INTRODUCTION

Historians using the word cardiology, usually do so in an intellectual sense, tracing theories of the heart's action and disorders back to Harvey and beyond. Thus, the standard collection of readings, Willius and Keys's *Classics of cardiology*, begins with *De motu cordis*, and, in the recent third volume, concludes with a 1954 paper by S.J. Sarnoff and E. Berglund, on 'Starling's law of the heart studied by means of simultaneous right and left ventricular function curves in the dog'.[1] Cardiology, however, means more than ideas about cardiac physiology or pathology; the word also describes an institutionalized medical speciality. The essays in this volume explore various cognitive, technological, and social aspects of this discipline. Some of them examine its emergence in late nineteenth- and early twentieth-century Europe and America. Others survey features of current cardiological practice and research. It will be seen that in order to describe the historical growth of modern cardiology, the authors have had to take into account not only intellectual upheaval, but also changes in clinical practice, the growth of the basic sciences, epidemiological data, technological innovation, as well as professional and institutional developments.

At the end of the nineteenth century, the heart was taken as a specific object of study by a large variety of workers in a number of areas, particularly by those practising within the new discipline of experimental physiology. Much of the work which is fundamental to modern conceptions of the heart's action and heart disease was produced within a few crucial years at the turn of the century. A great deal of this research centred on the nature of the heart's rhythmical activity. One of the most famous episodes in this story occurred in 1883, when W.H. Gaskell, working in Michael Foster's laboratory at Cambridge, published what became the definitive paper on the myogenic origin and transmission of the heartbeat.[2] This physiological work on rhythmicity was later extensively drawn on by clinicians to explain the nature of cardiac disorders, notably the heart's irregularities. The physiological research of this period had an anatomical counterpart. The decades spanning the turn of the century witnessed the careful exploration of the histology of the heart's conducting system. In 1893, Wilhelm His described what is now known as the atrioventricular bundle.[3] In 1907, Arthur Keith and Martin Flack published a work on the sinoauricular node.[4] It was not only the heart itself, however, which became an object of intensive study at this time. During these years, other, more general, aspects of cardiovascular physiology were conceptualized. Much of this work took

[1]Frederick A. Willius and Thomas E. Keys (editors), *Classics of cardiology*, 2 vols. New York, Dover Publications, 1961. Vol. 3, edited by J. A. Callahan, Thomas E. Keys, and Jack D. Key, was published by the Robert E. Krieger Publishing Co. in 1983.

[2]W. H. Gaskell, 'On the innervation of the heart, with special reference to the heart of the tortoise', *J. Physiol*, 1883, **4**: 42-127.

[3]Wilhelm His, 'Die Thätigkeit des embroyonalen Herzens und deren Bedeutung für die Lehre von der Herzbewegung beim Erwachsenen', *Arb. Med. Klin.Leipzig*, 1893, 14-49. The bundle was also described by Albert Frank Stanley Kent in 'Researches on the structure and function of the mammalian heart', *J. Physiol*, 1893, **14**: 233-254.

[4]Arthur Keith and Martin William Flack, 'The form and nature of the muscular connections between the primary divisions of the vertebrate heart', *J. Anat. Physiol.*, 1906-07, **41**: 172-189.

place in continental Europe, notably in the laboratories of Étienne Jules Marey in Paris and Karl Ludwig in Leipzig. In both of these centres influential research on the dynamics of the circulation was conducted. In Paris, for instance, Marey devised many of the fundamental tools used for investigating and measuring dynamic circulatory events, notably the blood pressure.[5] In Germany, in 1870, Ludwig's pupil, Adolf Fick, described a fundamental method, which still bears his name, for estimating the cardiac output.[6]

These basic physiological reconceptualizations of the heart's action were parallelled by transformations in clinical medicine. In the 1880s, a Burnley general practitioner, James Mackenzie, began investigating disorders of the heart's rhythm, such as the extra-systole, first with a sphygmograph and then with the aid of a device he had invented, the polygraph.[7] Mackenzie's work, along with that of continental clinicians, such as K. F. Wenckebach, proved seminal in the reappraisal of the nature of cardiac disorders.[8] Clinicians began to direct their attention to the rhythmical behaviour of the heart as well as investigating the obstructive consequences of valvular disease. In this volume, Christopher Lawrence's essay explores the ways in which the new physiological work was used by clinicians in Britain to reconceptualize heart disease and, in turn, how the new formulations were used as the intellectual basis for creating a speciality. In addition, he traces the intellectual and institutional resistance to these new views.

Around 1900, simultaneously with the mechanical investigations of the heart's rhythm, such as those of Mackenzie, other figures were attempting to record the heart's action through its electrical activity. The most successful of these was the Dutch physician, Willem Einthoven, who in 1902, described a new type of string galvanometer. This became the basis of one of the most widely used diagnostic and research tools of this century, the electrocardiograph.[9] John Burnett's paper investigates the electrocardiograph from a new perspective. He traces the origins of its major components to a variety of fields where diverse changes had made the ECG machine *technologically* possible. It was this new instrument, in the hands of workers such as Thomas Lewis, which was used in physiology and pathology to map the normal and abnormal conduction pathways of the heart.[10] Arthur Hollman's essay is a detailed study of Thomas Lewis's work on a specific conducting defect: bundle branch block. It was during these years that most of the cardiac arrhythmias which are still the cornerstone of current clinical practice were described. Dennis Krikler's paper outlines the description of these disorders. Besides the ECG, other technological innovations appearing at the turn of the century, such as the X-ray

[5]Étienne Jules Marey, *La circulation du sang à l'état physiologique et dans les maladies*. Paris, G. Masson, 1881.

[6]Adolph Fick, 'Ueber die Messung des Blutquantums in den Herzventrikeln', *S.B. phys.-med. Ges. Würzburg*, 1870, 16.

[7]James Mackenzie, 'The extra-systole. A contribution to the functional pathology of the primitive cardiac tissue', *Quart. J. Med.*, 1907-08, **1**: 131-149, 481-490.

[8]Karel Frederik Wenckebach, 'Zur Analyse des unregelmässigen Pulses', *Zt. Klin. Med.*, 1899, **36**: 188-199.

[9]Willem Einthoven, 'Un nouveau galvanomètre', *Arch Néerl. Sci. exactes nat.*, 1901, 2 sér., **6**: 625-633.

[10]Thomas Lewis, *The mechanism and graphic registration of the heart beat*, London, Shaw, 1920.

apparatus, were also incorporated into these new studies of the heart. Later, other, very specific technologies, such as the vectorcardiograph, were devised, and George Burch's paper charts the use of this instrument in modern practice.

Cardiology, however, was not simply the child of late nineteenth-century experimental physiology and technological ingenuity, it was the product of many far-flung changes in medical science and practice occurring at the time. Bacteriology, for instance, was utilized by physicians with a special interest in the heart to elucidate the nature of acute and chronic rheumatic valvular disease.[11] Experimental pharmacology, too, was important. As far back as the 1860s, Thomas Lauder Brunton had demonstrated experimentally the value and action of amyl nitrite in angina.[12] Later tangential work, such as that of Henry Dale on histamine, also proved to be important in the conceptualization of the reactions of the vascular system to injury.[13] In the early years of this century, the action of digitalis was investigated and explained in the light of the new theories of the heart's action. This work is outlined and placed in a broader context in the paper by Susan Wray, D.A. Eisner, and D.G. Allen, a timely reminder that 1985 is the bicentenary of William Withering's classic publication on the purple foxglove.

Such changes, of which the above are simply some of the best known, did not occur during a period of professional and institutional stagnancy. Quite the reverse. During these years, a few men, and latterly a handful of women, began to divide the unity of clinical medicine and practice as specialists. Eventually, a few set themselves up in practice as full-time cardiologists. By the second decade of this century, many hospitals in Britain and America had established special departments for the study of heart cases. By the 1920s, it was possible to speak of the speciality, even if it was a minor one compared to others, such as psychiatry or obstetrics.

As the speciality has grown so has its field. From being of relatively modest significance, heart disease has become one of the leading causes of morbidity and mortality in the western world. Using current categories, Rodney Finlayson's paper studies the historical incidence of heart disease in London by examining post-mortem and coroners' reports. The relationship between the epidemiological change and the growth of cardiology seems to have a persuasively obvious explanation. The speciality has expanded because there are more people suffering from heart disease. Such an explanation, however, may be an illusory perspective arising from the overlap of two separate disciplines: epidemiology and intellectual history. Contemporary historians of medicine are becoming increasingly uncomfortable with the view that it is their task to relate how modern medicine came to describe the diseases that exist in nature. Instead, they are beginning to ask, what are the social and intellectual forces that constrain us to conceptualize diseases in particular ways? Why, for example, at a particular historical moment, does an object of study, such as the heart and its diseases, appear in a certain intellectual form? Such

[11]For example, William Osler's description of sub-acute bacterial endocarditis in 'The Gulstonian lectures on malignant endocarditis', *Br. med. J.*, 1885, **i**: 467-470, 522-526, 577-579.

[12]Thomas Lauder Brunton, 'On the use of nitrite of amyl in angina pectoris', *Lancet*, 1867, **ii**: 97-98.

[13]Henry Hallett Dale and Alfred Newton Richards, 'The vaso-dilator action of histamine and of some other substances', *J. Physiol. (Lond.)*, 1918-19, **52**: 110-165.

questions necessarily point to important problems in the epistemological basis of demographic science. For instance, what is the relation between perceived disease distribution and the cognitive ordering of nature at any time? The heart itself has been the object of such an exercise at least as far as its physiological characteristics are concerned.[14] In this volume, Joel Howell's paper addresses this problem in a particular context, showing how a specific complaint, soldier's heart, was fundamentally reconceptualized during the First World War with the result that its incidence noticeably changed. Such an approach suggests that cardiology, after all, is no more a natural speciality reflecting the ordering of disease in nature than any other speciality, such as cardio-pulmonary medicine or cardio-nephrology, might be. This point is clearly instanced by the so-called "fight for the urogenital tract" between urologists, nephrologists, gynaecologists, and specialists in venereal disease. The social ordering of the body does not mirror any "natural" category.[15] How modern specialities have been created, then, is a fascinating social and intellectual problem. Yet the subject has been relatively neglected by historians, apart from George Rosen's famous monograph and Rosemary Stevens's study of specialization in England.[16] None of the essays in this volume attempts a comprehensive explanation for the origins of modern cardiology. Nor as a whole do they cover every factor that should be taken into consideration. As a collection, they are intended to indicate the breadth of view which is necessary if the histories of modern specialities are to be written.

[14]Gerald L. Geison, *Michael Foster and the Cambridge School of Physiology*. Princeton University Press, 1978.

[15]See, for example, David Armstrong, *Political anatomy of the body*, Cambridge University Press, 1983.

[16]George Rosen, *The specialization of medicine*, New York, Froben Press, 1944; Rosemary Stevens, *Medical practice in modern England*, New Haven, Conn., Yale University Press, 1966.