SPECIAL ARTICLE

The Evolution of Our Knowledge about the Heart and Its Diseases since 1628

By Paul D. White, M.D.

IT HAS been a pleasant task to prepare this survey of cardiovascular medical literature since the days of William Harvey, and I am grateful for the opportunity. It seems best to present the review by centuries although there will be, perforce for the sake of continuity, some overlapping. Scattered through the chronologic account there will be included certain general observations about the history of medicine that have been of interest to me during the past 30 years since I first began to pay particular attention to this historical field and since I began to collect many of the noted works about which this article deals.

1600–1700

Italian medicine was at the height of its long reign when William Harvey studied the circulation under the masters of the Padua School in the early years of the seventeenth century. During the next century and a half, and right through the leadership of Morgagni, students and young physicians flocked to that part of the world to begin and to complete their medical studies, particularly in the field of the circulation and its diseases. It is a pleasure to record a pilgrimage that I myself made in 1954 to the ancient medical school in Bologna where an active and stimulating program in teaching and research still continues. This school will be 800 years old in 1958.

The influence and the inspiration of the Italian schools during the middle and later years of the seventeenth century spread widely abroad through students like Harvey in England and his contemporaries in France, in Switzerland, and in the low countries. Oxford, Cambridge, London, Geneva, Basel, Paris, Montpellier, Toulouse, Brussels, Antwerp, Leiden, and Amsterdam all played their roles in the evolution of our knowledge of the heart and its diseases. Through that century and those that have followed it has been evident that no country or race has had a monopoly on science or its practical applications. This seems to be especially true in medicine, where discoveries have been made by the citizens of many nationalities in both the old and the new worlds. Happily no secrets were kept about medical advances which in those earlier centuries were slow for other reasons, namely, the paucity and expense of publication, the lack of adequate transportation, the inhibitive effect of the Inquisition and other tyrannies of the day, and the short lives of the investigators themselves who, like the rest of the population, were exposed to epidemics of plague and other such scourges and to early deaths in battle or at the hands of brigands.

For a century after Harvey it was customary for those writing treatises on the circulation or even chapters in books on medicine to begin the title with the same words that Harvey used, De Motu Cordis, no matter what followed. Many of these writings added new observations about the circulation in health and about diseased conditions found at autopsy although in that century there was very little correlation of lesions themselves with symptoms or clinical findings. Cardiology as a special field of practice or teaching had not yet begun. To be sure there were compilations of case records, like that in particular of Theophile Bonet of Geneva, namely the Sepulchretum (1679) with its two or three lines of symptomatology and four or five lines of gross autopsy findings, but these were all apparently composed in retrospect by the pathologists who secured the information post mortem.

Presented at the Graduation Exercises of the Harvard Medical School, June 1, 1956.
from the family of the victim or from a doctor who had seen him. Despite this fact there are to be found in this remarkable collection of autopsies many "firsts," such as the first recorded sudden death in a middle-aged man with calcareous aortic stenosis, the first case of heart disease interpreted as a cause of severe dyspnea which hitherto had been ascribed to pulmonary disease (but here the lungs were normal), and, in the second edition of the Sepulchretum published in 1700, the first rapid death in the case of a man with coronary artery occlusion.

I would hasten to add that even Bonetus, a century before Morgagni, but followed the lead of his predecessors, in particular of the pioneer of case history books Benivieni of Florence who in the year 1507, over 170 years earlier, had published a classic report of 111 cases including several with autopsies. And yet in my own time some writers of medical case histories had thought that they themselves were the pioneers.

It was back in Italy that the final link in the circulation of the blood was discovered. Harvey had assumed that there must be minute connections between the arteries and the veins that are, however, invisible to the naked eye. This assumption was proved to be correct when, in a letter to Borello, Malpighi in 1661 described the capillaries that he found in the lung of a frog with a magnifying lens. It was van Leeuwenhoek who later in 1688 perfected the microscope itself, a few years before Floyer introduced the pulse watch in 1707. And it was Sir John Floyer who enunciated one of the most important principles of medical practice which should still be applied to all physiologic tests and technics in man (pulse rate, blood pressure level, electrocardiogram, and heart size and shape by x-rays) in the absence of any adequate tables of standards. He wrote:

It is requisite that every intelligent Patient should thus try his Pulse in a Morning in his Health, that he may inform his Physician what number of Pulses he has in a perfect Health, by which a Physician may judge of his natural Constitution; and the Physician may know how far the disease'd Pulse recedes from the Natural Numbers; and whether the Numbers of the Pulse are increased or be deficient.

In England after Harvey the names of two leaders in cardiovascular anatomy and physiology stand out. Richard Lower of London published in 1669 his Tractatus De Corde, which in clear concise language described in detail the anatomic structure of the heart, showing the heart muscle bands and the coronary circulation. It was he who first described the constricting effect of pericardial disease nearly two centuries before its fuller discussion by Chevers in 1842, and it was he who carried out transfusion in one of the earliest cases, a clergyman with a disturbed mentality, described also by Mr. Pepys at about the time of the plague and great fire in London in 1666. A contemporary case was done in Paris but trouble must have followed in other instances since nothing more was heard about transfusions for over 200 years. Lower added an illustration of his transfusion tubes in his Tractatus de Corde.

Another English contributor of note who pioneered in the understanding of the oxygenation of the blood was John Mayow of Oxford, who published his Tractatus Duo in 1671 and his Tractatus Quinque a few years later (1674). Among the treatises, in addition to that on oxygen (then called nitro-aerious spirit), there was one on the fetal circulation and another on rickets.

Let us go across the channel now to the Netherlands where there lived and worked in Amsterdam a man little known in medical history but, nevertheless, a keen observer. He deserves a prominent place in the Hall of Fame because with one bold stroke of his pen he wiped out about half of all the heart disease of his day. This man was Kerckring who in his Spicilegium Anatomicum in 1670 presented his discovery that the so-called polypous disease of the heart was not a disease at all but consisted simply of postmortem clots. In declaring this he apologized to his professors and colleagues for having made this discovery which exposed their universal error.*

* There remains, however, in rare cases an exception "that proves Kerckring's rule," namely, a myxoma in the left atrium that can simulate mitral stenosis.
It is fitting, at this time, in closing this brief review of the more important contributions in the cardiovascular field in the seventeenth century, to say a word about priority of medical discoveries and of their publication. Discoveries are, in fact, usually slow processes, credit for them going, as a rule, to the final worker or thinker in the chain of events who adds the finishing touch as Harvey did in 1628. Also many discoveries are rediscovered as in the case of the pulmonary circulation (Ibn Nafis, about 1290, and Servetus, 1553), the explanation of the dyspnea and asthma in mitral stenosis (Vieussens, 1715, and Hope, 1832) the jugular vein engorgement in right heart failure (Lancisi, 1728, and Mackenzie, 1902) cinchona for “obstinate arrhythmia” (Senac, 1749, and Wenckebach, 1914) the description of the tetralogy of Fallot (Sandifort, 1777, and Fallot, 1888), and chronic constrictive pericarditis (Chevers, 1842, and Pick, 1896). As Sir Michael Foster said “To Whom shall be given the honor of a discovery? This question can never be answered fully. Science is a continuous process, each investigator must of necessity build on the work of those who came before him. What we know and what we think is a stream which flows by us and through us, fed by the far-off rivulets of long ago.”

1700 to 1800

The eighteenth century saw the beginning of clinical cardiology. The three most important contributors to this new development all published their books in the first half of that century. These volumes are milestones in the development of that high-road and each author deserves special comment.

Raymond Vieussens of Montpellier had already made a notable contribution in the seventeenth century with his Neurographia in 1685. Thirty years later in 1715 his more famous treatise on the heart appeared in the vernacular and may justly be considered from the clinical standpoint to be the pioneer work on the subject. Notable was his description of mitral stenosis with the clear recognition of the cause of the dyspnea, which he ascribed correctly to pulmonary congestion secondary to the mechanical effect of the tight mitral stenosis (of which he gives an excellent description) and not to failure of the heart muscle as is even now sometimes wrongly thought, or to disease of the lungs; this concept of Vieussens has been rediscovered in our own day.

A contemporary of Vieussens was Joannis Maria Lancisi of Rome, physician to Pope Clement XI, and a brilliant leader in the medicine of his day. He wrote extensively not only about the heart and its diseases but about other things, medical and non-medical. He was an expert on gardens and on fungi, and he discussed rheumatism and sudden death. In fact his most important contribution was probably the volume De Subitaneis Mortibus (On Sudden Death) published in 1707 and dedicated to the Pope. In his book he demonstrated a natural cause for death in every one of a series of individuals who died suddenly in Rome in the winter of 1705 to 1706, proving unfounded the fears of the populace that God in his anger was supernaturally striking down prominent Romans of the day. One of the chief values of the volume is that it demonstrates the scientific interest of the Pope himself in requesting postmortem study, the Church thus urging autopsies for the benefit of our health and understanding. A translation of this book is underway and should help in the struggle against disease. Eight years after Lancisi’s death his brother arranged the publication of another important treatise of his concerning the causes and signs of enlargement of the heart and great vessels, De Aneurysmatibus. In this book engorgement and pulsation of the jugular veins (Lancisi’s sign) were described as evidence of enlargement and failure of the right ventricle almost 200 years before Sir James Mackenzie rediscovered the importance of this phenomenon.

In 1749 the first textbook on heart disease, containing much therapeutic advice, appeared from the hand of Senac, noted Parisian physician of his day and evidently an able cardiologist. He advised opiate and venesection for acute pulmonary edema, rest for heart failure, and quinine for disorders of rhythm. Senac represented the beginning of the revival of the prominence of the French school, especially in cardiology, which reached its height in the
early part of the next century in the persons of Corvisart, Laennec, and Louis.

Also in the first half of the eighteenth century (1733) a classic contribution was made in the field of cardiovascular investigation by Stephen Hales when he published his volume on *Haemastaticks* which contained not only the first direct measurement of blood pressure in a mare but also much detailed analysis of the work of the heart and of the volume of blood. Nearly two centuries passed before sphygmomanometry became a routine clinical procedure and a new generation of physiologic and clinical investigators went further into the field of hemodynamics. Hales was a brilliant star too early for the times.

In the latter half of the eighteenth century there were several very important, though special and almost isolated, cardiological milestones. The first of these came in 1761 when Auenbrugger of Vienna introduced the technic of percussion of the chest to determine in a rough way the heart size and the presence of hydrothorax. This, however, attracted little or no attention, despite a contemporary French translation, until 1808, 47 years later, when Corvisart, Napoleon Buonaparte’s physician, called attention to it in a new French translation; Auenbrugger was still alive to receive belatedly due credit for his discovery. Percussion was the first new method of examination to be added in centuries to the brief personal history, palpation of the pulse, and urinoscopy which had been routine through the dark and middle ages ever since the time of Galen.

Also in 1761 appeared the monumental work in gross pathology by Morgagni of Bologna who was 79 years old at the time of its publication. *De Sedibus et Causis Morborum* contained many good descriptions of disease, in particular of heart disease, including the first clear account of the Adams-Stokes syndrome discussed later by Adams in 1827 and by Stokes in 1854.

Then the limelight swung back again to England where a group of able clinicians, some of them close friends, made important discoveries. William Heberden of London in 1768 gave a lecture on angina pectoris, the cause of which he did not know although he recognized it as a serious and dangerous symptom. This lecture was published in 1772, 4 years later. He coined the words describing this symptom in differentiating it from other pain in the chest (dolor pectoris). His friend, Edward Jenner of Berkeley was the one who, in the 1870’s, discovered the cause to be obstruction of blood flow due to disease of the coronary arteries which he finally announced in a letter which was published by another associate, Caleb Hillier Parry of Bath in 1799, over 20 years later. Jenner had kept silent all those years because his friend John Hunter had developed angina pectoris and he did not wish to alarm him. Heberden’s description of the symptoms was so perfect that it cannot be improved upon today, nearly 200 years later.

Another Englishman, William Withering of Birmingham, an able botanist as well as a good doctor, took advantage in 1775 of the successful use by an old woman of Shropshire of a family recipe for the dropsy and, during the next 10 years, tested the powdered leaves of the purple digitalis in a variety of diseases. In 1785 there was published his *Account of the Foxglove* which, like Heberden’s lecture, is one of the great classics in medical literature. He gave exact directions for its use but over 100 years passed before the medical profession appreciated his contribution and followed his advice.

Thus ended a very fruitful century of progress in the evolution of our knowledge about the heart and its diseases.

1800 to 1900

Although there were many more physicians and other scientists interested and working in the field of heart disease during the nineteenth century, their contributions stood out as milestones in a less dramatic way than did those of the eighteenth century, even though, when added together, they were considerable in total volume. There was a steady increase in the clinical recognition of heart disease and in physiologic studies of the circulation, but diagnosis, prognosis, and treatment were still primitive. Certain technics were helpfully introduced for the study of the heart, particularly mediate auscultation with the invention of the mon-
aural stethoscope by Laennec in 1819, the new field of bacteriology that began with Pasteur in the 1860's, and the Roentgen rays in the 1890's.

At first auscultation of the heart was apparently as misleading as it was helpful (witness Oliver Wendell Holmes' Ballad of the Stethoscope of the 1840's) but slowly, with the help of Stokes, 1825; C. J. B. Williams, 1828; Austin Flint, 1862; Roger, 1879; and Graham Steell, 1881; the stethoscope became more useful. It was only in the second quarter of the twentieth century that auscultation came into its own through the work of a host of investigators and the introduction of scientific phonocardiography. One especially important auscultatory finding, often of grave significance, gallop rhythm, was first recognized in the nineteenth century (Potain, 1875), but several decades passed before it was rightfully appraised.

Bacteriology came to the fore at the turn of the century and during the first years of the twentieth with the final proof of the syphilitic origin of aortitis and of the majority of thoracic aneurysms (Reuter, 1906), and of the bacterial nature of "malignant endocarditis" (acute and subacute bacterial endocarditis, Schottmüller, 1910). It took a long time, however, before it became clear that a reaction to the hemolytic streptococcus was responsible for much if not all of rheumatic heart disease (Poynton and Paine, 1913, Coombs, 1924, and Coburn, 1931).

Roentgenology, within a few months of its introduction by Roentgen in 1895, was applied to the heart by Williams in 1896. During the next two decades it was rapidly utilized in clinical studies in the two technics of (1) fluoroscopy and orthodiagraphy (Moritz 1902) and (2) teleoentgenography by many workers in the field.

The various kinds of heart disease began to be studied and defined during the nineteenth century. Congenital defects were discussed by Farre in 1814, Gintrac in 1824, Peacock in 1858, Roger in 1879, Fallot in 1888, and Eisenmenger in 1897. Several of their names have remained to designate particular lesions.

Rheumatic heart disease was described by Baillie in 1799, Wells in 1810, Bouillaud in 1840, and many of their successors. Little was said about either hypertensive or coronary heart disease, although Bright (1836) described the big heart found in nephritis and ascribed the enlargement to overwork (as did Allbutt in 1895), and a number of pathologists described coronary artery disease and myocardial infarcts (Parry, 1799; Scarpa, 1804; Hodgson, 1815: Lobstein, 1833; Leyden, 1884; Marie, 1896) and rare cases of clinical coronary thrombosis were described (Hammer, 1878 and Dock, 1896). However, it was necessary to wait until the next century for hypertensive heart diseases to evolve from "cardiorenal or Bright's disease" (although Sir Clifford Allbutt was close to the answer) and for coronary thrombosis to be described clearly as a common clinical entity (Herrick, 1912).

Chronic constrictive pericarditis, long and erroneously called Pick's disease (Pick, 1896), was well described by physicians at Guy's Hospital in London, by Chevers in 1842 and by Sir Samuel Wilks in 1870. It remained for twentieth century physicians and surgeons in the 1920's and 1930's to put it in its proper place.

One other very interesting condition which we now call neurocirculatory asthenia, and which is not heart disease although its multiple cardiovascular symptoms may be confused by the uninitiated with those of heart disease, was described in part by John C. Williams in 1836 but in more detail by B. R. Williams in 1870 and Da Costa in 1871. Its etiology still remains obscure in 1957.

Arrhythmias attracted more attention during the nineteenth century although they had actually been noted in all their forms ever since Galen described them in detail in the second century A.D. However, labels began to be attached to them, for example, paroxysmal tachycardia by Bristowe in 1887 and Bouveret in 1889. Changes in the pulse volume were also defined, such as pulsat alternans by Traube in 1892, and the so-called paradoxical pulse by Kussmaul in 1873. Towards the end of the century these various abnormalities of the pulse were brought together by Mackenzie and Wenckebach whose clinical observations, based on arteriograms and phlebograms, culminated in their notable contributions in 1902 and 1903.
respectively; but atrial fibrillation was still to be described in 1909, independently, by Thomas Lewis, and Rothberger and Winterberg, and atrial flutter by Ritchie in 1911. Ventricular fibrillation, however, had been identified in the experimental animal as long ago as 1850 (Hoffa and Ludwig) and 1887 (McWilliam). Heart block with very slow or intermittent pulse had been clinically known and defined much earlier, as already noted, and described in laboratory animals by Stannius in 1852 and by Gaskell in 1881. Kent and His described their so-called bundles in 1891 and 1893 respectively.

During the latter half of the century, the electric activity of the heart was being studied in laboratory animals and in man (Kölliker and Müller, 1855; Sanderson and Page, 1878; Waller, 1887; Bayliss and Starling, 1893), but it was not until Einthoven invented the "string galvanometer" in 1903 that clinical electrocardiography became possible.

Other physiologic technics that were developed during the latter half of the century included vital capacity recording (Hutchinson, 1846), sphygmography (Vierordt, 1855, and Marey, 1860), ballistocardiography (Gordon, 1877), blood flow studies (Pick, 1870, and Stewart, 1894), and sphygmanometry (Von Bausch, 1881, and Riva Rocci, 1891), but all these studies were in their early stages and became clinically applicable only in the next century.

Finally, although during the nineteenth century treatment of cardiovascular disease began to develop slowly, it was still in a primitive stage in 1900. The remedies described by Senac in 1749 were still largely operative—rest, which was often effective, venesection, which on occasion was helpful in acute pulmonary edema but which was largely overdone until the latter part of the century, leeches, a light diet (though there were no clear rules about salt or fat except that the Karell diet (1866) consisting of 200 ml. of milk 4 times a day did have a low content of salt and fluid as well as of calories and, for short intervals, is still quite effective in the treatment of congestive heart failure), opiates in emergency, mercury in toxic doses such as the Massachusetts General Hospital doctors were still using for rheumatic fever in the 1840’s, and foxglove, usually in improper dosage and in the wrong cases. A purified form of digitalis scientifically designated digitoxin but called digitaline was introduced in France by Nativel in 1845. Lauder Brunton recommended amyl nitrite in preference to spirits for angina pectoris in 1867, and Murrell introduced nitroglycerin in 1879. Pericardial paracentesis was begun by Vernay in 1856 and in 1898 Delorme recommended pericardial resection for chronic constrictive pericarditis, no one, however, following his advice for a good many years (Sauerbruch, 1913, Rehn, 1920, Schmieden, 1924, Churchhill, 1929, Beck, 1930). Southey introduced his "tubes" in 1877 and, even now, they prove helpful on occasion. Farina and Rehn in 1896 began to operate on the heart to repair wounds.

And so the century closed with very many minor advances which, however, when added together assumed a considerable total; but there was still, in general, a lack of team work between internists on the one hand and physiologists, pathologists, and surgeons on the other.

1900–1957

Before presenting certain outstanding specific advances in the first half of the twentieth century, I would like to review a few of the general reasons for the remarkable development of our knowledge of diseases of the heart and blood vessels during the last generation.

Until after the first world war, that is, about 1920, there was little or no recognition of the wisdom of specialization in the field of internal medicine. Even today in certain parts of the world, including areas in the U.S.A., there is in practice, teaching, and research a reluctance to subdivide the body. Yet, to many of us, it was quite obvious several decades ago that such specialization and concentration in practice must develop in order to advance our knowledge. It was our thought then, and it still is, that groups of people specializing in different fields can, by their propinquity and frequent consultations with each other, keep their feet on the ground and maintain a proper
point of view. This must be true also of our special community health drives. Until we have progressed further than we have to date we are not in a position to relax and, as frequently is said, to put the body back together again in perfect order. Eventually, after we have mastered the main health problems that still face us then we can probably get along with one community drive and one hearing before the Committees in Congress.

Thus, specialization beginning about 1920 has, without doubt, been largely responsible for the fact that more has been learned about the diagnosis, prognosis, and treatment of diseases of the heart and blood vessels in the last generation than in all the centuries before.

The second important reason why such an advance has taken place in our knowledge, not only of heart disease but also of almost all other fields in medicine, is the development of team work, both between the various workers in the basic sciences and those in the medical and surgical fields in the community, and also through the coordination of such activities by national and international teams. Cooperative researches have been, and will continue to be, very valuable. One of the needs of the future is that of international epidemiologic cardiovascular research to study the relationship of the ways of life to heart disease throughout the world.

The third reason for the great advance in this generation is that heart disease has been accepted as a major public health problem just as, in the past, infections like tuberculosis, poliomyelitis, and the various kinds of cancer had been accepted. This acceptance has resulted in the support of research through private and public funds, highlighted by two events, the establishment of the American Heart Association in 1924 and its recognition some 20 years later of its role in cardiovascular research, teaching, and community programs, and the establishment of the National Heart Institute and National Advisory Heart Council under the wing of the U. S. Public Health Service, by act of Congress in 1948. At the hearings before the House and Senate Committees every year there has been afforded an opportunity to educate the legislators and, through them, the public at large, to the need for research and training in heart disease.

Now as to certain major specific advances, in 1912 James Herrick of Chicago published a paper in the Journal of the American Medical Association that will remain a medical classic for all time. It was entitled Clinical Features of Sudden Obstruction of the Coronary Arteries. This was the basis on which rests our growing knowledge of this major threat to the health of our young and middle aged males in this country today. A very important and useful related study by Schlesinger and Blumgart in 1937 concerning the development of the collateral coronary circulation has explained the role of nature in the common experience of recovery from coronary insufficiency without either wonder drugs (except the very useful role of nitroglycerin) or surgical techniques.

The second major milestone in our knowledge of heart disease came in the form of a paper by Richard Cabot published also in the Journal of the American Medical Association, two years later, in 1914, entitled The Four Common Types of Heart Disease: an Analysis of 600 Cases. This directed attention to the etiologic factors in contrast to structural defects and functional disorders which are, of course, also important, but should be preceded in the diagnosis by the etiologic factor. Following this paper of Richard Cabot's there developed, slowly, in various centers, the recognition of the importance of this change in the classification of cardiac diagnosis. The earliest paper in this field was that by White and Myers in 1921 entitled The Classification of Cardiac Diagnosis.

The third great specific advance has been that in cardiovascular surgery to which I have already referred. First the outside of the heart was worked on when a constricting pericardium was removed successfully. Then other surgery on the blood vessels around the heart developed, for example, the ligation and section of the congenitally patent ductus arteriosus (Gross, 1939), by anastomoses carried out by Blalock and Taussig (1945) and by Potts (1946) for the tetralogy of Fallot. Later, there developed the surgical correction of coarctation of the aorta (Gross, 1945, Crafoord, 1945).
Finally, the interior of the heart now has become subject to correction. Although an effort was made by Cutler in 1924 to correct the lesion of tight mitral stenosis, inadequate technic and anesthesia of the day forced a delay of some 20 years until after the second world war when several courageous surgeons (in particular Harken and Bailey) initiated the successful surgical amelioration of the effects of mitral stenosis.

Medical advances too have been of great significance. A number of congenital cardiovascular defects, not even recognized clinically a generation ago, such as coarctation of the aorta, are now easily diagnosed. The importance of correct diagnoses in congenital defects is clearly borne out by the possibility of surgical cure or improvement. In the diagnosis of these defects and also in the case of rheumatic valvular disease (in particular mitral stenosis) and for chronic constrictive pericarditis, cardiac catheterization has been of the greatest value. This was first done by Forssmann (who received a Nobel Prize in 1956) on himself in 1929 and was developed as a practical routine measure by Courmand and Richards in the years that followed (they also received Nobel Prizes in 1956). Advances in the field of electrocardiography have also been outstanding due, particularly, to the introduction of chest leads in practice by Wood and Wolferth in 1932. Now vectorcardiography is beginning to be introduced in a useful way, although there is much still to be done in its appraisal and final establishment. Similarly, ballistocardiography is going through the pains of childbirth.

Medical treatment of heart disease has developed since 1900 so rapidly that those of us who were taught in medical school in the first two decades of the century had very little idea of what to do for cardiac patients. The proper use of digitalis, the use of quinidine sulfate for the control of arrhythmias, the introduction of mercurial diuretics in a practical way (Saxl, 1920), the introduction of the low sodium diet for congestive heart failure (Widal and Lemierre, 1903, Schroeder, 1941), and the use of the antibiotics in the control of infectious causes of heart disease have all made the difference between our hopeless therapy of years ago and the optimism that is rightfully ours today.

Our knowledge of the prognosis of heart disease has also made great strides in the past generation because some of the conditions, such as myocardial infarction, were just beginning to be recognized 30 years ago and a long follow-up has been needed to determine more adequately the prospects of those who are affected by myocardial infarction due to coronary thrombosis. A much neglected area in prognosis is that of the recognition of the importance of heredity and the taking of an adequate family history.

May I add that one of our defects today, both of commission and omission, is to attempt to provide an answer concerning all the aspects of the medical problems that beset us in diagnosis, prognosis, treatment, and prevention, by setting up programs across the board, that is, one standard for all. We know from our clinical experience in the practice of medicine that in diagnosis, prognosis, and treatment, the individual and his background of heredity are just as important, if not more so, as the disease itself. Far too little attention has been paid to research on the host, i.e., on human genetics, while much study has been done and is projected for the future on the agent, that is, on the effect of the various ways of life. It is timely that we should begin concentrated efforts to determine the candidates for whose sake we should apply in particular the preventive measures that we may discover in the future.

Two of the greatest problems remaining for us to take up with vigor are rehabilitation of cardiovascular patients and epidemiologic cardiovascular research, that is, the relationship of the various ways of life to disease of the heart and blood vessels. This last is the basis for our ultimate aim in preventive medicine. Until we learn all the answers, however, may I suggest that more attention be paid to the simple rules of health such as were advanced and often applied by our medical ancestors of centuries ago. These, if adequately carried out, especially by candidates for certain diseases such as hypertension and coronary atherosclerosis, might, for all we know, prevent or delay the onset of these diseases. At least we must try to find out if our diet is too rich and if our life is too soft. There may be more truth than poetry in such a statement, howbeit an
exaggerated one, as that made by John Dryden in 1680 in a letter to a kinsman:

"By chase our long-liv'd fathers earn'd their food;
Toil strung the nerves and purified the blood;
But we, their sons, a pamper'd race of men,
Are dwindled down to three score years and ten.
Better to hunt in fields for health un-bought
Than fee the doctor for a nauseous draught.
The wise for cure on exercise depend;
God never made his work for man to mend."

But lest we become overconfident in our accomplishments let us remember the advice of the old man in Adelphi, the comedy of Terence, quoted by William Harvey:

For never yet hath anyone attained
To such perfection, but that time and place,
And use, have brought addition to his knowledge;
Or made correction, or admonished him,
That he was ignorant of much which he
Had thought he knew; or led him to reject
What he had once esteemed of highest price.

Most learned Riolan, by the help of the Presse, many years ago, I published a part of my labour:

But since the birth-day of the Circulation of the Blood, almost no day has past, nor the least space of time, in which I have not heard both good and evil of the Circulation of the Blood which I found out: Others rail at it, as a tender babie unworthy to come to light; Others say, that it's worthy to be foster'd, and favour my writings, and defend them; Some with great disdain oppose them; Some with mighty applause protect them; Others say, that I have abundantly by many experiments, observations, and ocular testimony, confirm'd the Circulation of the blood against all strength and force of arguments; Others think it not yet sufficiently illustrated, and vindicated from objections; Others think it a thing unworthy of a Philosopher and a searcher of the truth, to return bad words for bad words; and I think I shall doe better and more advised, if with the light of true and evident observations, I shall wipe away those symptoms of incivility.

It cannot be eschewed but doggs will bark and belch up their surfeits; nor can it be help'd but that the Cynicks will be amongst the number of the Philosophers; but we must take a speciall care that they do not bite, nor infect us with their cruel madnesse, or lest they should with their doggs teeth gnaw the very bones of principles of truth.—WILLIAM HARVEY, De Circulazione Sanguinis, 1649.
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Circulation. 1957;15:915-923
doi: 10.1161/01.CIR.15.6.915

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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