation of aging, except in the same way that I consider gray hair a manifestation of aging, and that may first appear at the age of 30, or at the age of 60 years. I do not subscribe to the statement attributed to Osler that "a man is as old as his arteries" if that statement was
intended to imply that atherosclerosis is an inevitable companion of aging. It would be much wiser to parody a statement of Gertrude Stein and say, "A man is as old as he is old as old as he is."

The use of anticoagulants has lessened somewhat the incidence and severity of chronic venous insufficiency which results from acute thrombosis of deep veins of the legs. Chronic venous insufficiency is, however, of much too common occurrence. At the very great risk of too much simplification, I may state my belief that manufacture of an elastic stocking which would provide adequate support, be "easy on the eye," and comfortable when worn would largely or completely remove the need for surgical treatment of varicose veins, and prevent the complications of deep venous thrombosis.

The antibiotics have made subacute bacterial endocarditis a minor disease in most instances although, as stated earlier, the development of severe congestive failure is cause for concern. Syphilitic heart disease is gradually passing from the scene and the time is not far off when it will be as scarce as typhoid fever.

The usefulness of adrenocorticotrophic hormone and cortisone in treatment of acute rheumatic fever needs additional study. Inasmuch as the joint and systemic manifestations of this disease are of minor importance, the two hormones just mentioned will be of great value only if they prevent or lessen rheumatic heart disease. It appears that they may have this effect, for great benefit already has been demonstrated in acute rheumatic myocarditis. It is to be ardently hoped that preliminary studies suggesting prevention of valvular heart disease by means of cortisone will be confirmed. There seems little doubt that early treatment of streptococcus infections of the throat will eliminate acute rheumatic fever in many cases.

Elucidation of the role of sodium in congestive heart failure, and the purification of digitalis, have increased success in the treatment of congestive heart failure. The mercurial diuretics which are efficient when injected subcutaneously have simplified the outpatient and home care of patients with congestive heart failure. The artificial, extracorporeal kidney has proved its value in instances of cessation of renal function when, under appropriate circumstances, renal function may be re-established after a period during which life ordinarily would cease.

The electrocardiogram, commonly abused and unjustly maligned, has proved, as a result of precordial exploration in expert hands, to be of tremendous value in the diagnosis and localization of myocardial infarction.

Angiocardiography and vasography have permitted better understanding of abnormal anatomic changes in the heart and blood vessels. The need in this field is for a substance which is highly radiopaque, yet lacking in toxicity, so that arteries and heart may be as readily visualized by roentgenologic studies as is bone.

The syndromes of potassium intoxication and potassium depletion have been clearly demonstrated.

**Advances in Surgery**

In the preceding sections of this presentation some consideration was given to matters such as sympathectomy which might more properly be considered under the heading of this section. This was done not to detract from the contributions of the surgeons, which in the aggregate have been of the greatest magnitude, but because I was considering what tend to be considered as nonsurgical conditions.

I need mention here, with a brevity which greatly minimizes the triumphs of modern surgery, surgical treatment of coarctation of the aorta, patent ductus arteriosus, and certain congenital malformations of the heart and great vessels. When I add to this illustrious accomplishment the surgical treatment of chronic constrictive pericarditis and varicose veins and some progress in the treatment of portal hypertension I cannot help but wonder if the pride of surgeons, who have a dynamic approach, is not even more justified than commonly it is considered to be. Valvulotomy and closure of septal defects are being perfected with gratifying rapidity. The surgical treatment of valvular heart disease may well become the greatest contribution in surgery in the first decade of the second half of this century.
The Unsolved Problems

As I wrote that to which you have so patiently listened, I remarked that our greatest achievements have been in the field characterized by rare disease, for such are patent ductus arteriosus, the tetralogy of Fallot, subacute bacterial endocarditis and pheochromocytoma, for example. It is equally apparent that, from the standpoint of clinical application, the best results have been those of the surgeons. I do not minimize the facts that the pathologist, the clinician and the physiologist have laid the groundwork for the praiseworthy results of surgery; in fact, I emphasize them, for there may be a lesson in this observation. I am sure that we who are internists have not enlisted the aid of investigators in fundamental fields to the degree desirable. Few internists are capable workers in basic fields such as chemistry, and few chemists are aware of the primary importance of cardiovascular diseases. It is unfortunately true that in modern practice it is difficult to be an investigator and a clinician, even for one who is competent in both fields. Custom has dictated that, in large part, the investigator must remain in his shining laboratory and the clinician in the hospital. This, as well as the observation that the internist cannot solve the problems which remain, being true, the responsibility is clearly on the shoulders of the internist to enlist the aid of all who might contribute. I wish to emphasize the word "enlist," which I use to mean a positive action, quite the opposite from the passivity implied by the word "permit." I favor proselytism of chemists, physicists, endocrinologists, physiologists and representatives of all the basic sciences, to an understanding of the urgency of research in disease of the heart and blood vessels. It is not enough that we, through our allocations committee, act favorably on requests for financial support for such research. We must go into the laboratories of those equipped to do research and persuade them to abandon less important matters for those of major importance. We, as an organization, have made a wise step in the right direction, by establishing financial support for career investigators, but this is only a beginning; we must actively and aggressively feed the fire of research and support it with adequate funds. The activation of such a program would require, in my estimation, efforts equivalent to those annually expended by any full-time employee of the association, as well as the cooperation and interest of all of us.

The major problems remaining are numerically, as well as individually, most important. They are, in my estimation, intravascular coagulation, hypertension, arteriosclerosis and rheumatic heart disease. It is a conviction with me that these problems can be solved. The solution would be no more startling than that which has been recorded in one field; namely, the almost complete conquest of bacterial diseases, nor in yet another field, the effect of cortisol and ACTH on rheumatoid arthritis. So important is fundamental research that I would look with concern on the expenditure of money and effort on surveys which can prove hardly anything more than that the situation is about as bad, better or worse than was anticipated. This sort of activity deprives those whom we wish to help of the prospect of aid and accomplishes little more than collection of statistics which are only figures without the vitality of progress through research.

I am concerned that Congress has appropriated $2,000,000 for "heart disease control" in the fiscal year 1950. I have studied carefully the program which will result from use of these funds; I see little evidence that they will be used for scientific research, without which there can be no substantial progress. I can see little justification for allocation of funds to uses such as have been forecast unless there has been complete saturation of research projects. We of this society cannot directly govern the use of funds allocated by the federal government but we can, through judicious influence, indicate the most desirable way in which our money should be used. The problem requires constant vigilance on our part, as individuals, and, more specifically, on our part as the American Heart Association.

Summary

In the course of this presentation I hope it has become evident that the professional life
of George Brown could well serve as a model for the activities of the American Heart Association, which has made astonishing and gratifying progress in a few years. The advances in physiology, anatomy, surgery and medicine, as related to cardiovascular diseases, are justifiable reasons for pride. Yet pride in the past can produce no results in the future. Progress in the future must be supported by a tripod, such as has supported it in the past; one leg of the tripod is zeal, another is utilization of skill and knowledge, and another is money. We must furnish all three. The unsolved problems are unsolved not only because they are difficult but because we have not yet achieved a co-ordinated program of investigation. We must abandon all feelings of futility and avoid tedium. I can find no logical reason to believe that any important cardiovascular disease cannot be largely or wholly vanquished. If the conquest of these diseases continues at the rate which characterized the fifteen years just past, within the lifetime of physicians now living there will be no cardiovascular disease which cannot be prevented or corrected. If we remain imbued with untiring resolution to attack vigorously and with persistent zeal the greatest destroyers of health and life in America, such a program will be continued. We must hold forever before ourselves the truism that scientific research is progress.

Because this is the George Brown Memorial Lecture, I may appropriately quote from another "Brown," although spelled Browne, Sir Thomas, the author of "Religio Medici," who, in 1643, wrote as follows:

"The World which took but six days to make, is like to take six thousand to make out: meanwhile old Truths voted down begin to resume their places, and new ones rise upon us. . . . Men disparage not Antiquity, who prudently exalt new Enquiries, and make not them the Judges of Truth, who were but fellow Enquirers of it. . . . Despise not the obliquities of younger ways nor despair of better things whereof there is yet no prospect."
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EDGAR V. ALLEN

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